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CHAMBERS'S ENCYCLOPÆDIA

A DICTIONARY OF UNIVERSAL KNOWLEDGE

NEW EDITION

Edited by

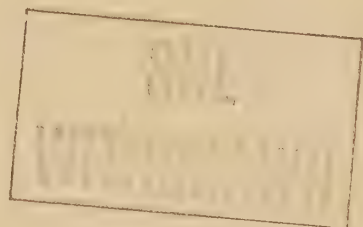
DAVID PATRICK, M.A., LL.D.

AND

WILLIAM GEDDIE, M.A., B.Sc.

VOLUME VII

MANCHESTER TO PENNYWORT



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A great many of the articles named above are new; others written for earlier issues of this Encyclopædia have been so thoroughly revised by their authors as to be virtually new. In addition to these many other revisers have taken part, including Professor J. A. S. WATSON (Agriculture), Professor DAVID HEPBURN (Anatomy), Dr DRINKWATER (Chemistry), Dr R. CAMPBELL (Geology), Mr G. E. SHEPHERD (India), Mr W. A. FLEMING, Advocate, and Mr NORMAN MACDONALD, Advocate (Law), Dr J. D. COMRIE (Medicine), Admiral Sir REGINALD TUPPER (Navy), Dr ALFRED DANIELL (Physics), Professor A. BERRIEDALE KEITH (Sanskrit), Dr S. A. COOK and Mr HERBERT LOEWE (Semitic Subjects), Dr F. E. BEDDARD and Professor J. ARTHUR THOMSON (Zoology). Thanks are due to many town-clerks and others for information and corrections.



CHAMBERS'S ENCYCLOPÆDIA

A DICTIONARY OF UNIVERSAL KNOWLEDGE



Manchester lies on the east bank of the Irwell, which divides it from Salford. The two places may be regarded to-day as making a single town, though they are governed by independent corporations. The origin of Manchester can be traced back to Roman times, but there is still doubt as to the name with which it began. *Mancunium* is the usually accepted Latin name, but throughout the Middle Ages the place was invariably known as *Mamecestre*, which cannot be derived from *Mancunium*. It is not unlikely that the Latin was really *Manucium*, which occurs in the Itinerary of Antonine; and it has been suggested that the earliest form was *Mammium*, which could have been altered into either disputed form.

Despite its early beginnings, it was not until modern times that Manchester achieved distinction, but it is now one of the cities of the world, both because of the part played by it in the initiation of the present economic epoch, and because it presents unique features. It was in and around Manchester that the industrial revolution made its first noticeable marks and proceeded with greatest rapidity. Consequently problems connected with the industrial revolution were peculiarly associated with this great Lancashire town. The attitude to these of the new men naturally came to be designated as that of the Manchester School, in view of the fact that Manchester dominated the area of greatest disturbance, and that many of the new men who voiced the new ideas were connected with Manchester. The prominence in and about the town of the Radical movement of the first quarter of the 19th century is signified historically by the 'Peterloo Massacre,' which took place where a building now stands to commemorate the part played by Manchester men in another social movement, also connected with the industrial revolution, which followed some years later. The building is

the Free Trade Hall, and the movement was that initiated and engineered by the Anti-Corn Law League (led by Richard Cobden), the seat of which, naturally enough, was Manchester. From the point of view of social history, therefore, Manchester is of peculiar interest; and, as will be explained later, to the historic interest there has been added another, connected with the present relation of the town to the business activities of Lancashire.

It must not be supposed, however, that Manchester first came into business notice when the industrial face of the country was being transformed a hundred years ago. Mention of it as a town of economic importance will constantly be met with in works of standing in the 16th and particularly in the 17th century. Some connection with textiles no doubt dates back to the 13th century, but it was not until later that Manchester began to assume an outstanding position. Camden, who visited it in the reign of Elizabeth, describes it as 'surpassing neighbouring towns in elegance.' 'Here,' he says, 'is a woollen manufacture, church, market, and college. In the last age it was more famous for the manufacture of stuffs called Manchester cottons and the privilege of sanctuary, which the parliament under Henry VIII. removed to Chester.' In 1641 Lewes Roberts, in his *Treasure of Traffic*, writes, with reference to the cotton and linen manufactures, that the people of Manchester should be 'remembered, and worthily, and for their industry commended.' Again, in 1724, Stukeley describes it as 'the largest, most rich, populous, and busy village in England. Here,' he adds, 'are about 2400 families, and their trade, which is incredibly large, consists of fustians, tickings, girthwebbs, and tapes, which are dispensed all over the kingdom and to foreign parts. . . . On the same river for the space of three miles are sixty water-mills.' It was the coming of the cotton industry which gave Manchester rank among the chief towns of England. As Daniel Defoe observed in the course of his tour in 1727, 'the grand manu-

facture which has so much raised this town is that of cotton in all its varieties.' By 'cotton' he meant cotton proper, and not the coarse woollens which under the name of cottons had won for themselves a reputation generations before. For some years in and about Manchester the cotton and woollen industries flourished side by side; but the former, introduced probably in the second half of the 16th century, eventually pushed the latter over the Pennine Range, and in the period 1770-88, according to Radcliffe, the author of *The Origin of the New System of Manufacturing*, 'cotton was become the almost universal material for employment.' At the end of the 18th century Manchester was a pre-eminent manufacturing town, but its form then was very different from what it is to-day. In those times, where there are now streets of vast warehouses and offices, buildings stood, part residences and part business premises, in which Manchester merchants lived and stored their goods, and from which they put out their work to the numerous hand-loom weavers and small manufacturers in the vicinity. A faithful and picturesque account of Manchester life in these pre-factory days, and of the general features of the town, will be found in Mrs Linnaeus Banks's *The Manchester Man*. Around these merchants' premises factories soon sprang up, and Manchester became a mixed textile manufacturing (including spinning) and commercial centre, with numerous subsidiary industries such as machine-making.

The next epoch in the history of Manchester is signalled by its development as a marketing-centre. It is this characteristic, namely, that of serving as the trading nucleus of an extensive industrial district, which in the main renders Manchester a striking type of town organisation at the present day. Spinning and manufacturing, and even machine-making, were continuously pushed in bulk south and north and west, but they were not completely dissevered from Manchester. The necessary trading functions connected with the cotton industry were conducted on the Manchester Exchange, which has more than once been housed in a larger building. A large extension of the present building has been made. The Exchange, it may be incidentally remarked, is maintained out of the subscriptions of members, and is managed by a board of directors. When spinning separated to a large extent from weaving, the exercise of the marketing functions uniting them became of paramount importance, for the spinner and weaver had to keep in constant touch with one another for the purposes of sale and purchase of the material for cotton cloth; and a marketing-centre was also needed for the disposal of the cotton cloth. With regard to the cotton-wool, however, for the feeding of spindles, the market for this concentrated at Liverpool, its natural home, after the opening of railway communication between the two towns. Previously spinners bought, as a rule, from Manchester cotton-dealers, and up to 1789 the leading cotton mart had not been Liverpool but London. It is to be noted that a portion of the raw cotton market, but only a fraction, has been recovered for Manchester since its transformation into a port by the opening of the Manchester Ship-canal. It is the proximity of the manufacturing places in Lancashire to a marketing-centre with which they are united by a dense network of railways, offering frequent services, which accounts for the highly differentiated form of the Lancashire cotton industry when compared with the same industry on the Continent and in America, where the same crowding of the industrial centres around commercial centres is not to be found.

Manchester serves as a market not only for the home trade, but also for the foreign trade; and it

is from the foreign trade, which has assumed prodigious dimensions, that Manchester has received its cosmopolitan character. At first the foreign trade was carried on by travellers abroad representing Manchester firms, just as the home trade between merchants and retailers used to be conducted through the medium of 'riders out' with samples. But the method of using the English traveller to get in touch with foreign demand was soon found to be unsatisfactory. The travellers knew little of foreign conditions, and, however long their acquaintance with another country, they seldom learned to read its needs as a business man of the country could. Consequently the tendency soon appeared for the foreign houses to send their representatives to Manchester and establish offices there instead of awaiting the travellers from Manchester firms. In a sense the foreign business of every important country has permanently affixed one of its tentacles to Manchester, with the result that the latest demands of other countries can now be learned from visits to offices in Manchester streets instead of being gleaned piecemeal, imperfectly and slowly, from the correspondence of travelling representatives. The extent to which this transference of commercial points from abroad to the metropolis of the cotton industry has proceeded may be gathered from a walk through Manchester streets when attention is given to the names on the doorplates of the various offices. At first the invasion of the foreign business man excited not a little distrust, but to-day it is realised that through this invasion foreign trade has been assisted in attaining its present dimensions. With this remodelling of Manchester into an outstanding commercial centre there has been associated the development of credit facilities, since finance plays so large a part in modern commerce, and, indeed, in modern industry also. The leading banks of the country have important branches in the metropolis of the cotton industry, which do duty as centres for smaller branches in various cotton-towns; and there have appeared in addition (as should perhaps have been mentioned first) powerful local banks with their head-offices in Manchester, just as there has arisen for the same reason a local railway system, namely, the Lancashire and Yorkshire, which is managed from Manchester. Thus Manchester is to-day a metropolis somewhat in the same sense that London is a metropolis. London is the financial and business centre of the whole country. Similarly Manchester is the financial and business centre of the cotton industry and trade and all that is subsidiary to it. But the Lancashire district is not, therefore, self-contained and unlinked from the national metropolis, for the credit system of the country is substantially one, and it must be largely through the national metropolis that Lancashire business interests are brought into relation with those of other parts of the country. The development of the twin city of Manchester and Salford is to be read to some extent from the population figures below:

	Manchester.	Salford.	Total.
1801.....	75,300	14,500	89,800
1851.....	303,400	102,450	405,850
1871.....	351,200	124,800	476,000
1881.....	462,300	176,250	638,550
1901.....	544,000	220,950	764,950
1911.....	714,350	231,350	945,700
1921.....	730,307	234,045	964,352

This growth is partly to be explained by incorporation of new areas from time to time. An area of about 4300 acres was extended to 6000 acres in 1885, 13,000 in 1890, 20,000 in 1904, and 21,650 in 1909. Apart from London and Glasgow, Manchester and Salford together make up the largest town in Great Britain, in respect of population,

according to the census of 1921. Next to it stood Birmingham with 919,444, Liverpool with 802,940, and Sheffield with 490,639.

Facilities for transportation more than anything else govern the economic development of districts. Manchester has been fortunate in its proximity to a port, and it has been peculiarly fortunate also in having taken early steps to meet the needs of its trade by improving means of communication. In 1720 an act was obtained to make the Irwell navigable. In 1759-61 the Bridgewater Canal was constructed (by Brindley on the undertaking of the Duke of Bridgewater), which put Manchester in touch with the coalfields of Lancashire and, later, with the salt-mines of Cheshire, and made an outlet to the sea. Other canals which followed were the Ashton and Oldham, the Manchester, Bolton, and Bury, and the Rochdale. In 1830 Manchester had the first perfect railway in full operation between it and Liverpool, and at the present time no town in England is better served with railways. Moreover, in order to avoid transhipment of goods and to render Manchester an inland port, the gigantic work of making a ship-canal was carried out in 1887-94 at a cost of about £14,000,000, including the purchase of land and the Bridgewater Canal. The total amount charged to capital now stands at nearly £18,000,000. Through this canal Manchester has been made a port of no mean size in respect of tonnage cleared.

Though the name of Manchester calls up first in the mind the conception of a vast business system, it is not for its business alone that Manchester is of interest. It is of interest also on its administrative side, again on account of its past and of its present activities. Manchester received a charter from the last of the Grelleys in 1301, seventy years after the chartering of Salford by Randle de Blundeville. Prior to 1301, however, Manchester (or Mamecestre, to give it the name by which it was then known) had certain borough characteristics. Burgage tenements, a borough court, a weekly market, and a three days' fair (granted by Henry III. in 1227) were all in existence. The last was held until early in the 19th century on the spot now known as St Ann's Square. It was then twice removed, and finally abolished in 1876. Despite the charter of 1301, it was formally decided in 1359 that Manchester was no borough, but a market town, the reason being, no doubt, that a distinction was drawn between royal charters and those received from lords of the manor. Why Manchester was omitted, therefore, from the list of 246 corporations 'possessing and exercising municipal functions,' drawn up in 1833 by the Municipal Corporation Commissioners, is comprehensible. In 1791, however, some of the benefits of incorporation had been anticipated by the transference of the government of the town to police commissioners. Incorporation came in 1838. In connection with the agitation for it, Richard Cobden's pamphlet, *Incorporate Your Borough*, is worthy of note. In 1839 the first commission of the peace was created; in 1847 a bishopric followed; in 1853 the title of City was conferred, and in 1893 its chief officer received the title of Lord Mayor. In 1888 it became a county borough under the Act of that year. The Reform Bill of 1832 gave Manchester two members of parliament and Salford one. The Act of 1867 gave them three and two members respectively; and from 1885 Manchester had six, until they were increased to ten (1918), and Salford three members.

Of late years the corporation of Manchester has gone a long way in assuming control of its public services. Gas, water, electricity, and the tramway system have all been municipalised. To improve the water-supply, obtained in the main from Longdendale valley, reservoirs having been constructed

in 1848 and extended in 1884, connection was established with Thirlmere in 1894, the year in which the Manchester Ship-canal was completed after the final stages had been rendered possible by a loan to the directors from the corporation. On the educational side also a progressive policy has been pursued. The schools of the city under public control are numerous and attain a high standard of efficiency, and in addition a municipal college of technology has been established on a palatial scale. Such of the work in this college as is of university character is now organised as the Faculty of Technology of the University of Manchester.

Among the features of Manchester, apart from business, the university is one of the chief. It began as the Owens College on the basis of an endowment left by John Owens in 1851. In 1870 it acquired new buildings, and ten years later it received a royal charter as the Victoria University, with which the college of Liverpool and eventually that of Leeds were associated. In 1904, in consequence of the development of university teaching in the north, the federal university split into three, and the Victoria University became the independent Victoria University of Manchester. At this time among the changes made was the institution of a Faculty of Commerce. Shortly after its foundation the Owens College took a high rank, notably in science, and particularly, perhaps, in chemistry, and for many years now it has been admirably equipped all round, in the arts and other faculties as well as in science. In addition to the university there are also in Manchester a famous Grammar School and a well-known High School for Girls. The Grammar School dates back to 1515, in which year it was founded by Hugh Oldham, Bishop of Exeter. It has produced many eminent men, and at the present time is one of the largest public day-schools in the country. Almost as old as the Grammar School is the Blue Coat School, founded, together with a library, by Humphrey Chetham in 1653. In addition to the Chetham Library, containing some rare books and manuscripts, and the Free Reference Library, maintained by the corporation together with numerous branch libraries, there are two other libraries of note in Manchester, namely, the Christie Library and the John Rylands Library, which, in respect of the value of its possessions, is of world-wide repute. The John Rylands Library possesses the famous Althorp collection of books, and was presented to the town in 1892 in commemoration of John Rylands, a Manchester warehouseman and manufacturer, by his widow. On the cultural side Manchester has for long been to the fore among English cities, in this respect almost rivalling Edinburgh. Of the existing daily papers, the *Manchester Guardian*, founded early in the century, ranks with the best in the country. The Literary and Philosophical Society, which contains on its roll of members the distinguished names of Benjamin Franklin, Thomas de Quincey, John Dalton, Sir William Fairbairn, James Nasmyth, and Dr Joule, dates back to 1789. The Statistical Society was instituted in 1833, a year before the London one.

Manchester has in addition several first-class theatres, and maintains among its concerts the famous Halle Concerts. There are also several museums and art galleries. The chief museum is maintained by the university, but it receives a grant from the corporation, which also shares in its management. The chief art gallery is located at present in somewhat cramped premises in Mosley Street. The parks are also worthy of mention. Of public buildings the most striking are the Town Hall, which contains some remarkable paintings

on its walls by Ford Madox Brown, the Law-courts, and the University (all designed by Waterhouse), and the Cathedral. The Cathedral, formerly known as the College Church, was built in 1422, but between 1845 and 1868 it underwent complete restoration.

See Whittaker's *History of Manchester* (1771); Reilly's *History of Manchester* (1861); Baine's *History of Lancashire* (1870); Proctor's *Memorials of Manchester* (1880); Axon's *Annals of Manchester* (1886); Saintsbury's *Manchester* (1887); Tait's *Medieval Manchester and Beginning of Lancashire* (1904); Chapman's *Lancashire Cotton Industry* (1904); Bamford's *Early Days* (1848) and *Passages in the Life of a Radical* (somewhat earlier), both republished in 1893; Victoria County History (volumes on Lancashire); and Prentice's *Historical Sketches and Personal Recollections of Manchester* (1850).

Manchester, the largest city of New Hampshire, stands mostly on the east bank of the Merrimac River, 16 miles S. of Concord, 59 miles NNW. of Boston by rail. Its principal streets are wide and shaded with elms, and it has several public parks. The river here falls 54 feet, and affords water-power to numerous factories. The great industry of the place is its manufacture of cottons and woollens; but locomotives, fire-engines, sewing-machines, wagons, edged tools, boots and shoes, paper, &c. are also manufactured. Manchester is the seat of a Roman Catholic bishop, and has a Catholic orphanage and a convent, besides a state reform-school. Pop. (1870) 23,536; (1920) 78,384.

Manchester, EDWARD MONTAGU, second EARL OF, English general and statesman, was the son of the first earl, and was born in 1602. After leaving Cambridge—his college was Sidney Sussex—he accompanied Prince Charles to Spain, and afterwards was created Baron Montagu of Kimbolton. But siding with the popular party, and being an acknowledged leader of the Puritans in the Upper House, he was charged by the king (3d January 1642) with entertaining traitorous designs, along with the five independent members of the House of Commons. He succeeded his father as earl in the same year. On the outbreak of hostilities he of course fought for the parliament. He served under Essex at Edgehill, then held the associated (eastern) counties against Newcastle, took Lincoln (1644), and routed Prince Rupert at Marston Moor—that is to say, he nominally commanded; the real fighting was done by Cromwell and his Ironsides. He then marched to oppose the royalists in the south-west, and defeated them at Newbury (the second battle). But after this battle he again showed slackness in following up the victory, the same fault that had been noticed after Marston Moor. In consequence Cromwell accused him of military incompetency in the House of Commons, and the two had a downright quarrel. The Self-denying Ordinance deprived Manchester of his command, and this did not allay his bitterness against Cromwell. He opposed the trial of the king, and protested against the Commonwealth. Afterwards, having been active in promoting the Restoration, he was made Lord Chamberlain, a step designed to conciliate the Presbyterians. He died 5th May 1671.

His grandson, CHARLES MONTAGU, fourth EARL, supported William of Orange in Ireland, was sent as ambassador extraordinary to Venice (1696), Paris (1699), and Vienna (1707), and was made Duke of Manchester in 1719 for having favoured the Hanoverian succession. He died 20th January 1722.

Manchineel (*Hippomane Mancinella*), a tropical American tree of the natural order Euphorbiaceae, celebrated for the poisonous properties of its acrid milky juice. A drop of this burns like fire if it falls upon the skin, and the sore which it produces is very difficult to heal. The Indians use it for poisoning their arrows. The fruit is

not unlike a small apple; dried and pulverised it is diuretic; and still more so its seeds. The wood is well suited for cabinet-making.

Manchuria, the north-easternmost portion of the Chinese dominions, lies between the Yellow Sea and the Amur, and borders on Korea and Siberia. The area of Manchuria is said to be 360,000 sq. m.; total pop. 21,000,000. There are three provinces—Kirin in the centre, Feng-tien or Liao-tung in the south, and Hei-lung-chiang in the north. The eastern and most of the central parts are covered with the irregularly grouped ranges of the Long White Mountains, which in the White Mountain itself reach 8000 feet, whilst the northern province is crossed by the Chingan Mountains. The central parts of the country are watered by the Sungari, which rises in the crater-lake of the Long White Mountains, and after a course of 850 miles joins the Amur on the north border. The hills are rich in timber, pines predominating; in minerals, chiefly gold, silver, coal, and iron, little worked till lately; and in fur-bearing and other animals, as the sable, foxes, lynx, squirrel, tiger, bear, wolf, deer, &c. The Manchurian lark, a clever mimic, is exported in great numbers to China. The rivers swarm with salmon, and trout are plentiful. The climate is temperate in summer, especially whilst the rains last (May to September), but very severe in winter, the season of traffic, when the streams and extensive marshy tracts are frost-bound; the thermometer frequently falls as low as -25° F. in the northern province in the depth of winter. The soil is extremely fertile, and produces in abundance millet (with vegetables the chief food of the people), beans, wheat, rice, maize, hemp, vegetables, and ginseng. Cultivation of the soy (or soya) bean has developed prodigiously. Wild silk is produced. Manufactures for the most part are primitive, but there has been a very vigorous growth of factory enterprise under Russian, Japanese, and Chinese management. A large amount of trade is carried on at the towns in the interior, and especially at the treaty-port of New-chwang (q.v.). Beans, bean cakes and oil, silk, ginseng, skins and furs, &c., are exported, and cottons, woollens, metals, sugar, silk, paper, medicines, &c., imported. There is a railway, connecting with those of Chih-li, Dairen, and Korea, through southern Manchuria to Mukden and Kharbin, where it joins the Russian direct line ('Chinese Eastern') to Vladivostok, which crosses Manchuria from north-west to south-east. Floods have often caused severe famines. The population includes but few Manchus, and most of these dress and speak like Chinese. Yet they are the aristocracy of the country, furnishing its magistrates and soldiers, its police, and its hunters, though many cultivate their own land. From the time when the Manchus conquered China (1644) and founded the late imperial dynasty Manchuria was the favourite recruiting-ground for the Chinese army. The rest of the population consists almost entirely of Chinese immigrants, enterprising, industrious, and prosperous, and still pouring in. The principal towns are Mukden (q.v.), the capital; Kharbin (q.v.); Kirin (q.v.); Kwangcheng-tzu; Liao-yang; Tsitsihar; Ying-tzu, commonly called New-chwang, the chief port; Antung, also a great port. All Manchurian towns are indescribably filthy, worse than English towns in the 15th century, and most of them are walled. The religions current are those found in China (q.v.), though the original creed of the Manchus was Shamanism. Early in the 11th century B.C. there existed a native kingdom in the southern of the three provinces, and this was succeeded by other states, until in the beginning of the 17th century Nurhachu, a Manchu chief, founded a powerful

sovereignty; in 1644 his grandson ascended the throne of China, and thus founded the dynasty that reigned till 1911. The conquerors imposed upon the conquered the custom of wearing the pigtail. The first step in the Russian occupation was the concession by China allowing the deviation of the Siberian railway through Manchuria; then the events connected with the russification of Port Arthur (q.v.) and Ta-lien-wan. Finally it was arranged that the Siberian railway should be connected with Kirin and Mukden, with Peking on the one hand and Port Arthur on the other. Since the Russo-Japanese war of 1904-5 (see JAPAN) Japan holds a lease of the Liao-tung peninsula, and has railway and other trade privileges in southern Manchuria (the principal theatre of war). The Russians and the Japanese control the railways. In the Chinese civil wars General Chang-tso-lin, governor of Manchuria, played a leading part as the rival of General Wu-pei-fu. The Manchu language is of the Ural-Altaic family. The Manchu alphabet is of Syriac descent. See ALPHABET. French Catholics (since 1838) and Presbyterians (since 1861) have missions. See books by Hosie (1901), Whigham (1904), Weale (1904), Kemp (1912), Christie (1914), Sowerby (1923).

Mancini. See MAZARIN.

Manco Capac, mythical ancestor of the Incas.

Mancumium. See MANCHESTER.

Mandæans, a small sect found in South Babylonia and Khuzistân. The members are a fine race, chiefly gold and silver smiths and boat-builders; and their sacred books are written in a very archaic Aramaic dialect and script which date back before the 7th-8th centuries A.D. The religious beliefs, which are of remarkably diverse origin, are opposed to Judaism, Christianity, and the dualism of Manichæism (see MANICHÆUS), and have much in common with Gnosticism (q.v.). From ancient Babylonia are derived the names of certain deities, astral elements, the fight with darkness, Hibil's descent into the underworld, the sanctity of water, and the elaborate water-ritual. The Great Fruit (*Pira*) and the Great Vessel (*Mânâ Rabba*) stand at the head of the religious system. Then comes the First or Great Life, the King of Life, the source of all development and of the Great Jordan which encircles the celestial realm. Next follow the Second Life and the *Mandâ d Hayyâ* (Knowledge of Life, i.e. salvation), from whom the sect derives its name. He is source of life, mediator, and saviour. His three sons, messengers of the true religion, are Hibil (Abel), Sithil (Seth), and Enoch (Gen. iv. 26, fused with the Son of Man in Dan. vii. 13, and, like the latter, dwelling in a cloud). The Third Life is father of the '*Uthrê*' ('riches,' Mammons?), and his son Ptahil created the bodies of men, although the spirit comes from *Mânâ Rabba*. In another version this demiurge is Gabriel. The *Ruha* ('spirit') with her son '*Ur*' ('light')—both derived from Gen. i. 2 seq.—produced the planets, signs of the zodiac, &c., including Ishtar (Venus, or the Holy Spirit), Bel (Jupiter), Nebo (Mercury), Adonay (the founder of Judaism), and other sources of false religion and evil. The false prophets extend from Abraham to Mohammed. The true prophet was John the Baptist, Jesus being a false prophet (also identified with Mercury) whom Enosh exposed. The Mandæan reverence for John and the prominence of rites of baptism (*maṣbutḥa*)—Christian baptism being condemned—account for the misleading name of St John's Christians given to the sect (17th century onwards), and for the older title of Sabians (in the Koran), whence the modern name of Subbis. The native title, Naṣoræans, suggests the old Jewish-Christian Nazoræans; but

although there are resemblances to Ophites and other old sects, the name probably means 'observers,' i.e. men distinguished for their knowledge. Prayers are recited thrice during the day and twice at night. Emphasis is laid upon ritual rectitude and truth, and ritual purity; and there are some special food-laws. In course of time Christian, Jewish, Persian, and other influences continued to modify the religion (e.g. observance of the Sabbath, resurrection), even as they explain the heterogeneous elements already present in the sacred books. The light thrown by the Mandæan writings upon early beliefs in Babylonia prior to the age of Islam is of great value; but the analysis of the different elements, as will be seen from the above, is a very difficult task, upon which the chief work has been done by Brandt (see *Encyclopædia of Religion and Ethics*) and Lidzbarski (edition of texts); on the book of John see Mead, *The Quest*, vol. xv.

Mandalay, the chief town of Upper Burma, stands 2 miles from the left bank of the Irawadi, a little N. of Amarapura (q.v.), the former capital, and 410 miles by rail (1888) N. of Rangoon. Founded in 1860, it was the capital of independent Burma until its capture by the British in the end of 1885, and after the treaty (1886) by which the king lost his throne it became the capital of Upper Burma. The city forms a square, each side a mile long, and is surrounded by a wide moat, a crenelated brick wall 26 feet high, and an inner earthen parapet. In the centre of the city stand the royal palaces, constructed principally of teak-wood, and enclosed by three stone walls and a teak-wood stockade. There is little of real interest or beauty in them beyond some rich wood-carving. The most famous building in Mandalay is, however, the Arakan Pagoda; it contains a brazen image of the Buddha, 12 feet high, an object of veneration to thousands of pilgrims. Outside these enclosures was, until the British conquest, a crowded, dirty native town, now cleared away to make room for a British cantonment. The present native quarters lie outside the fortified city. Beyond them, again, on the slopes of the hills that border the valley of the Irawadi, are numerous fine monasteries. Pop. (1921) 148,917. Silk-weaving is the most important of the industries; the others are gold and silver work, ivory and wood carving, bell and gong casting, and knife and sword making. A disastrous fire in 1892 destroyed most of the town and facilitated the great improvements made since the British occupation. It has now fine well-lighted streets.

Mandamus is a writ, not of right but of prerogative, which issues from the Court of King's Bench, commanding some public body, or inferior court, or justices of the peace, to do something which it is their legal duty to do. In the United States the power to issue writs of mandamus is vested in the Supreme Court, and is also allowed to the circuit courts, subject to considerable restrictions.

Mandarin, a general term applied to Chinese officers of every grade by foreigners, derived from the Portuguese *mandar*, 'to command.' For the Chinese governmental authorities, their rank and distinctive buttons, see CHINA.

Mandeville, BERNARD, an English satirical writer, though born of Dutch parents at Dordrecht in Holland in 1670. He graduated in medicine at Leyden, after six years of study, in 1691, and immediately afterwards settled in London to practise his profession; he died in that city in 1733. He is known as the author of a short work in doggerel verse entitled *The Fable of the Bees*, which, as finally published in 1723, included the fable itself, called *The Grumbling Hive*, first printed in 1705, *Remarks on the Fable*, and *Inquiry into the Origin of Moral Virtue*, both added to the 1714 edition,

and *An Essay on Charity Schools and Search into the Origin of Society*, added in 1723. This book (ed. F. B. Kaye, 1925) was levelled against the ethical theories of Shaftesbury, who set up as the standard of virtue the ultra-refined tastes of an idealistic aesthete. Mandeville, writing in a vein of extremely coarse and brutal paradox, cynical in its frankness, though frequently of striking acuteness, affirms that 'private vices are public benefits,' and that every species of virtue is at bottom some form of gross selfishness, more or less modified. Thus he over-emphasises the baser elements in human nature, as Shaftesbury does the 'dignified.' The book was condemned by the grand jury of Middlesex as being immoral and pernicious in its teaching. Besides that, it was attacked by Law (q.v.) the nonjuror, by Berkeley, by Brown, Warburton, Hutcheson, and others. Mandeville in his defence states that he wrote in irony for the diversion of people of discernment and knowledge, and his words were not to be taken in literal earnest, as if meant for general readers. Nevertheless, his other works, such as *The Virgin Unmasked*, *Free Thoughts on Religion*, &c., detract greatly from the sincerity of this plea. It is worth while observing that his realistic habits of thought bring him in some respects curiously into touch with the exponents of modern scientific methods of inquiry.

See Sir Leslie Stephen, *Essays on Freethinking* (1873), and *English Thought in the 18th Century* (1876); Sakmann's *Bernard Mandeville* (1902).

Mandeville, JEHAN DE, the name assumed by the compiler of a famous book of travels, written in French, and published between 1357 and 1371. Versions in Italian, Spanish, Dutch, Walloon, German, Bohemian, Danish, and Irish are found, and the number of MSS. amounts to at least 300. Many have maintained the priority of the Latin text, which exists in as many as five independent versions, but it seems much more probable that the French was the earlier. The earliest edition of the French text was printed at Lyons in 1480. Indeed, it is most probable that the book was written under a feigned name by the physician Jehan de Bourgoigne, otherwise Jehan à la Barbe, who is stated in an early Latin edition to have met Mandeville first at Cairo, and again at Liège, and to have persuaded and helped him to write his travels. There can be little doubt that this statement of Bourgoigne's was merely an ingenious blind, and that he alone was the author of the book. But a statement has been discovered that Bourgoigne revealed on his death-bed his real name of Mandeville to Jean d'Outremeuse, explaining that he had had to flee from his native England for a homicide. We are told further that this physician, who died in 1372, had practised his profession at Liège since 1343. And it is apparently quite certain that in the 16th and 17th centuries a tomb was shown at Liège, with a Latin inscription stating that Mandeville died there in November 1372. An English version was made from a defective French manuscript at least as early as the beginning of the 15th century, and two extant independent revisions of this followed within a quarter of a century. The original defective form was printed by Pynson and Wynkyn de Worde (1499); the editions of 1725 and the well-known reprints by Halliwell (1839 and 1866) represent one of these later revisions; that first printed for the Roxburghe Club in 1889 is an admirable edition of the other. But the glaring errors of translation render it impossible that either of these forms of the English version can be from the hand which wrote the original work, in spite of the statement in the preface, which has been too easily believed, that it was made by Mandeville himself. None the less it remains an admirable

monument of English, but the name of Sir John Mandeville should now disappear from histories of literature as the 'father of English prose.'

In the preface the French compiler describes himself as a knight born at St Albans, who left his native country in 1322, travelled by way of Turkey, Armenia, Tartary, Persia, Syria, Arabia, Egypt, Libya, Ethiopia, Amazonia, and India, often visited Jerusalem, and who wrote in Romance as better understood than Latin. In the course of the book we are told further that he had served the sultan of Egypt against the Bedouins, and the emperor of China against the king of Manzi; that he had seen the glory of Prester John and drunk of the Fountain of Youth at Palombe (Quilon on the Malabar coast), and returned home unwillingly owing to arthritic gout in 1357.

By far the greater part of the book has now been proved to be borrowed, with interpolations, usually extravagant, from the narrative of Friar Odoric (written about 1330); from Hayton, an Armenian who became a Premonstratensian monk, and dictated at Poitiers in 1307 a book about the East in the French tongue; from the work of the Franciscan Carpini; from the well-known *Epistle of Prester John*, widely known in the 13th century; from Albert of Aix, Brunetto Latini, Peter Comestor, Jacques de Vitry, Vincent de Beauvais (*Speculum Historiale* and *Speculum Naturale*); from the 12th-century Latin itineraries of Palestine, and from the work of the German knight William of Boldensele, written in 1336. A small portion of the book may still represent actual travels and personal knowledge, especially in the part relating to the Holy Land; but this does not re-establish the honesty of the writer, who claims himself to have travelled in the remotest regions described, and to have seen with his own eyes the wonders enumerated, while he never mentions Odoric, from whom he conveyed by far the greater part of his book. Among these wonders we find stories of fabulous monsters, such as anthropophagi, and men whose heads grew beneath their shoulders, the phoenix, the vegetable lamb, the weeping crocodile, the garden of transmigrated souls at Cansay (Hang-choo-foo), and the Valley Perilous. Of the Terrestrial Paradise, however, the writer is candid enough to say that he had not been there.

See Yule and Nicholson in the *Encyclopædia Britannica*, Dr Albert Bovenschen, *Quellen für die Reisebeschreibung des Johann von Mandeville* (Berlin, 1888); the Introduction by G. F. Warner to his edition for the Roxburghe Club (1889), in which the views of Dr Vogels and Dr Carl Schönborn are also discussed; Alice Greenwood in the *Cambridge English Literature*, vol. ii.; and the edition by P. Hamelius (E. E. T. S. 1919-23).

Mandible, a name applied to various jaw-organs—e.g. the third pair of appendages in Crustaceans, the first pair of true appendages in Insects, the lower jaw in Vertebrates.

Mandingoes are a Bantu people of Africa, mainly in Senegambia (q.v.). See AFRICA.

Mandioca. See MANIOC, TAPIOCA.

Mandogarh, or MANDU, a ruined city of India, formerly capital of the Mohammedan kingdom of Malwa, stands 15 miles N. of the Nerbudda, in Dhar State (Central India). The ruins stretch for 8 miles along the crest of the Vindhya Mountains, and have a circumference of 37 miles. A deep, narrow valley separates them from the adjoining tableland. The least injured of the ruined buildings is the great mosque, which is reached by a handsome flight of stairs; it is said to be 'the finest and largest specimen of Afghan architecture extant in India.' There are also a massive royal palace and the white marble mausoleum of the king who raised the city to the acme of

its splendour (early 15th century). According to Malcolm, Mandogarh was founded 313 A.D.

Mandola, a musical instrument shaped like the eight-stringed Neapolitan mandoline, but larger and tuned an octave lower. The name is given in Venezuela to a small guitar whose apparently highest string gives a low note, thus ending a chord with a deep sound with strange effect.

Mandoline, a musical instrument of the lute family. The body is formed of a number of narrow pieces of different kinds of wood, bent into shape, and glued together. On the open portion of the body is fixed the sounding-board, with a finger-board and neck like a guitar. The Neapolitan mandoline, which is the most perfect, has four double strings, tuned (beginning with the lowest) G, D, A, E. The Milanese mandoline has six single strings, tuned G, D, A, E, B, C. The sound is produced by a plectrum in the right hand, the left hand fingering. In mandoline and guitar bands the mandolines play the first violin part, the mandola and lute, with guitars added, playing the accompaniments.

Mandrake (*Mandragora*), a solanaceous genus closely allied to *Belladonna* (q.v.). *M. vernalis* and *M. autumnalis* are both natives of the Mediterranean region and the East, and especially abound in Greece. The whole plant has a very fetid narcotic smell;



Mandrake.

and all parts have poisonous properties like those of belladonna, but more narcotic, for which reason a dose of the root was formerly sometimes given to patients about to endure surgical operations. The ancients were well acquainted with the narcotic and stupefying properties of mandrake, and it was a common saying of a sleepy or indolent man that he *had eaten mandrake*. The large taproot grows somewhat irregularly, and often seems divided into two, through the development of a branch which attains more or less equal size. Hence arises a rude resemblance to a human figure; and this is easily exaggerated by a little judicious pruning or carving, and by trimming the covering of fine hair-like roots. Hence Pythagoras speaks of the mandrake as *anthropomorphic*. To such mannikin-figures many magical virtues were ascribed: by the ancient Germans they were supposed to bring luck to their possessors, who accordingly dressed and tended them like dolls, yet kept them reverentially enshrined in caskets, and thus obtained their services for the healing of obstinate diseases of man and beast, for the divination of the future, or the ensuring of supplies of money. From the most ancient times aphrodisiac virtues have been ascribed to mandrake, which was therefore supposed to cure barrenness (see Gen. xxx. 14-16); such repute is hardly borne out by the actual properties of the root (which would, however, relax the womb), but probably more commonly depended on its magical associations as a phallic figure. The extremely

narcotic and poisonous properties of the plant could not but invest these figures with a more grim significance, of which the mediæval imagination made the most. So large, deep, and well fixed a root needs some labour to dig out, and if torn up by main force breaks with more or less noise, hence the ancient legend that the mandrake shrieks when torn out of the ground. The subsequent possibilities of accident (not to speak of misuse) can easily be imagined, not only from the sweet and attractive berries, but the leaves, root, or even juice. On the base of caution there arose a whole fantastic ritual: the plant could only be safely dug up at midnight, and when loosened by careful digging should be dragged out of the ground by a black dog, which served as a substitute for the herbalist. Mrs Campbell-Præd's *Insane Root* (1902) works in the fables.

Mandrill. See BABOON.

Manduria, a town of Southern Italy, 22 miles E. by S. of Taranto, near the ancient town of Manduria, of which some important relics are still extant; pop. 15,500. In 1790 it exchanged its name of Casalnuovo for Manduria.

Mandvi, the chief seaport of the principality of Cutch, in India, on the north shore of the Gulf of Cutch, 36 miles SW. of Bhuj, the capital. It has a good roadstead and a breakwater, but the harbour is choked with sand. The pilots are in request all through the state. Pop. 23,000.

Manes. See ANCESTORS (WORSHIP OF); LARES; and for Manes or Mani, see MANICHÆUS.

Manet, ÉDOUARD, French painter, was born in Paris, 23d January 1832, eldest son of a judge, from whom he inherited a considerable fortune, and was educated at the Collège Rollin. Intended for a barrister and elegant man of the world, he was sent on a voyage to Rio to distract his thoughts from art. Nevertheless he studied from 1850 to 1856 with Thomas Couture. Afterwards he travelled in Europe. At length he found in Velázquez and Hals the answer to his questionings after a just illumination and a true portrayal of nature. He first exhibited at the Salon in 1861, but on the classical tradition obtaining the upper hand he was excluded in 1863. With Monet, Renoir, and Whistler he showed his work in the *Salon des Refusés*, and from this meeting arose the solidarity of the Impressionist Movement (see IMPRESSIONISM). In 1873 he exhibited 'Le Bon Bock,' which showed his heirship to Velázquez and Hals as well as Courbet. 'A Bar at the Folies-Bergère' (1882) is a sparkling picture, more truly impressionistic, in which the almost infinite detail in the accessories is subordinated to the general composition. He died 30th April 1883. His dictum, since become famous, 'The principal person in a picture is the light,' sums up his aims.

Manetho, a celebrated Egyptian historian, native of Sebennytyus, a priest who flourished in the 3d century B.C. See EGYPT.

Manfred, regent and king of Sicily, was a natural son (afterwards legitimised) of the Emperor Frederick II. by Bianca, the daughter of Count Lancia, and was born in 1231. On his father's death in 1250 he received the principality of Tarentum, and in the absence of his half-brother, Conrad IV., acted as regent in Italy. He bravely defended Conrad's interests against the aggression of Pope Innocent IV., and after his death was acknowledged as regent of Apulia, in name of his nephew, Conradin (q.v.). The pope, however, renewed his pretensions to Apulia, and compelled Manfred to flee for shelter to the Saracens, by whose aid he defeated the papal troops, and became, in 1257, master of the whole kingdom

of Naples and Sicily. On the rumour of Conradin's death he was crowned king at Palermo, 11th August 1258, and immediately afterwards was excommunicated by Pope Alexander IV. along with his adherents; but Manfred invaded the papal dominions, and made himself master of the whole of Tuscany. His power now seemed secure, and his government was at once mild and vigorous. But this tranquillity was not of long duration. Pope Urban IV. renewed the excommunication against him and his friends, and bestowed his dominions as a papal fief on Charles of Anjou, the brother of Louis IX. of France. Manfred, though at first successful in the war which ensued, was at last treacherously defeated, and slain in a bloody battle at Benevento, 26th February 1266. His body was interred as that of an excommunicated person. His widow and children were barbarously treated by the French; the widow and three sons died in prison; the daughter was confined for twenty-two years. His history has been made the subject of drama and opera. See books by Cesare (1837), Schirmacher (1871), Karst (1897), and Hampe (1905).

Manfredonia, a walled seaport of Italy, on the Gulf of Manfredonia, a bay of the Adriatic, 23 miles by rail N.E. of Foggia. Founded by Manfred in 1261 from the ruins of ancient Sipontum, it has an old castle and a cathedral. Pop. 15,600.

Mangabey, a name applied to monkeys of the West African genus *Cercopithecus*, especially *C. fuliginosus*, the sooty mangabey. The mangabeys are long-tailed monkeys with white upper eyelids, lively and gentle in disposition.

Mangalore, a seaport and military station, chief town of South Kanara district, in Madras. A clean, picturesque town, embosomed in coconut groves, it ships much coffee (from Coorg and Mysore) in small Arabian and Indian vessels. Pop. 54,000, including a large body of Roman Catholics, who have a bishop and a college. The Basel Lutheran missionaries teach their people weaving, printing, bookbinding, and tile-making. From Mangalore the Madras Railway runs with a southerly bend across India. The town, which was three times sacked by the Portuguese in the 16th century, was taken by Hyder Ali in 1763. In 1784 its English garrison yielded to Tippoo Sultan after a nine months' siege. It became British in 1799, and was burned by the Coorg rebels in 1837.

Mangan, JAMES CLARENCE, a gifted Irish poet, was born in 1803, and employed for many years in the drudgery of copying in an attorney's office. His whole life was a tragedy of hapless love, poverty, and intemperance, until he died at Meath Hospital, Dublin, 20th June 1849. There is fine quality in his original verse, as well as in his translations from the German, but more especially from the old Irish, as in the impassioned ballad of *Dark Rosaleen*.

Miss Guiney, in her selections and study (1897), affirmed Poe's indebtedness to Mangan's recurrent refrains; the standard life is that of D. J. O'Donoghue (1898), who edited the *Poems* (1903) and the *Prose Writings* (1904).

Manganese (sym. Mn; at. numb. 25; at. wt. 55) is one of the iron group of heavy metals. It is darker than wrought iron, is capable of a high degree of polish, and is so hard as to scratch glass and steel. It is only feebly attracted by the magnet, and oxidises readily on exposure to the air. The metal occurs in nature in small quantity along with iron in meteoric stones, but may be obtained in large amount by the reduction of its oxides or carbonate by charcoal at an extreme heat.

With oxygen it forms six compounds: manganous oxide, MnO ; manganic oxide, Mn_2O_3 ; manganoso-manganic oxide, Mn_3O_4 ; manganese dioxide,

MnO_2 ; manganic anhydride, Mn_2O_3 ; and permanganic anhydride, Mn_2O_7 . Like iron it forms proto-salts, $MnCl_2$, and persalts, Mn_2Cl_6 . It also forms salts derived from an acid, H_2MnO_4 , such as potassium manganate, K_2MnO_4 , and from an acid, $HMnO_4$, as potassium permanganate, $KMnO_4$. The *binoxide*, MnO_2 , is the chief form in which manganese is found in nature, and is the general source of the other compounds. It is a soft, black, amorphous mineral, known to mineralogists as pyrolusite, and in commerce as black manganese or manganese simply. When heated alone or with sulphuric acid it gives off oxygen, and when heated with hydrochloric acid evolves chlorine. It is largely used in the manufacture of glass, to which it imparts a purple colour. It is also supposed to colour the amethyst.

Manganous oxide, MnO , is an olive-green powder. Its salts are colourless, or of a pale rose colour. The sulphate, $MnSO_4$, in pink crystals, is largely used by the calico-printer for the production of black and brown colours, by decomposing it with bleaching powder or an alkali.

Manganic oxide, Mn_2O_3 , in octahedral crystals, forms the mineral braunite, and in the hydrated form, $Mn_2O_3 \cdot H_2O$, the orthorhombic mineral hausmannite.

Red oxide of manganese, Mn_3O_4 , is formed when any of the other oxides are heated in the air. It is found in nature as the mineral hausmannite.

Manganic anhydride, Mn_2O_3 , is not known in the free state. It forms an acid and salts. Manganate of potassium, K_2MnO_4 , is in green crystals, and when its solution stands exposed to air the 'chameleon mineral' rapidly becomes blue, violet, purple, and finally red, by the gradual conversion of the manganate into permanganate.

Permanganic anhydride, Mn_2O_7 , is only known in solution or in a state of combination. Its solution is of a splendid red colour, but appears of a dark violet tint when seen by transmitted light. Permanganate of potash, $KMnO_4$, which crystallises in reddish-purple prisms, is largely employed in analytical chemistry. Very similar is permanganate of sodium, which is understood to be the basis of Condy's Disinfectant Fluid.

Manganese is a constituent of many mineral waters, and various preparations of it are employed in medicine; the binoxide has been used as a substitute for bismuth in dyspepsia. Alloys with copper and some zinc are used under the name of manganese bronze. The 'black oxides' (manganite, pyrolusite, psilomelane), long familiar in making chlorine and bleaching-powder and in decolorising glass, are now used in large quantities in iron-works (see IRON AND STEEL). They are mined chiefly in Brazil, in the Caucasus, and in India, which began to exploit its supplies only at the end of the 19th century. Rhodochrosite or manganese spar, the carbonate, is found, in beautiful rose-red crystals, in Rheinland, Transylvania, the Pyrenees, and Colorado. As it contains no dioxide it is of no use for the other named purposes, but only in iron-manufactures. Manganese occurs in many of the United States and in Australia.

Mange, a contagious disease which occurs in most animals, is, like scab in sheep, and itch in the human subject, due to the presence of minute mites or *acari*. Some of these burrow in the skin, others move about upon the skin, and cause much irritation, heat, and itching, and the eruption of minute pimples, with dryness, scurfiness, baldness, and bleaching of the skin. Mange in horses has been since 1911 scheduled under the Diseases of Animals Acts, and is a notifiable disease. The treatment consists in destroying the *acari*, and ensuring the cleanliness of the skin. Most of the better-known sheep-dips are equally efficacious in the treatment of mange, and if animals cannot be dipped,

they can be washed or sprayed. Animals with heavy coats are more easily treated after being clipped. Where the general health is indifferent, as in chronic cases, the patient should be liberally fed, kept clean and comfortable, have an occasional alterative dose of any simple saline medicine, such as nitre or common salt, and a course of such tonics as iron or arsenic. Cleanliness and occasional washing and brushing maintain the skin in a healthy state, and thus prevent its becoming a suitable nidus for the *acari*.

Mangel-wurzel. See MANGOLD-WURZEL.

Mangkassars. See CELEBES.

Mangnall, RICHMAL, of Irish extraction, but born probably in Manchester, 7th March 1769, was the head-mistress of a ladies' school at Crofton Hall, near Wakefield, and died there 1st May 1820. Few particulars of her personal history have been preserved; she survives only in her redoubtable *Questions*, the pride and terror of several generations of school-girls. She was an amiable and excellent woman, but as a writer she has been well called 'the very high-priestess of the great god Cram.' Of the popularity of her schoolroom encyclopædia, compiled entirely by herself, there can, however, be no doubt: an impression, printed in 1857 in America, was taken from the 84th London edition. It has been reprinted in England (ed. by Wright and Hodder) as recently as 1892.

Mango (*Mangifera indica*, natural order Anacardiaceæ), one of the most esteemed fruits of India. The tree grows from 40 to 50 feet high, with spreading top and numerous branches, at the extremities of which are the densely-crowded long lanceolate leaves. When in flower it bears some resemblance to the Sweet Chestnut. The fruit,



Common Mango (*Mangifera indica*).

which is a fleshy drupe, when fully ripe is somewhat kidney-shaped or oval, varying in size from that of a small hen's egg to a large goose's egg, in colour yellow or reddish, speckled with black, and containing a large flattened stone, the kernel of which is nutritious. There are several varieties of mango. Some have the flesh of the fruit full of fibres, and are on that account considered inferior; those that cut like an apple, and have few or no fibres, are the most highly esteemed. The fruit is eaten without any preparation, except peeling the outer rind off. Jellies, preserves, and tarts are made of the unripe fruit, and it is also pickled. Mango was introduced into Jamaica in 1782, and is now very generally cultivated in tropical and subtropical countries. The tree is ordinarily raised from seeds, but, as the finer varieties cannot be depended upon to come

true from seeds, they are increased by layering and inarching. *M. sylvatica*, besides being eaten when ripe and fresh by the natives of India, is dried and used medicinally. *Bouea burmanica* (formerly called *M. oppositifolia*), the fruit of which is of the size of a pullet's egg, is much esteemed in Burma.

Mangold-wurzel, or MANGOLD, a German name in general use in Britain and America to designate the varieties of the Common Beet (q.v.) cultivated in fields for the feeding of cattle—*Beta vulgaris* of the natural order Chenopodiaceæ. The field beets differ from the garden beets chiefly in being larger in all their parts, and coarser. They have large roots, which in some of the varieties are red, in others greenish or whitish, in some carrot-shaped, and in others nearly globular. The cultivation of mangold as a field-crop was introduced from France into England in 1786. At first, so little was its value known, that the leaves alone were used as food for cattle. Its importance, however, was soon appreciated, and it rapidly gained favour. It is much more patient of a high temperature than the turnip, liable to fewer diseases, and vastly more productive under favourable conditions. In highly-manured grounds in the south of England as much as from 60 to 70 tons to the acre have been raised; throughout the south of England it is generally admitted that it is as easy to grow 30 tons of mangold to the acre as 20 tons of Swedish turnips. The lower temperature of Scotland, however, does not admit of the crop being raised there to advantage. The mode of culture does not vary materially from that followed in raising turnips. The land in which the crop is to be planted receives a deep furrow in autumn; and, if it is quite free from perennial weeds, it is often previously well manured. Mangolds are sown both in rows on the flat ground and in drills raised by the plough—the former from 18 to 25 inches apart, and the latter from 25 to 28 inches wide. From 12 to 16 tons of dung with from 2 to 3½ cwt. of superphosphate, 2 to 3 cwt. common salt, and 2 to 3 cwt. nitrate of soda per acre are common dressings for mangolds. Indeed, this crop can hardly be over-manured. It requires 6 or 7 lb. of seed to the acre; and, as the grains are enclosed in a hard and rough coat, they are steeped in water for two days previous to their being planted, for the purpose of promoting a quick and regular 'braid.' The long red, the round red, and the orange and yellow globes are all favourite varieties in England. As soon as the plants are about 3 inches above ground, they are singled out by the hand, and their cultivation is afterwards the same in all respects as in the case of Swedish turnips. The crop should always be stored by the end of October, and should not be consumed till the following spring, by which time the roots have lost their tendency to produce scour in animals, and have greatly improved in feeding value. Care has to be taken not to injure the leaves or bulbs, as they are liable to suffer from 'bleeding.' The roots are stored in pits or 'clamps,' covered with straw and a little earth, as a protection in severe weather.

Mangonel. See BALLISTA.

Mangosteen, produced by *Garcinia Mangostana* (natural order Guttiferæ), is considered the most delicious and wholesome of all fruits. The tree, which is a native of the Moluccas, grows about 20 feet high in very regular symmetrical form. The leaves are large, oval, entire, deep dark green above with a dull lustre, olive-green below. The open flowers resemble those of a red rose, but have only four petals. The fruit, in size and shape, resembles a middling-sized orange; it is dark brown, spotted with yellow or gray, has a thick rind, and is divided internally by thin partitions

into cells. The pulp is soft and juicy, of a rose colour, refrigerant and slightly laxative, with a mixture of sweetness and acidity, and has an extremely delicate flavour. It may be eaten very freely with perfect safety, and is esteemed very beneficial in fevers. It is cultivated in Java and in the south-east of Asia; it has recently become common in Ceylon, and has been successfully introduced into other tropical countries.

Mangrove (*Rhizophora*), a genus of archichlamydeous dicotyledons, of the order Rhizophoraceæ. The name is also applied to plants of similar habit and habitat belonging to other orders. They are trees and shrubs, all tropical, and natives of coasts, particularly about the mouths of rivers, where they grow in the mud, and form a close thicket down to and within the margin of the sea, even to low-water mark, forming the characteristic mangrove-swamps so often described



A Mangrove-swamp.

by travellers and naturalists. Most species send down roots from their branches, and thus rapidly extend over large spaces, forming secure retreats for multitudes of aquatic birds, whilst crabs and shell-fish are also to be found in them in vast numbers. Their interlacing roots retain mud, seaweed, &c., and thus rapidly form soil and encroach upon the shallow sea; on the north coast of Java and elsewhere their geological importance is specially marked. The seeds have the peculiarity of germinating before the fruit has fallen, a long thick radicle proceeding from the seed, piercing its covering, and extending rapidly downwards. When the fruit drops, the stout heavy radicle pierces the mud, and the young tree is thus planted in the proper position forthwith. The fruit of the common mangrove (*R. Mangle*) is sweet, eatable; and its juice, when fermented, yields a light wine. The bark is rich in tannin, and is largely imported for tanning; it is exported from British East Africa and Queensland. The Chinese and East Indian mangroves (*Bruguiera gymnorrhiza*, &c.) are similar.—*White Mangrove* is *Avicennia* (q.v.).

Mangu, brother of Hulagu (q.v.). See MONGOLS.

Manhattan Island, an island in New York Bay, forming the New York City borough of Manhattan, and still containing the commercial nucleus of the city. Till 1874 the city did not extend beyond it; now it contains only a very small part of the total area. See NEW YORK.

Mania. See INSANITY.

Manica, a gold-field long worked by the Portuguese, 130 miles NW. of Beira, now divided between Southern Rhodesia and Portuguese East Africa.

Manichæus, or, more correctly, **MANI**, the founder of the sect of the Manichæans, was born in Babylonia, near Ctesiphon, about 216 A.D. His father Fatik is said to have belonged to the sect of the *Mughtasila* (Ablutioners), apparently a semi-Christian sect, akin to but not identical with the Mandæans; these latter, at least in their extant form, are later than Manichæism. On 20th March 242 A.D. Mani began to proclaim his new religion. He obtained some favour at the court of the Persian king, Sapor I., and then undertook long missionary journeys, returning to the court about 270. Pursued by the enmity of the Magians he was obliged to flee, was protected by the next king, Hormuzd, but under his successor, Bahram I., was abandoned to the hatred of his enemies, who put him to death about 276 and flayed his lifeless body. Till the 20th century, when Manichæan writings were discovered in Turkestan, Mani and his religion were known only from the testimony of their enemies—notably the Arabic work called *Fihrist*, and allusions and extracts in Epiphanius, Augustine, and Photius.

MANICHÆISM, though Mani its founder lived in Babylonia under the Persian dominion, is best regarded as a Christian heresy. It naturally uses much of the terminology of Persian religion, and in its later developments in Turkestan undoubtedly borrowed some things from the neighbouring Buddhism of Tibet. But Mani's face appears to have been turned to the West: the Christian elements which are obvious in Latin and Greek Manichæism are fundamental also to the Manichæism of Central Asia. What influenced Mani, however, was not orthodox Catholicism, but the forms of Christianity most prevalent in the Euphrates Valley during the 3d century, viz. the philosophy of Bardaisan (Bardesanes) and the heretic Church of the Marcionites. From the former Mani got the idea that this world is the result of a regrettable accident, whereby the pure Elements have been mixed with the Element that is naturally dark and foul; from the latter he derived his ascetic ethics and the organisation of the Manichees into the two classes of the *Elect*, who are world-renouncing monks and nuns, and the *Hearers*, who may marry and hold property. This organisation is also found in Buddhism, but it was fully developed among the disciples of Marcion (fl. 138 A.D.), and while traces of Manichæan polemic against the Marcionites survive, there are none of polemic against Buddhists.

The Manichees themselves start from the doctrine of the Two Roots and the Three Moments. The Two Roots, or, as we should say, the Two fundamental Principles, are Light and Dark; by the Three Moments they mean the Past, the Present, and the Future. Light and Dark are two absolutely different eternal Existences. Originally they were separate, as they should be. But in the *Past* the Dark made an incursion on the Light and some of the Light became mingled with the Dark, as it still is in the *Present*; nevertheless a means of refining this Light from the Dark was called into being and of protecting the whole realm of Light from any further invasion, so that in the *Future* the Light and the Dark will be happily separated.

It is right to begin a description of the Manichæan Religion thus, and not with theology proper, for to the Manichee the distinction between Light and Dark meant more than the distinction between God and Man or Devil. Mani taught an elaborate mythology, and Manichees prayed to 'God,' and to Mani as well as Jesus; but pure Light itself was divine to them, and in Manichæan writings it is often very difficult to distinguish between 'God' and the divine Light or a divine Man. The whole Manichee philosophy is materialistic as distinct from personal: what is saved of a man after death is

not what Christians would call 'himself' or his soul, but the particles of Light contained in him. The religious emotion of the Manichee was directed not towards men, but towards the Light imprisoned in men. Men were to some extent, and at second hand, in the image of God, but they were only a sort of pirated copy made by the evil, dark Archons to imitate the Messenger of Light that had appeared to them.

The Manichæan account of how the present state of things came about is shortly as follows. The Light and the Dark had existed side by side from all eternity without any commixture. Each Realm was self-contained and appropriately organised. In the Realm of Light dwelt the Father of Greatness with his Light, his Power, and his Wisdom. Persian-speaking Manichees called him *Zrvān*, i.e. the Eternal: his attributes were Sense, Reason, Thought, Imagination, good Intention—the qualities of a sane and intelligent mind. Opposite this blissful Realm or *terra lucida*, as Augustine calls it, is the Realm of the Dark, where everything was hostile and pestiferous. Its denizens suited its character: Mani represents them as groping about in aimless enmity with one another. Somehow once upon a time they became aware that there was something strange and yet pleasant outside their own region, and so the Ruler (or Archon) of the Dark invaded the realm of Light. Thus the event, to the issue of which is due the existence of the world we live in, came to pass through the unlicensed initiative of the Powers of Darkness.

To oppose this invasion the Father of Greatness called into being the Primal Man, clothed or armed with the Five Bright Elements, viz. Light, Wind, Fire, Water, and that pure Air which Mani seems to have regarded as the breath of Life. But the first consequence was disaster: the Primal Man was left unconscious on the field of battle and the Five Bright Elements were swallowed up by the Archons of Darkness. But the Father of Greatness sent powers which restored to the Primal Man his divine energy, so that he mastered the Archons and definitely arrested their invasion of the realm of Light. The problem now was not only how to turn the proper region of Darkness into a prison by encircling it with an impenetrable wall, but also how to extract the Light-substance which the Archons had swallowed. Out of what they immediately disgorged the Sun and Moon was formed, and out of their own bodies was formed the Earth, 'so that in rain and dew the pure Elements yet remaining in them might be squeezed out.' They yet had a certain power and volition, so to coax the Light out of them there appeared another divine being, the Messenger, and in a passion of desire for his beauty there exuded from them that which became plants and animals, and finally a Man, made in the image of the divine Messenger. The Messenger himself is the prototype of the true Prophets (called *Prēstags* in Persian and *Burkhāns* in Turkish), such finally as Mani was, who come to men in this dark world and tell them of the Light.

Man, i.e. Adam, thus formed by the Archons, was the image of the universe, of God and matter, of light and dark. But he lay on the ground inert and ignorant of his nature. So 'Jesus' appeared to him, awoke him, and made him realise that he had within him particles of Light. Jesus, it seems, was to the Manichee the Fruit which is man's food, 'hanging on every tree, produced by the energy and power of the air that makes the earth conceive' (Faustus *ap. Aug.* xx. 2). Adam, thus enlightened and energised, ate of the Tree of Life, and as Cumont (l. 49) says: 'By making Adam taste of the fruit of knowledge Jesus, and not the Tempter, revealed to him the depth of his misery. But man will know henceforth the way of enfranchisement. He must consecrate his life to keeping

his soul from all corporal defilement by practising continence and renunciation, so as to set free little by little from the bonds of matter the Divine Substance within him and disseminated throughout nature, and thereby to join in the great work of distillation (i.e. of the Light from the Dark) which God is occupied with in the Universe.'

It was further taught by Mani that Jesus had contrived a vast mechanism, like a water-wheel with twelve buckets, which takes up the light-particles from the souls and bodies of men when they die to the Moon, which thus waxes for fifteen days. While in the Moon the souls are somehow purged and purified by the Sun, and then the Moon empties itself of the purged Light, whereby it wanes for another fifteen days. The souls when purged are gathered into the Column of Glory (apparently the Milky Way), and so is gradually formed the Perfect Man (see Ephesians, iv. 13). When all the Light that can be distilled has been taken out of the Earth and its inhabitants, the filthy remainder will be burned, like a bonfire, for 1468 years, and the ashes will descend into the realm of the Dark from whence they came. In the Future, therefore, all will be as it was in the beginning, and this World, which is essentially a sort of Smudge, the result of a regrettable accident, will have altogether disappeared.

Mani recognised a succession of Prophets of the Truth at divers times and in many countries, with whose doctrine he believed his own to be in essential accord. But Jesus in Mani's system occupies a peculiar position. He was the last of the series before Mani, but he is more than that. To Mani Jesus was a Divine Being, who had 'appeared in Judæa' but was never born of woman; the Christians believed that this Jesus had been really crucified, but this was their carnal error. Of the true Jesus Mani regarded himself as the apostle, as the 'Paraclete' whom Jesus had foretold. 'Jesus' further signified to the Manichees Divine Redemption of man, Divine nourishment for man, accompanied somehow by the almost inconceivable idea of Divine suffering for man—and all this effected by 'Jesus who appeared in Judæa.' These are specifically Christian ideas; and though the Jesus revered by Mani has a different nature from the Jesus Christ of orthodox theology the same historical personage is meant. This unique position given to Jesus in Manichæan religion does make it a form of Christianity, however heretical or inconsistent. The Manichees of Chinese Turkestan invoked Jesus along with Mani in their prayers: we do not find that they invoked Zoroaster or the Buddha.

As explained above, the Manichees were divided into Elect Righteous initiates (*Zaddīks*, *Zendīks*) who abstained from all marriage and property, and the Hearers who lived in the world. The Elect might not sow or reap, or even prepare their food, for fear of hurting the Light contained in it: one chief religious duty of the Hearers was to feed the Elect, whose partaking of food given in alms was of benefit to the donor. The Hearers were, of course, the large majority of the Manichees; St Augustine was one for nine years (373–382 A.D.). Since 1911 we have possessed a document which shows us this Religion as a system of life for the ordinary Hearers. This is the *Khuastuanift*, or Confession, edited by Professor A. von Le Coq (*J.R.A.S.* for 1911, pp. 277–314); it contains a detailed confession of sins both in belief and practice, and so exhibits the Manichæan ideal better than any other surviving source.

The outward history of the sect is one of almost continuous persecution. Yet it spread rapidly from Persia and Mesopotamia to Syria, Turkestan, Northern Africa, and even Constantinople and Rome, drawing adherents from all sorts and condi-

tions of men and women. Both the Roman and Byzantine emperors enacted stringent laws against the Manichæans, the most severe being Valentinian III. and Justinian. Pope Leo the Great persecuted them in Rome, and in Northern Africa they were exterminated by the Vandals. But their peculiar doctrines are thought to have influenced many sects, as the Priscillianists, Paulicians, Bogomiles, Catharists, and Albigenses. In the 20th century archaeological researches in Central Asia, especially those of A. von Le Coq, P. Pelliot, and Aurel Stein, have shown that there was a well-organised Manichæan church on the confines of China in the 10th century. The documents found shed new light on their tenets and religious formularies: the *Khuastuaniſt* has been mentioned above. Besides this many fragments of MSS. in the peculiar Manichæan script were discovered, including portions of Mani's work called the *Shābuhrahgān*. Only insignificant scraps survive in the Mesopotamian Syriac in which Mani originally wrote, the MSS. from Chinese Turkestan being in a sort of Persian or in Turkish.

Mani is said to have been a skilful painter, and the Manichæes bestowed much care on the decoration of their sacred books. Many of the fragments collected by A. von Le Coq in Khotscho near Turfan in Chinese Turkestan are illuminated, and what is believed to be a portrait of Mani himself was found on a wall-fresco. It is probable that Manichæan art had some influence on the revived Persian art of the 13th century. The tale of Barlaam and Joasaph, so popular all over Europe and the Nearer East in the middle ages, is of Buddhist origin, but it appears to have reached the West through a Manichæan version.

See books by Beausobre (1734) and Baur (1831) for older opinions; for modern views see Flügel (1862); Cuimont's *Manichéisme* (1908-12); Bevan in *Ency. of Religion and Ethics* (1915); Alfario's *Écritures manichéennes* (1918-19); Mitchell's *Refutations of S. Ephraim* (1912-21); Burkitt's *Religion of the Manichæes* (1925). For the texts from Turfan see F. W. K. Müller, *Handschriften-Reste aus Turfan*, ii. (Berlin Academy's *Abhandlungen*, 1904); A. v. Le Coq, *Khuastuaniſt* (*J. Roy. Asiatic Soc.*, 1911), *Manichaica*, iii. (Berlin Acad. *Abhandl.*, 1922); W. Bang, *Khuastuaniſt* (*Muséon*, Louvain, 1923). For the Chinese texts see E. Chavannes and P. Pelliot, *Un Traité manichéen* (*J. Asiatique*, Paris, 1911-12). For the Art see A. v. Le Coq, *Die Buddhistische Spätantike in Mittelasien*, part ii. *Manichæan Miniatures* (Berlin, 1923).

Manihiki. See POLYNESIA.

Manihot. See MANIOC, TAPIOCA, INDIA-RUBBER.

Manila (by English people often spelt *Manilla*), chief town of the Philippine Islands (q.v.) and, till the blockade by a United States fleet in May 1898 and the subsequent American occupation of the Philippines, capital of the Spanish possessions in eastern Asia, stands on the east side of a wide bay on the SW. coast of Luzon, 650 miles SE. of Hongkong, with which it is connected by telegraph (1881). It is divided into two portions by the little river Pasig. On the south bank stands the sleepy old town (founded in 1571 by Legazpi), surrounded by crumbling walls, with tolerably wide straight streets crossing each other at right angles. Here are the archbishop's palace, numerous churches and monasteries, the cathedral, the university of San Tomas, Jesuit observatory, arsenal, and barracks. On the north bank are suburbs, Binondo, &c., the commercial and native quarters, and the ruins of the captain-general's palace. Looking forward to a rapid growth of population, the Americans have laid down a plan for the future extension of the city. It provides for the housing of 2,000,000, about ten times the population at the date of cession. The historical parts of the town are, on the whole, preserved, and it is recognised that 'the general

effect of the existing well-shaded narrow streets is picturesque, and should be maintained.' But wide spaces have been cleared for parks and new public buildings. These include a Capitol (for the elected Legislative Assembly, instituted 1907), surrounded by government offices, library, museum, observatory, laboratories, and hospitals; and to the north of the town the new university buildings. The native houses are generally constructed of bamboo, and thatched with the leaves of the nipa palm. Glass is not used in the windows, but the flat shell of a large oyster, and the window-frames all slide horizontally. This is to exclude the great heat, the mean for the year being 82° F.; but during the rainy season (May to November) it ranges from 65° to 68°. The population (mostly Tagálogs, with a few thousand Chinese, Americans, and Spaniards) is about 300,000. The people are fond of dancing and music; but their predominant passions are cock-fighting, betting, and gambling. The chief industry is the manufacture of cigars, which employs many thousands of women. The harbour is not very safe during south-west and north-east winds, although improvement works were on foot for ten years until suddenly stopped in 1889. These were resumed by the Americans, and much has been done. Since 1893 the city has been lighted by electricity. A new water-supply, from the Mariquina River, and a sewerage system, completed in 1909, have almost stamped out cholera and small-pox. Sugar, hemp, cigars and tobacco, and coffee account for the bulk of the exports, and cotton goods, rice, wine, silk, and flour figure most prominently amongst the imports. The trade is principally with China, the United States, and Great Britain, and is mostly carried in British vessels. The city has several times suffered from earthquakes (that of June 3, 1863, wrecking all the public buildings and killing several thousand persons), from typhoons (as in 1882, when half the city was wrecked), and also from great fires in 1893 and 1922. It shared in the revolution that began in 1896, and saw in its harbour the destruction of the Spanish fleet by the American commander Dewey in May 1898.

Manila Hemp. See ABACA.

Manin, DANIELE, an Italian patriot of Jewish descent, was born 13th May 1804 at Venice, studied law at Padua, and subsequently practised at the bar. From 1831 he became a recognised leader of liberal opinion in Venice. Previous to the outbreak of 1848 Manin was imprisoned for presenting a somewhat outspoken petition to the authorities; but on the promulgation of the news that Paris, Naples, and Tuscany were in revolution he was released in triumph by the populace, and was at once invested with supreme power. From the period of his election to the presidency of the Venetian republic Manin's energies were devoted to the organisation of the inhabitants for self-defence. During the annexation of Lombardy to Piedmont he laid down his authority; but on the defeat of the Sardinian army at Novara, 23d March 1849, he resumed it, and was the animating spirit of the entire population of Venice during the heroic defence of the city for five months against the besieging Austrian army. On the 24th of August Venice capitulated; but Manin, with forty of the principal citizens, being excluded from the amnesty, quitted the city. He retired to Paris, where he taught Italian, and where he died of heart-disease, 22d September 1857. See *Lives* by Henri Martin (Paris, 1859), Finzi (1872), Errera (1875), G. M. Trevelyan (1923).

Manioc, MANDIOC, or CASSAVA (*Manihot utilisima*), a plant of the order Euphorbiaceæ, a native of tropical America, much cultivated

there and in tropical Africa, Malaya, and the Dutch East Indies. Manioc, or *Mandioca*, is the Brazilian name, *Cassava* the West Indian; and in Peru and some other parts of South America the name is *Yuca*. The plant is shrubby, with brittle stems 6 to 8 feet high, and crooked branches, at the extremities of which are the large palmate leaves and green flowers. The root is tuberous, of immense size, weighing often as much as 30 lb. The milky, acrid juice which permeates every part of the plant is a deadly poison in its fresh state, owing to the presence of hydrocyanic acid, which is quickly dissipated by heat. The juice, inspissated by boiling, forms the excellent sauce called *Casareep* (q.v.), and fermented with molasses yields an intoxicating beverage called *Ouyouu*; whilst the root, grated, dried on hot metal plates, and roughly powdered, becomes an article of food, largely used in South America, and there very generally known as *Farina* (Port., 'meal'). It is made into thin cakes, like the oatmeal-cakes of Scotland, which are formed, however, not by mixing it with water, but by the action of heat softening and agglutinating the particles of starch. *Cassava* is also used in Europe and elsewhere for the manufacture of starch, alcohol, dextrin, and glucose, and to some extent as a cattle-food. The true starch of manioc, separated in the ordinary manner or by specially devised machinery from the fibre, is known in commerce as *Brazilian Arrowroot*. From it tapioca is made, by heating the undried starch on hot plates, and stirring with a fork; the starch-grains burst, the whole of the starch is converted into dextrin, and the whole agglomerates into small irregular masses. The name *Pearl Tapioca* is given to a product of potato starch; also to the granules of true tapioca broken up and graded according to size. Flake tapioca is made by stirring a thin layer of wet cassava starch on a hot plate.—Another species or variety of manioc is also cultivated, the roots of which, having their hydrocyanic acid mainly in the skin and cortex, are peeled and eaten raw, roasted, or boiled. This, the Sweet Cassava or Sweet Yuca (*M. palmata*), has the root of longer shape than the common or bitter cassava, and smaller. It endures cooler climates than the bitter cassava, and is cultivated in the Southern United States. *M. Glaziovii* yields Ceará rubber.—The manioc is easily propagated by cuttings of the stem, and is of rapid growth, attaining maturity sometimes in six months. The yield may be below two tons of fresh roots an acre on poor soil, or above fifteen on good. Some so-called tapioca is really a kind of Sago (q.v.).

Manipur, an Indian state in the east of Assam, occupying some 8500 sq. m. of for the most part heavily timbered mountain-land; pop. 384,000, collected most thickly in one valley, 650 sq. m., situated 2500 feet above sea-level. The men are incorrigibly lazy, but passionately fond of Polo (q.v.). The Manipuris combine Mongolian and Aryan characteristics, and are mainly Hindus in faith. The wild hill-men belong to the Naga and other stocks. A British political agent was established at the raja's court in the town of Manipur or Imphail (pop. 80,000) in 1835. In 1891 the chief-commissioner of Assam and others, seeking to remove a rebellious 'senapati' or commander-in-chief, were murdered. A British military expedition was sent, and the senapati and chief executed. The state was restored in 1907 to its native raja, a maharaja since 1918.

Manis. See PANGOLIN.

Manissa. See MAGNESIA.

Manistee', capital of a county in Michigan, is on Lake Michigan, at the mouth of the Manistee River, 135 miles NW. of Lansing; pop. 10,000.

Manitoba, a province of Canada, is bounded on the N. by Hudson Bay and the North-west Territories, on the S. by the United States, on the E. by Ontario, and on the W. by Saskatchewan. The area, originally about 15,000 sq. m., is now 251,832 sq. m., 178,100 sq. m. being added out of the North-west Territories (south-western Keewatin) in 1912. This total area includes over 20,000 sq. m. of water. The Red River rises in the United States, and flows almost due north about 85 miles through the province to Lake Winnipeg. Its principal tributary is the Assiniboine, which latter has again a large tributary, the Souris. Both the Red River and the Assiniboine are navigable for river steamers. The Winnipeg flows through the south-eastern part of the province from Ontario westwards to Lake Winnipeg. The Churchill and Nelson are the largest rivers; they drain into Hudson Bay, and possess an incalculable power in their waterfalls and rapids. The principal lakes are Winnipeg, 9460 sq. m.; Manitoba, 1775 sq. m.; South Indian, 1800 sq. m.; and Winnipegosis, 2086 sq. m. The country consists for the most part of a level plain, with occasional undulations. The summer mean temperature is 65° to 70° F.—nearly the same as in the state of New York. In winter the thermometer occasionally sinks to 30°, 40°, and even 50° below zero; but these extreme temperatures are not prolonged, and the bright and dry atmosphere and continued sunshine compensate for the low temperature. The cold is not so much felt as in many countries with a higher temperature and a more humid atmosphere. Very little snow falls on the prairies, the average depth being about 18 to 24 inches; the native horses graze out of doors all winter. Ploughing generally begins during April. The harvest takes place in August and September. Trees are found along the rivers and streams, and in greater abundance in the eastern and northern parts of the province; but Manitoba is not well wooded.

The population, in 1901 255,211, was in 1921, on its extended area, 610,118 (13,869 Indians); Presbyterians outnumbering the Methodists, Anglicans, or Roman Catholics. Among the principal cities and towns are Winnipeg, Brandon, St Boniface, Portage la Prairie. The chief industry is agriculture; the soil is of remarkable depth and fertility, and in favourable seasons the crops are large. Manitoba wheat and flour are regarded as the finest in the continent, if not in the world. Manitoba wheat is eagerly sought by American millers, notwithstanding duty, to mix with their own softer wheats. Other crops (oats, barley, and flax) succeed admirably. Vegetables are unusually prolific and of great size. Wheat-growing was for a time the staple industry; but the farmers are now turning their attention more to mixed farming, including dairy-farming and the raising of cattle and sheep. Fruit-growing is not carried on to any extent, although many of the smaller varieties—such as the strawberry, black and red currant, raspberry, gooseberry, and cranberry—appear to be indigenous. Apples are grown to a small extent, and the native plums are of excellent quality. In minerals the province is not very rich, but lignite is found in southern Manitoba. Copper and a little gold and silver are got. Manufactures of various kinds are increasing; and Winnipeg is to a large extent the distributing centre for the western part of the Dominion. The city has an ample supply of cheap power from the rapids and falls on the Winnipeg River about 60 to 80 miles north-east. Big game is still found in the less accessible parts—moose, elk, and some other kinds of deer, as well as bear. Small game is plentiful, principally prairie-chicken and wild-duck. Close seasons are provided for the protection of all the

principal wild mammals and birds. A considerable fishing industry is carried on in the rivers and lakes, and white-fish and pickerel are caught in large quantities. The white-fish of Lake Winnipeg are of superior quality.

The government is administered by a lieutenant-governor (appointed by the governor in council), an Executive Council, and an elected Legislative Assembly of fifty-five members. There is only one House of Parliament in Manitoba. The province sends six members to the Dominion Senate and seventeen to the House of Commons. A local Education Act in 1890, establishing rate-supported non-sectarian schools, abolished denominational education, and caused friction with the Roman Catholics, who had hitherto possessed separate schools; but an amending act in 1897 was accepted as a compromise, though it did not destroy the essential features of the non-sectarian system. A system of savings-banks in connection with the schools was established in 1899. There is a normal school for teachers at Winnipeg. The University of Manitoba at Winnipeg, which has several affiliated colleges, was in 1901 reorganised as a teaching university.

In Manitoba the Dominion government has offered free grants of land—160 acres—on homesteading conditions, to every male settler above eighteen years of age, and to every female who is the head of a family. There is still a considerable area of government land undisposed of in the north-west and north-east. Various companies have a considerable quantity of land for sale in different parts of the province.

Manitoba is in communication by rail with the Atlantic and the Pacific, and with all parts of Canada and the United States. The Canadian Pacific Railway—completed in 1885—has been of immense advantage to the province. The first railway to Manitoba, a continuation of the United States system to Winnipeg, was opened in 1879. The Grand Trunk Pacific, through Manitoba, Saskatchewan, and Alberta to British Columbia, was completed in 1914. A network of railways covers the southern settled region. The Hudson Bay Railway to Port Nelson, begun in 1911, runs through the northern extension of Manitoba.

Manitoba formed a portion of the territory under the control of the Hudson's Bay Company. The first agricultural settlement was formed in 1812, under the auspices of the Earl of Selkirk, who took out a party of Highlanders in that year. They were mainly located at Kildonan, on the Red River, just north of the site of the present city of Winnipeg. In 1868 the company gave up its exclusive rights to the government of the territory on certain conditions, among others a money payment of £300,000 and a considerable grant of land. The province was constituted by an act passed in 1870. The Riel rebellion of 1869-70 arose out of a feeling of some of the inhabitants that their position and rights had not been sufficiently considered in the transfer already mentioned. The rising collapsed in 1870 on the arrival at Fort Garry, the site of the present city of Winnipeg, of the expedition under Wolseley. Most of the leaders in the rebellion were subsequently amnestied. The progress of Manitoba from an agricultural point of view has been remarkable, but its political history has been comparatively uneventful, excepting for the existence of occasional friction between the provincial and Federal authorities in connection with railway extension and the school question. Its area was more than trebled in 1912. Female suffrage (with eligibility to parliament) passed in 1916.

See Bryce's *Manitoba* (1882), Boam and Brown's *Prairie Provinces* (1914), Martin's *Lord Selkirk's Work in Canada* (1916), Campbell's *Northern Manitoba* (1917),

the official Dominion and provincial year-books, and books named at CANADA.

Manitou. See ANIMAL-WORSHIP.

Manitou, a summer-resort at the base of Pike's Peak, Colorado, 6296 feet above the level of the sea. It is the Saratoga of the west, with soda springs and several large summer hotels.

Manitoulin Islands, a chain of islands separating Lake Huron from Georgian Bay. The principal are Grand Manitoulin (80 miles by 28), Cockburn Isle, and Drummond Isle; the last belongs to Michigan, the rest to Ontario. All are irregular and striking in their natural features, and Grand Manitoulin and Cockburn are covered with great pine-forests.

Manitowoc', capital of Manitowoc county, Wisconsin, lies at the mouth of the Manitowoc River, on Lake Michigan, 73 miles N. of Milwaukee. It has a good harbour, with shipbuilding, lumber-sawing, and manufactures of cigars, metal goods, &c. Pop. 18,000.

Manka'to, capital of Blue Earth county, Minnesota, on the right bank of the Minnesota River, 86 miles SW. of St Paul. Three lines of railway pass, and small steamboats can ascend as far as this point. The city contains a state normal school, Roman Catholic college, &c., and has varied manufactures. Pop. 12,000.

Mann, HORACE, American educationist, was born at Franklin, Massachusetts, 4th May 1796, graduated at Brown University, and studied law. He was elected to the legislature of Massachusetts in 1827, and succeeded in founding the state lunatic asylum. Removing to Boston, he was elected (1833) to the state senate, of which he became president. After editing the revised statutes of the state, he was for eleven years secretary of the Board of Education. He devoted his whole time to the cause of education, working usually fifteen hours a day. In 1843 he made a visit to educational establishments in Europe, and his Report was reprinted both in England and America. In 1848 he was elected to congress, as the successor of John Quincy Adams, whose example he followed in energetic opposition to the extension of slavery. In 1853 he accepted the presidency of Antioch College, at Yellow Springs, Ohio, where he laboured until his death, August 2, 1859. See his *Life and Works* (5 vols. 1898), and Hindale's *Horace Mann and the Common School System* (1898).

Mann, THOMAS, German novelist, born at Lübeck, 6th June 1875, removed to Munich, where he worked for a time in an insurance office, and studied at the High School. A psychological realist and a constructive artist, he made his reputation with *Buddenbrooks* (1903), and maintained it with *Königliche Hoheit* (1909). Besides these he excels in short stories (*Der Tod in Venedig, Tristan*, &c.), and has written a play, political reflections, miscellaneous prose, and verse.—His brother, HEINRICH MANN, born at Lübeck, 27th March 1871, and educated at Lübeck Gymnasium and Berlin University, is also a novelist of note, playwright, and essayist. *Der Untertan*, assailing the Kaiser and his admirers, was denied publication till the revolution.

Manna, a saccharine exudation got from the manna ash (*Fraxinus Ornus*), cultivated for the purpose chiefly in Sicily and Calabria. In July or August the collectors make deep cuts through the bark to the wood near the base of the tree; and if the weather be warm and favourable, the manna oozes out slowly, and hardens in lumps or flakes, which are removed. Manna is a light porous substance, usually in stalactiform pieces, 1 to 6 inches long, crystalline, friable, yellowish in colour, with a honey-like odour and a sweetish,

somewhat bitter taste. It is used in medicine as a gentle purgative for young children. It consists of about 60 to 80 per cent. of Mannite (q.v.), about 10 per cent. moisture, a bitter substance, and other less important constituents. There are several other manna-yielding plants besides the ash, especially the manna-bearing Eucalyptus of Australia (*Eucalyptus mannifera*), which is non-purgative, and is a favourite sweetmeat with the children of that country. Small quantities are found on the common Larch (q.v.) in some districts; this kind is known under the name of manna of Briançon.

The manna of the Israelites Ehrenberg identified with the saccharine substance called *Mount Sinai Manna*, produced in that region by *Tamarix mannifera*, a species of Tamarisk (q.v.), from whose branches it falls. It does not, however, contain any mannite, but consists wholly of mucilaginous sugar. The exudation which concretes into this manna is caused by the punctures made in the bark by insects of the genus *Coccus* (*C. manniparus*), which sometimes cover the branches. It is a kind of reddish syrup, and is eaten by the Arabs and by the monks of Mount Sinai like honey with their bread. Others have supposed that the manna of the Jews was produced by a species of Camel's Thorn (q.v.).

Manners, a noble family of Northumbrian extraction, their ancestor, Henry de Maners, having in 1178 been lord of the manor of Ethale, or Etal, in that county. His descendant, Sir Robert de Manners, was governor of Norham Castle in 1327. In 1454 another Sir Robert de Manners was sheriff of Northumberland; in 1525 his grandson was raised to the earldom of Rutland; and in 1703 the tenth earl was raised to the dukedom. The eldest son of the third duke was the celebrated Marquis of Granby (q.v.). The chief seat of the family is Belvoir Castle, 7 miles W. by S. of Grantham, a large castellated pile, reconstructed by Wyatt, and commanding a splendid view. Crabbe was chaplain here. See works by Eller (1841) and Allen (1874).

Mannheim, the capital formerly of the Rhenish Palatinate, and now the chief trading-town in Baden, lies low in a fertile plain on the right bank of the Rhine, here 400 yards wide and joined by the Neckar, 53 miles S. of Frankfurt and 38 N. of Karlsruhe. The fortifications have been converted into gardens, and the town is remarkable for its cleanliness and regularity, the whole of it being laid out in quadrangular blocks. The palace, built in 1720-29 by the Elector-Palatine Charles Philip, is one of the largest in Germany, covering 15 acres, with a façade 580 yards long, and 1500 windows. The Schillerplatz is adorned with colossal statues of Schiller, Dalberg, and the actor and dramatist Iffland (1759-1814). A great river-trade is carried on, the harbour having been opened in 1875. There are manufactures of dyes, chemicals, machinery, flour, agricultural implements, iron, cigars, carpets, rubber, &c. Pop. (1875) 46,453; (1885) 61,273; (1919) 229,576. Mannheim is heard of as early as 705, but remained a mere village till 1606, when a castle was built by the elector-palatine, around which a town grew up, peopled chiefly by Low Country Protestant refugees. It was several times taken and retaken in the 17th century; totally destroyed by the French in 1689; rebuilt and strongly fortified; bombarded by the Austrians in 1795, and by French and British in the Great War on account of its chemical and aeroplane works.

Mannikin. See WEAVER-BIRD.

Manning, HENRY EDWARD, born 15th July 1808, at Totteridge in Hertfordshire, was educated at Harrow and Balliol College, Oxford, and, after taking a first in 1830, and resigning a post in the

Colonial Office, was made a fellow of Merton. He soon came to the front as an eloquent preacher. In 1833 he was appointed to a country rectory in Sussex, and married a lady whose sisters were the wives of Samuel and Henry Wilberforce. Mrs Manning died after about four years of married life. In 1840 Manning became Archdeacon of Chichester. But in 1851, deeply moved by the final decision in the 'Gorham Case' (q.v.), he left the Church of England and joined the Church of Rome. His advancement in that communion was rapid from the first; having been ordained priest, he studied for some years in Rome, and in 1857 he founded the congregation of the Oblates of St Charles Borromeo at Bayswater, London. He was made provost of Westminster, and in 1865, on the death of Cardinal Wiseman, was promoted to be Archbishop of Westminster. At the Ecumenical Council of 1870, Manning was one of the most zealous supporters and promoters of the infallibility dogma; and, named cardinal in 1875, he continued an influential leader of the Ultramontane section of the church. Besides being the foremost spirit in most Catholic movements in England, he took part in many non-sectarian good works designed to better the social life of the people, such as the temperance movement; and he was a member of the Royal Commissions on the Housing of the Poor (1885) and on Education (1886). Before his secession to Rome, he published several volumes of powerful sermons; his subsequent writings were mainly polemical. He revised a number of articles in this work. A devout prelate, a churchly statesman, and a practical reformer, he died 14th January 1892. The Life by Purcell (1896), which was considered hardly fair to his memory, and provoked controversy, is supplemented by Leslie's (1921).

Manning, ROBERT. See BRUNNE, ROBERT OF.

Mannite, $C_6H_8(OH)_6$, is a peculiar saccharine matter which forms the principal constituent of Manna (q.v.); it is also found in several kinds of fungi, in asparagus, celery, onions, &c. It is most readily obtained by digesting manna in hot alcohol.

Manny, SIR WALTER DE, born in Hainault, followed Queen Philippa to England, fought well by land and sea for Edward III. against Scots, Flemings, and French, received broad lands as Lord de Manny, founded the Charterhouse monastery, and died in London, 15th January 1372.

Manoa. See EL DORADO.

Man-of-war. See NAVY.

Man-of-war Bird. See FRIGATE BIRD.

Manometer (Gr. *manos*, 'thin,' 'rare') is properly an instrument for measuring the rarity of the air or of other gases; but the name is most frequently applied to instruments for indicating the elastic pressure of gases, which is approximately, for each kind of gas, inversely proportional to its rarity, or directly proportional to its density. The several kinds of Barometers (q.v.) are really manometers, and so is the steam-gauge of a Steam-engine (q.v.). The name manometer is also given to piezometric tubes for measuring local pressures in liquids (say, flowing in a pipe) by the height to which the liquid is forced up the tube, this height corresponding to the difference between the internal pressure and the external atmospheric pressure.

Manor, in English law, denotes the land held by a body of tenants under one seignory or lordship. Manors were probably formed by the gradual establishment of feudal rights over free townships and subject communities of villeins or serfs; but, according to legal theory, the lord derives his rights from the king or from some superior lord. In a fully-organised manor the local customs are enforced by three courts: a Court Baron for the

free tenants, who are emphatically the *barones* or men of the manor; a Customary Court for the copyholders, who hold by base or customary tenure; and a Court Leet, in which officers are elected and minor offences punished. The lord's demesne includes lands occupied by himself and by his tenants-at-will, including customary tenants. Freehold lands do not form part of the lord's demesne; but free tenants are essential to the existence of a manor. Where the services of free tenants have been allowed to pass into desuetude the manor survives as a 'manor by reputation,' but the Customary Court is kept alive for the purpose of recording acts and events which affect the title to copyhold lands, and of collecting the quitrents, fines, &c., which are payable to the lord. No new free tenure can be created in England since the statute *Quia Emptores*, passed in 1290; all existing manors, therefore, must trace their origin from before that time. The king himself was lord of many manors in right of his crown; and these are called manors of ancient demesne, to distinguish them from lands which fell casually into the king's hands by forfeiture or otherwise. Manors closely resemble the feudal estates known to the law of Scotland. In the United States there is no such institution.

See FEUDALISM; Vinogradoff, *The Growth of the English Manor* (1905); Hone, *The Manor and Manorial Records* (1906); B. and S. Webb, *The Manor and the Borough* (1908).

Manrent (or MANRED), BONDS OF, agreements which used to be entered into in the Highlands of Scotland between the greater and lesser magnates, where protection on the one hand was stipulated in return for allegiance on the other.

Mauresa, a town of Spain, on the Cardoner, 41 miles NW. of Barcelona. It has a fine church (1020-15th century), the cave of Ignatius Loyola, and manufactures of cotton, broadcloths, brandy, &c. Pop. 27,000.

Mans, LE, once capital of Maine, and now of the department of Sarthe, 132 miles SW. of Paris. The cathedral, 390 feet long, has a Romanesque nave of the 11th and 12th centuries, and a matchless Pointed-Gothic choir of the 13th century, 104 feet high, with splendid stained glass. In the right transept is the monument of Berengaria, Cœur-de-Lion's queen. There are two other interesting churches, and both prefecture and seminary occupy old conventual buildings, the former comprising also a museum and a library. Le Mans does a large trade in poultry and clover-seed, and manufactures candles, woollens, lace, and soap. Pop. (1872) 42,654; (1911) 69,361; (1921) 71,783. The *Cenomanum* of the Romans, and the birthplace of Henry II. of England, Le Mans witnessed in 1793 the dispersion and massacre of 10,000 Vendéans, and in 1871 the defeat of 100,000 Frenchmen under Chanzy by Prince Frederick-Charles.

Mansard Roof, a form of roof, invented by the French architect François Mansard (1598-1666), is constructed with a break in the slope, so that each side has two planes, the lower being the steeper. It has the advantage of giving more space than usual for living rooms.



Mansard Roof.

Mansarowar, or MANASAROWAR, or TSO-MAYANG, a lake of Tibet, on the north slope of the Himalayas, in long. 81° 30' E., over 15,000 feet high, receives the Tage-tsangpo, the source of the Sutlej. It is noted in Hindu sacred legends, and is a place of pilgrimage for Hindus and Tibetans. The drainage into and out of Langak-tso is now normally underground. It lies between the sacred

mountain Kailas (20,300 feet) and Gurla-Mandhata (25,350). See Hedin's *Trans-Himalaya* (1909).

Manse, the dwelling-house of a minister of the Church of Scotland, in popular use applied also to that of a dissenting minister, though no legal right exists in the latter case. In the Established Church every first minister of a rural parish is entitled to a manse, which the heritors or landed proprietors in the parish are bound to build and uphold; and he is also entitled, as part of the manse or dwelling-house, to a stable, barn, and byre. The manse must, by statute, be near to the church. When a manse has been built or repaired by the heritors it becomes a free manse, and all ordinary repairs have to be done at the charges of the minister. Decree to the effect that a manse is 'free' may be given by the sheriff, and stands good for fifteen years, or until the appointment of a new minister. It has been judicially decided that a minister has a right to let his manse at a rent for two months in summer.

Mansel, HENRY LONGUEVILLE, Dean of St Paul's, was born at Cosgrove rectory, Northamptonshire, October 6, 1820. Educated at Merchant Taylors' School and St John's College, Oxford, he became Reader in Moral and Metaphysical Philosophy in 1855, and Waynflete professor in 1859. Appointed regius professor of Ecclesiastical History, and canon of Christ Church, Oxford, in 1867, he was made Dean of St Paul's in 1869. He died 31st July 1871. The pupil and continuator of Hamilton (q.v.), he differed from him in holding that there is immediate cognition of the conscious ego; he went beyond him in emphasising the Relativity of Knowledge (q.v.) in the province of theology—alleging that we have no positive conception of the attributes of God (see CONDITION). The agnostic tendency of this doctrine created violent controversy. His published works are Aldrich's *Logic*, with Notes (1849); *Prolegomena Logica* (1851); article 'Metaphysics' in 8th edition of the *Encyclopædia Britannica* (1857), afterwards published separately; *The Limits of Religious Thought* (Bampton Lectures, 1858); *The Philosophy of the Conditioned* (1866), in reply to Mill's *Review of Hamilton's Philosophy*; and lectures on *The Gnostic Heresies*, edited by Lightfoot in 1874, with Life of Mansel by the Earl of Carnarvon. He was co-editor, with Professor Veitch, of Sir William Hamilton's *Lectures*. See Dean Burgon's *Lives of Twelve Good Men* (1888).

Mansfeld, COUNTS OF, an old German noble family (founded circa 1060), whose ancestral castle stood at the east end of the Harz Mountains, 14 miles NW. of Halle. Two members of the family have acquired historical reputation. COUNT PETER ERNEST L., afterwards elevated to the rank of a prince, was born on 15th July 1517. Having taken part in Charles V.'s expedition against Tunis, and distinguished himself afterwards at the siege of Landrecies, he was made by the emperor governor of the duchy of Luxemburg. But in 1552, whilst raiding in Champagne, he was taken prisoner by the French, and not ransomed until 1557. He fought against them again at St Quentin. On the outbreak of the revolt in the Low Countries he made a name as one of the cleverest generals in the Spanish service. Having been sent by Alva to the assistance of the French king against the Protestants, he covered himself with glory at Montcontour (1569). He subsequently took part in many sieges and military operations in the Netherlands, and acted for a while as governor of the Spanish Low Countries. In 1597 he retired to Luxemburg, where he had gathered a valuable collection of antique art, and died there on 22d May 1604.

His illegitimate son, PETER ERNEST II., usually called Count Ernest von Mansfeld, was one of the most prominent military leaders during the Thirty Years' War (q.v.). Born at Luxemburg in 1580, he served his apprenticeship to war in the Austrian service in Hungary and in the Juliers dispute. As part of his reward he was promised his father's possessions; but when it came to the pinch, they were refused to him. This converted Mansfeld into an implacable enemy, and he went over to the side of the Protestant princes. He assisted the Duke of Savoy against the Spaniards (1613-17), and in 1618 was despatched to Bohemia, to aid the Count-Palatine Frederick, and captured Pilsen and other strongholds. But the disaster of the Weissenberg compelled him to retreat to the Palatinate, from which he carried on for nearly two years a semi-predatory war on the imperialists, defeating Tilly at Wiesloch (April 1622). When Frederick abandoned the struggle, Mansfeld, with his chosen ally Christian of Brunswick, a swashbuckling adventurer like himself, fought his way through the Spanish-Austrian forces to take service for the United Netherlands, beating Cordova at Fleurus (29th August). At the bidding of his new masters Mansfeld chastised the Count of East Friesland, and then, dismissing his army, retired into private life at The Hague. But in 1624 he resumed active work again at the solicitation of Richelieu. With an army of 12,000 men, raised mostly in England, he renewed the struggle on the Lower Elbe, till on 25th April 1626 he was crushingly defeated by Wallenstein at the bridge at Dessau. Once more raising a force of 12,000 in Brandenburg, with these and 5000 Danes he marched by way of Silesia to join hands in Moravia and Hungary with Bethlen Gabor of Transylvania. But the French and English subsidies failing, on which he relied for pay for his men, he was making his way to Venice with a few officers to raise fresh moneys when he fell sick and died, standing, clad in full panoply and supported by two attendants, at Racowitza, near Serajevo in Bosnia, on 29th November 1626. Count Ernest, a soldier of fortune, was the idol of his lawless soldiery, whom he frequently allowed to plunder and raid to their heart's content, so that they were a terror to friends as well as foes.

Mansfield, a municipal borough (since 1891) of Nottinghamshire, in Sherwood Forest, 17 miles N. of Nottingham. Its grammar-school (1561) has been rebuilt; and there are a memorial cross (1850) to Lord George Bentinck, a town-hall (1836), an interesting parish church, &c. Mansfield stands in the centre of a manufacturing and mining district, and has manufactures of lace-thread and iron. Pop. (1851) 10,012; (1911) 36,888; (1921) 44,418.

Mansfield, capital of Richland county, Ohio, stands on an elevated site, 155 miles NE. of Cincinnati, and contains iron-foundries and manufacturing of flour, agricultural implements, stoves, tiles, &c.; pop. 28,000.

Mansfield, KATHERINE, writer of short stories, was born (Kathleen Beauchamp) in 1889 in New Zealand, a daughter of Sir Harold Beauchamp of Wellington. She published from 1911 onwards. In 1913 she married Mr Middleton Murry the critic, and became one of the most distinguished reviewers in *The Athenæum*. With *Bliss* (1920) she stepped into the front rank of writers, the nearest perhaps to Tchekhov that English literature could show. She wrote with an amazing intensity, and had an unearthly gift for the significance of minute happenings. In *The Garden Party* (1922) again was seen the like power of sensitive expres-

sion in few and simple words. She died 9th January 1923. Posthumous volumes of short stories, *The Dove's Nest* and *Something Childish*, appeared in 1923 and 1924; and a volume of *Poems* in 1923.

Mansfield, WILLIAM MURRAY, EARL OF, Lord-chief-justice of the King's Bench, was the fourth son of Andrew, Viscount Stormont, and was born at Perth, 2d March 1705. From Westminster he passed to Christ Church, Oxford, graduated M.A. in 1730, and was called to the bar the following year. He soon acquired an extensive practice—mainly, it would seem, on account of his facility and force as a speaker, for neither then nor at any subsequent period of his career was he reckoned a very erudite lawyer—and was often employed on appeal cases before the House of Lords. In 1743 he was appointed Solicitor-general, entered the House of Commons as member for Boroughbridge, and at once took a high position. In 1746 he acted, *ex officio*, as counsel against the rebel lords, Lovat, Balmerino, and Kilmarnock; was appointed Attorney-general in 1754; and at this time stood so high that, had not the keenness of his ambition been mitigated by a well-founded distrust of his fitness for leading the House, he might have aspired to the highest political honours. He became Chief-justice of the King's Bench in 1756, and, contrary to usage, also a member of the cabinet; and entered the House of Lords under the title of Baron Mansfield of Mansfield, in the county of Nottingham. Although he was impartial and tolerant as a judge, his opinions were not those of the popular side, and accordingly he was exposed to much abuse and party hatred. Junius bitterly attacked him, and during the Gordon riots of 1780 his house, with all his books and papers, was burned. The aged judge declined with much dignity to be indemnified by parliament. In 1776 Murray was made Earl of Mansfield. Age and ill-health forced him to resign the Chief-justiceship in 1788. He died, 20th March 1793, when the title devolved upon his nephew, Viscount Stormont.

Mansfield College, a Congregationalist theological college at Oxford (q.v.), not included in the university.

Mansion, or **HOUSE**, in astrology, each one of the twenty-eight divisions of the ecliptic, occupied by the moon on successive days; also that sign of the zodiac in which each planet was supposed to have most influence; or one of twelve portions of the sky divided by great circles through the north and south points of the horizon.

Mansion, COLARD, a Bruges printer, for a time the partner, perhaps the teacher, of Caxton (q.v.).

Mansion House, the official residence of the Lord Mayor of London, was built on the site of the Old Stocks Market in 1739. It is an oblong building, and at its farthest end is the Egyptian Hall. Four hundred guests can dine in this grand banquetting-room, which was designed by the Earl of Burlington from the description of an Egyptian chamber given by Vitruvius. All the great banquets, public and private, given by the Lord Mayor take place here, and there are also fine ball and reception rooms. At the close of the exhibition of 1851 the Corporation of London voted £10,000 to be expended on statuary for the adornment of the Mansion House; and there is also a fine gallery of portraits and other pictures. Among its curiosities may be mentioned a state bed, and a kitchen and cooking utensils of vast size. The Mansion House is too modern to possess much historical interest; but the Wilkes riots frequently took place in its neighbourhood during the mayoralty of Wilkes's friend, Brass Crosby. It is often a centre for the collection of money for sufferers from disasters and

unemployment and for memorials to heroic worth. See a history by Sydney Perks (1922).

Manslaughter is the crime of unlawful homicide without malice aforethought. Homicide, or the infliction of death, is not a crime when it is done in self-defence against unlawful violence, or when it is done in the execution of the sentence of a court of justice. Thus one whose life is endangered by the violent attack of a madman, and who kills the madman, commits homicide, but is innocent of manslaughter. So, too, is the executioner who hangs a convicted murderer. Homicide is unlawful, and amounts to manslaughter when, without being justified in any such manner as has been exemplified above, it is committed with the intention to cause physical injury; or is the result of culpable negligence or omission to perform some legal duty; or is the result of an accident occasioned by some unlawful act. Thus, if one man strike another without intending to kill him, and the blow prove fatal, the striker is guilty of manslaughter; or if, where it is the duty of the master of a ship to keep a lookout for small boats in the ship's way, a boat is run down and its occupants drowned in consequence of the absence of a lookout upon the ship, the master of the vessel is guilty of manslaughter; or if a man is engaged in an unlicensed manufacture of dynamite, and by an accidental explosion of the dynamite another is killed, the manufacturer is guilty of manslaughter. When manslaughter is accompanied by malice aforethought, it becomes murder. See Sir James Stephen's *Digest of the Criminal Law*.

Manson, GEORGE, a Scottish water-colour painter, was born in Edinburgh on 3d December 1850. He served five years as a wood-engraver in the establishment of Messrs W. & R. Chambers, studying art in his spare hours morning and evening. His first picture which attracted attention, 'Milking Time,' was painted at Craigmillar Castle, between four and eight o'clock of the mornings of a whole summer. In 1871 he devoted himself to painting altogether, but his youthful hard study had permanently injured his health, and he died at Lympstone, Devonshire, 27th February 1876. His pictures are mostly from humble life; beauty and refinement of drawing and colour are their great charm. See a memoir by J. M. Gray, with photographs of his principal pictures (1880); also P. G. Hamerton's *Graphic Arts*.

Mansur. See ALMANSUR, KHALIF.

Mansûra, a town of Lower Egypt, on the Damietta branch of the Nile, 30 miles SW. of Damietta; pop. 50,000. The place was founded in 1220, and here St Louis of France was imprisoned in 1250.

Mantchuria. See MANCHURIA.

Mantegna, ANDREA, Italian painter, born in Vicenza in 1431, was the favourite pupil and adopted son of that tailor Mæcenas of painters, Squarcione. By studying the antique collections gathered together by his patron, especially from the study of the sculpture, Mantegna became imbued with the spirit of ancient art, and all his works bear the impress of the severe dignity and precision of his models. Grace and beauty were not the ideals that he aimed at; some of his pictures are positively ugly. A precocious genius, Mantegna set up an independent atelier when only seventeen years of age. Amongst his earliest works, done at Padua, are frescoes of saints in the church of St Antony, an altarpiece for St Justina, and most of the frescoes of St Christopher, and some of those of St James, in the church of the Hermits. Having married the sister of Giovanni and Gentile Bellini, he seems to have become estranged from Squarcione, and left Padua (1459). He painted an altarpiece, the 'Madonna and Angels,' for St

Zeno's church at Verona, and was induced by Lodovico Gonzaga, Duke of Mantua, to settle in his city. There he remained, with the exception of a visit to Rome (1488-90) to paint a series of frescoes (now destroyed) for Pope Innocent VIII., until his death on 13th September 1506. His greatest works at Mantua were nine tempera pictures representing the 'Triumph of Cæsar' (his masterpiece), 'The Madonna of Victory with Gonzaga,' 'Parnassus,' 'Defeat of the Vices,' 'Triumph of Scipio,' and 'Madonna between St John the Baptist and St Magdalene.' Like Leonardo da Vinci, Mantegna was something of a universal genius. He was an engraver and an architect, as well as a painter, and is said to have written poems and wielded the sculptor's chisel. His best plates bear the titles 'A Bacchanal Feast,' 'Descent from the Cross,' 'Entombment,' 'Resurrection,' 'Battle of the Titans,' and 'Roman Triumphs.' Mantegna's technical excellencies, his skilful foreshortening, masterly perspective, and austerity of form exercised great influence upon Italian art.

See Miss Julia Cartwright's *Mantegna and Francia* (1881); Yriarte's *Mantegna* (1900); and the great monograph by Paul Kristeller (1901).

Mantell, GIDEON ALGERNON, an eminent British palæontologist and geologist, was born at Lewes, in Sussex, in 1790; studied medicine; and practised successively at Lewes, Brighton, Clapham, and London, where he died in 1852. Though long suffering from a distressing spinal disease, the result of an accident, he pursued his studies with unabated zeal. He bequeathed his geological drawings to Yale College. His collections he sold to the British Museum in 1839 for £5000. Mantell's principal works are *Fossils of the South Downs* (1822); *The Fossils of Tilgate Forest* (1826); *Wonders of Geology* (1833), perhaps the most popular geological work ever written by an Englishman; and *Medals of Creation, or First Lessons in Geology* (1844). He was a very voluminous writer, no less than sixty-seven works and memoirs of his being enumerated in Agassiz and Strickland's *Bibliotheca Zoologica et Geologica*. His claims to a permanent place in the history of science rest mainly on his laborious investigations into the fossils of the Wealden beds. To him we owe the discovery and description of the four great Dinosaurian reptiles, the *Iguanodon*, *Hylæosaurus*, *Pelorosaurus*, and *Regnosaurus*.

Mantes, a town in the French department of Seine-et-Oise, on the left bank of the Seine, 36 miles by rail WNW. of Paris. It has a striking tower (1344) and a beautiful church, a reduced copy of Notre Dame at Paris. The ancient *Medunta*, a town of the Celts, Mantes in 1083 was sacked by William the Conqueror, who here received the injury that caused his death; and here too Henry IV. was converted from Protestantism. Pop. 10,000.

Manteuffel, EDWIN HANS KARL, FREIHERR VON, Prussian general and administrator, was born, of an old Pomeranian noble family, at Dresden on 24th February 1809. Entering the Prussian guards in 1827, he rose to be colonel by 1854, and three years later was nominated head of the military bureau at Berlin, a post which he held until 1865. Having been appointed commander of the Prussian troops in Sleswick, he protested against the summoning of the Holstein estates by marching his men into that duchy (June 7, 1866). On the outbreak of hostilities Manteuffel commanded a division of the army of the Main, which was destined to act against the south German allies of Austria. He took part in the battle of Langensalza (27th June), which brought about the capitulation of the Hanoverian army, and on 19th July succeeded Von Falckenstein as commander-in-

chief of the Main army, and by winning the battles of Werbach, Tauberbischofsheim, Helmstädt, and Rossbrunn over the Bavarians and others he brought that part of the campaign to a successful issue. He entered the war of 1870 as commander of the First Corps, but was soon promoted to the command of the First Army, which fought successfully at Amiens and other places. Transferred in January 1871 to the command of the army of the south, operating against Bourbaki, Manteuffel assailed the enemy's rear near Belfort, and drove 80,000 men across the frontier into Switzerland. When peace was proclaimed he was placed at the head of the army of occupation in France, and in 1879 was appointed imperial viceroy of the newly-organised province, Alsace-Lorraine. He died 17th June 1885. See Life by Keck (1889).

Manticore, a fabulous beast mentioned by Ctesias (q.v.), having a human head, lion's body, scorpion's tail, and porcupine's quills. A form of it sometimes appears in heraldry.

Mantineia, an ancient city of Arcadia, in the Peloponnesus, in a plain on the river Ophis. Here Epaminondas fell in the moment of a great victory over the Spartans, 362 B.C.

Mantis. This name is commonly applied to the various genera which constitute the family Mantidae of the insect order Orthoptera. They are chiefly to be distinguished by the long prothorax and the enlarged front legs, which are fitted for grasping. They are entirely carnivorous in habit, but do not actively pursue their prey; the insect waits patiently until a fly comes within reach, and then rapidly seizes it with its fore-limbs (see the illustration).



Mantis religiosa.

The attitude adopted while waiting for insects to come within reach has given to one species, plentiful in the south of Europe, the name of 'praying mantis' (*M. religiosa*). This creature, invested with supernatural attributes, figures prominently in Bushman mythology and folklore. One of the most remarkable forms of mantis is the Indian *Hymenopus bicornis*; it has a flower-like shape and a pink colour. The apparent petals are the much-flattened joints of some of the limbs as it rests quietly among foliage. It is supposed that the resemblance to an orchid-like flower may delude smaller insects into approaching near enough for the mantis to take advantage of its 'alluring' colours and shape.

Mantle. See GAS (LIGHTING AND HEATING BY). Mantles have also been used with oil-lamps.

Mantling. See HERALDRY.

Man-traps, formerly often indicated by the warning notice 'Man-traps and spring-guns set here,'

resembled gigantic rat-traps four feet long. It is, since 1827, illegal to set them save indoors between sunset and sunrise, as a defence against burglars.

Mantua (Ital. *Man'tova*), a fortified city of northern Italy, formerly capital of a duchy and now of a province, 36 miles N. of Modena and 22 S. by W. of Verona, occupies two islands formed by the Mincio, and stands in the midst of a marshy district, which, combined with its artificial fortifications, makes it perhaps the strongest fortress in Italy. But its situation makes it liable to malaria. It forms one of the four fortresses of the Quadrilateral (q.v.). The streets are spacious, the squares numerous, and the population comparatively small—36,633 in 1921. For this reason, and because of the numerous massive mediæval buildings, the town has a lifeless and gloomy appearance. Chief amongst the buildings are the fortress of the Gonzagas, erected in 1393–1406, and adorned with paintings by Mantegna; close by is the ducal palace, begun in 1302, which contains 500 rooms, many of them ornamented with paintings and designs of Giulio Romano; the Palazzo Te, outside the city walls on the south, the greatest monument to the skill of Giulio Romano as architect, painter, and sculptor; the cathedral of San Pietro, restored from designs by Romano; and the church of San Andrea, one of the finest Renaissance churches in Italy, containing the tomb of Mantegna, whose pupils adorned the walls with frescoes. The public institutions include an academy of arts and sciences, a library, a museum of antiquities, an observatory, archives, a botanical garden, a large military hospital, &c. Virgil was born at Pietole (anc. *Andes*), now a suburb of Mantua. The industries include weaving, tanning, and saltpetre-refining. The Jewish population is considerable. Mantua, an Etruscan town, was successively in the possession of the Romans, Ostrogoths, and Lombards before falling into the hands of the emperors, who gave it to the Marquis of Canossa. From him it passed to the Countess Matilda of Tuscany in 1052. After her death it was a free imperial city and joined the Lombard leagues against the Hohenstaufen emperors. The Buonacolsis made themselves masters of the city in 1247, but were ousted from power by the head of the Gonzaga (q.v.) family in 1328. This dynasty, the head of which was created duke by Charles V. in 1530, not only maintained themselves against their great rivals, the Visconti of Milan, but raised the city to the height of its splendour and renown. The last duke died childless in 1708, and his duchy was confiscated by Austria, who kept her hold of it down to 1866, except for two short periods (1797–99 and 1801–14), when it was in the possession of France. Mantua has endured at least three great sieges, by the Emperor Ferdinand II. in 1630, by the French in 1797, and by the Austrians in 1799. Here Andreas Hofer (q.v.) was shot in 1810.

Mantuanus (or SPAGNUOLI), BAPTISTA (1448–1516), the 'good old Mantuan' of *Love's Labour's Lost*, was a native of Mantua, who became general of the Carmelites. He wrote Latin eclogues long read in schools, translated by Turberville, and imitated by Spenser in the *Shepherd's Calendar*. See the edition by Dr W. P. Mustard (Phila. 1911).

Manu is the reputed author of the most renowned law-book of the ancient Hindus, the *Manu-Smṛiti* or *Mānava-Dharmaśāstra*. The ascription is apocryphal; for, in several passages of the Vedas (q.v.), as well as the Mahābhārata (q.v.), Manu is mentioned as the hero of the Hindu legend of the flood and as the progenitor of the human race; and, in the first chapter of the law-book ascribed to him, he declares himself to have been produced by Virāj, an offspring of the

Supreme Being, and to have created all this universe. Hindu mythology knows, moreover, a succession of Manus, each of whom created, in his own period, the world anew after it had perished at the end of a mundane age. The word Manu—akin to our ‘man’—belongs therefore, properly speaking, to ancient Hindu mythology, and it was connected with the renowned law-book, partly in order to impart to the latter the sanctity on which its authority rests, and partly because, as Bühler has proved, the extant work is a verified recast of an older law-book, now lost, the *Mānava-Dharmasūtra*, the manual of a particular Vedic school, the Mānavas, whose name indicates that they claimed descent from Manu. This work is not merely a law-book in the European sense of the word, it is likewise a system of cosmogony; it propounds metaphysical doctrines, teaches the art of government, and, amongst other things, treats of the state of the soul after death. The chief topics of its twelve books are the following: (1) creation; (2) education and the duties of a pupil, or the first order; (3) marriage and the duties of a householder, or the second order; (4) means of subsistence and private morals; (5) diet, purification, and the duties of women; (6) the duties of an anchorite and an ascetic, or the duties of the third and fourth orders; (7) the duties of a king as regards internal administration, foreign relations, and war; (8) judicature and law, private and criminal; (9) marital relations, inheritance, miscellaneous royal duties, and the duties of the castes of commoners and serfs; (10) mixed castes and the duties of the castes in time of distress; (11) penance and expiation; (12) transmigration and final beatitude. Bühler holds that the work, the date of which used to be given at 1200 B.C., was certainly extant in the 2d century A.D., and seems to have been composed between that date and the 2d century B.C. There are many remarkable correspondences between this work and the Mahābhārata, suggesting the use in both of common materials.

The laws of Manu were translated by Sir William Jones (1794). See also *The Ordinances of Manu*, translated from the Sanskrit, with introduction by Burnell, completed by Hopkins (1884); *The Laws of Manu*, translated with extracts from seven commentaries by G. Bühler (in ‘Sacred Books of the East,’ 1886).

Manure. Any material, whether of animal, vegetable, or mineral origin, which adds to the fertility of the soil has been generally regarded as manure. The application of stable and farmyard manure, as also the ashes of plants, &c., to the soil has been practised probably in all ages; but the scientific principles involved in this ancient practice were but little understood until more recent times, when chemists, botanists, and physiologists set themselves the task of explaining to the agriculturist the changes which are ever taking place in the soil and in the plant itself. On virgin soils crops may be grown for years without much evident diminution in quantity or quality; but a period must come when there will be an exhaustion of one or more of the constituents of plants, and the soil can then be no longer regarded as fertile. That is to say, soils contain certain proportions of certain ingredients; and when these are abstracted by the plant and carried away in the form of crops, the soil must in time become exhausted. It then becomes necessary to add to the soil in the form of manure such constituents as the crops have removed in order that the land may regain fertility. When we consider that Soils (q.v.) are formed mainly from the weathering of rocks, it will at once be understood how it is generally unnecessary that manures should contain such things as magnesia, iron, alumina, &c. Speaking generally, the constituents which are removed by plants from soils,

the loss of which brings about that condition of ‘exhaustion,’ are compounds of nitrogen, phosphoric acid, and potash; and hence it is, in part at least, that farmyard manure is so universally regarded as the ‘stand-by’ of the agriculturist, for that material contains all those ingredients, and in a form easily assimilated by plants. It must not be overlooked, however, that possibly the chief advantage derived from the use of farmyard manure is that it adds humus or organic matter, which renders the soil more porous, increases its water-holding capacity, and renders it easy of reduction to a favourable state of tilth. Manures containing large proportions of organic matter, such as stable manure, wrack or seaweed, fish offal, &c., have value as plant-food; but their beneficial effects are largely due to the physical properties of the decaying organic matter which they contain.

The first *artificial* manure systematically used was probably bones, applied in the earlier periods, either in an unground condition or simply bruised. About the beginning of the 19th century, however, it was proved that fineness of division rendered bone more easily assimilated by plants; and further progress still was made when Liebig introduced the treatment of bone with sulphuric acid, whereby chemical division was realised. The relative importance of bones as a manure has decreased greatly.

Guano.—Peruvian guano was at one time imported from the Chincha Islands in enormous quantities; but the old deposits are practically exhausted, and the quality of the now available supply is comparatively poor (see GUANO). Ichaboe (off south-west Africa) guano is still imported, though in somewhat limited quantity; but it is much the richest available guano. The value of these guanos lies in the percentages of nitrogenous organic matter, ammonium salts, phosphates of the alkalies and of lime, and the potash salts which they contain. Some of the islands in the South Pacific yield supplies of guano, but these are almost purely phosphatic, owing to the abundant rainfall of that region having washed out all the ammoniacal salts. Liebig’s Guano and Liebig’s Meat Meal are by-products from the preparation of Liebig’s extract of meat. They are in a fine state of mechanical division, and are valuable sources of nitrogen and phosphates. Fish-guano is largely produced in Norway and the north of Scotland from fish offal (see GUANO). The process employed is essentially steaming to remove the oil, which is run off with the water; the solid residue is pressed and dried. The manurial constituents of this material are nitrogen and phosphates.

Dried Blood is another valuable source of nitrogen. Horn powder, shoddy and wool waste, leather raspings, &c. are also employed for the same purpose, but they are of much less value.

Phosphatic Substances are of two classes. Mineral phosphates are obtained from Florida, Carolina, Christmas Island, Algiers, and other places. They may be used directly as ‘ground mineral phosphate,’ or are more generally treated with sulphuric acid to form *superphosphate* ($\text{CuH}_4(\text{PO}_4)_2$), which is soluble in water, and therefore forms a quick-acting manure. Superphosphate is now widely used. The other common form of phosphatic manure is *basic slag*, a by-product from the manufacture of steel from phosphatic ores. It is used without any treatment beyond that of grinding to a very fine powder; 80 or 90 per cent. should pass through a sieve of 10,000 holes to the square inch. These manures are valued according to the quantity of phosphate they contain, which may vary from 15 per cent. in low-grade slag to 70 or 80 per cent. in high-grade mineral phosphate.

Sulphate of Ammonia is principally derived from

the destructive distillation of coal and shale (see GAS and PARAFFIN). Its value depends upon the percentage of ammonia which it contains. The normal commercial product, 95 per cent. pure, contains 20 per cent. of nitrogen, equivalent to 24 per cent. ammonia.

Nitrate of Soda or *Chile Saltpetre* is very extensively imported, and is sold on a basis of 95 per cent. nitrate, or '5 per cent. refraction'—i.e. not more than 5 per cent. of impurities—equivalent to 15 per cent. nitrogen. It is found native in several districts of South America in an impure state, and is rendered marketable by a process of solution and re-crystallising. See NITRE.

Nitrate of Lime and *Calcium Cyanamide* are made by different processes, in both of which atmospheric nitrogen is fixed and rendered available as manure. Both are valuable manures, but the cyanamide is not suitable for application to cold, wet soils. Commercial nitrate of lime is about 75 per cent. pure, equivalent to 13 per cent. nitrogen. Commercial cyanamide contains 18 per cent. nitrogen.

Potash Salts are of the utmost service to plants. Carse or clay lands generally contain a sufficiency of potash, while medium and light soils require it to be added. Nitrate, sulphate, and muriate are all more or less employed in compounding potash manures (i.e. manures containing potash as one of their constituents), but kainit—an impure potash salt largely imported from Germany—is perhaps the most generally used when a dressing of potash only is desired.

Liquid Manure may be classed with farmyard manure, as it is now very commonly absorbed in the 'courts' by the straw, &c. Occasionally it is used in the liquid form on grass or stubble land.

Lime is not a manure in the strict sense, in that it is never applied with the object of supplying the particular element, calcium, which it contains. Its great value is in supplying a *base*. In its absence soils become acid, and the normal bacteriological processes of nitrification cease. Lime may be applied as carbonate—e.g. ground limestone or chalk—as oxide (quicklime), or as hydrate (slaked lime). See AGRICULTURE, BONE MANURES, COMPOSTS, ROTATION, SEWAGE, SLAG.

Manuscripts. See PALÆOGRAPHY, CODEX, PAPYRUS, ILLUMINATION, WRITING.

Manutius, Manuzio. See ALDINE EDITIONS.

Manx. See MAN, ISLE OF.

Manyplies. See DIGESTION.

Manytch, a depression which in geologically recent times connected the Caspian with the Sea of Azov, and may still be regarded as the boundary between Europe and Asia. The river Manytch flows (when it is not a mere chain of salt lakes) WNW. to the Don. The eastern Manytch flows eastward from the watershed, until it is lost in the sands, or possibly sometimes reaches the Caspian through the Haiduk and the Kuma.

Manzanares, a town of the Spanish province of Ciudad Real, 100 miles S. of Madrid, in the La Mancha country, has an old citadel. The district produces saffron and wine. Pop. 16,000.

Manzanares. See MADRID.

Manzanillo, (1) a port of Mexico, on a fine bay opening to the Pacific, 41 miles WSW. of Colima, with which it is connected by rail. The country around is fertile. Pop. 4000.—(2) A port on the south coast of Cuba, with a good harbour, and export trade in valuable woods, sugar, &c.; pop. 60,000.

Manzanita, a name given to several Californian shrubs, species of *Arctostaphylos* (see BEARBERRY), which form dense thickets ('chaparral') on the mountain-sides. The berries are edible.

Manzikert, MANAZGERT, or MELAZGERD, in Armenia, N. of Lake Van, scene of the victory of Alp-Arslan (q.v.) over Romanus Diogenes in 1071.

Manzoni, ALESSANDRO, a great Italian writer, was born at Milan, March 7, 1785, of noble parents, through his mother grandson of the celebrated Marquis Beccaria. He published his first poems in 1806, married happily in 1810, and spent the next few years in the composition of the *Inni Sacri*, sacred lyrics, and a treatise on the religious basis of morality, by way of reparation for the unbelief of early youth. In 1819 he published his first tragedy, *Il Conte di Carmagnola*, a trumpet-blast of romanticism; the second, *Adelchi*, followed in 1822. Manzoni's first tragedy had the honour to be defended by Goethe, 'one genius having divined the other.' But the work which gave Manzoni European fame is his historical novel, *I Promessi Sposi*, a Milanese story of the 17th century (3 vols. Milan, 1825-6-7). The tale abounds in interesting sketches of national and local Italian customs and modes of life, portrayed with unflinching spirit and humour, while various grave historical events are narrated with force and grandeur of style, especially the episode of the plague in Milan. Manzoni's noble ode, *Il Cinque Maggio*, was inspired by the death of the great Napoleon. His last years were darkened by the frequent shadow of death within his household. He himself died at Milan, 23d May 1873, leaving to posterity the memory not alone of a great writer, but of a singularly noble and sincere man.

An edition of his works in 5 vols. was published in 1828-29, and his Letters were collected by Sforza (1875). The standard edition of the complete works (Hoeppli, Milan) includes his Letters edited by Sforza and Gallavresi (1913). See Bismara's *Bibliografia Manzoniiana* (Turin, 1875); Lives (Italian) by Albiani (1873), Bersezio (1873), Prina (1874), Pagni (1876), Gubernatis (1879), and Graf (1898); De Sanctis, *Manzoni: Studi e Lezioni* (1922).

Ma'oris, the native inhabitants of New Zealand (q.v.).

Maormor. See EARL.

Map (Lat. *mappa*, 'a towel'). A map is a delineation on a plane of the surface of the earth or of a portion thereof, exhibiting the lines of latitude and longitude, &c., and the forms and relative positions of the countries, mountain-ranges, rivers, towns, &c.; or it may be of the starry heavens, or of stars and constellations. As it is manifestly impossible correctly to represent a spherical upon a plane surface, geographers are consequently necessitated to resort to expedients in order to minimise or distribute the unavoidable distortion and disproportion. Hence the use of the various map projections or arrangements of the lines of latitude and longitude. The only true representation of the earth's surface, it is clear, is to be found on the *terrestrial globe*. This is inconvenient in form and necessarily too small in scale to serve the purposes effected by maps proper, which are usually produced on paper or other convenient plane surfaces, and a series of which, conjoined, form an *atlas*. A *hydrographical* map, specially representing oceans, seas, or navigable waters with their coasts, sandbanks, currents, lighthouses, depths, and other objects and information of importance to seamen, is usually constructed on Mercator's projection, and is called a *Chart* (q.v.). A special *topographical* map represents the details minutely and on a considerable scale. The Ordnance Survey (q.v.) of Great Britain and Ireland is a good example of such, and is produced on various scales. An *orographical* map shows the relief of the land surface. For this purpose Contour Lines (q.v.) are much more satisfactory than the old-fashioned hachures; and 'layers' coloured in a scale ranging (say) from dark green

for land near sea-level, through light greens and browns to dark browns for the highest hill-tops, present the character and details of a country vividly to the eye. In like manner a *bathygraphical* map shows depth of water, commonly by deepening shades of blue. A *bathyorographical* map is a combination of the two last. Maps may be constructed for special purposes, and are distinguished as physical, geological, political, military, statistical, historical, &c. See GEOGRAPHY, GEOLOGY, SURVEYING.

Officers of the Geological Survey (q.v.) insert in Ordnance Survey maps the boundaries of formations and other data of interest to geologists and miners. The geological maps thus made were long hand-coloured, but are now printed in colours. In like manner botanical maps have been constructed by ecologists, by indicating plant-formations upon an ordinary map.

Within the last century or so great improvement has been made in the art of map production or *cartography*, resulting in great clearness and the combination of a mass of information with artistic beauty. This is attained in some cases partly by the use of conventional signs or arrangements, such as the adoption of blue colour for coasts and water-courses, brown for mountain-ranges, and various tintings for the divisions, political or otherwise, and to distinguish the various natures of the surface, such as forest, arable, prairie, desert, differences of elevation, &c. The art of lithography has been an invaluable aid in all such cases. In Germany especially has this science-art been carried to the greatest perfection. Of late maps have been made by photographing the ground from aircraft, a method of use in difficult country.

The *scale* or definite relation of a map to the actual size of nature is indicated by a graduated line, showing by its divisions the number of kilometres, or miles, or yards corresponding to any space measured on the map. In comparing various maps by their scales, it is convenient to refer to the *scale of nature*, frequently indicated in proportional figures, thus—1 : 3,700,000 ; 1 : 500,000, &c.

The lines of *projection* on a map are essential for determining the positions of the parts, and indicate latitude, or distance north or south from the equator, and longitude, or distance east or west from any given line. These lines are called meridians, and are usually numbered from the meridian of Greenwich on English maps, and indeed on nearly all maps. Other first meridians in common use are those of Paris, Washington, and Ferro (see LATITUDE AND LONGITUDE). These distances are given in degrees, minutes, and seconds, as in other circle measurements. In choosing a projection, regard must be had to the purpose for which it is intended, and to the area to be represented. The errors inherent in a projection nearly imperceptible in a map of England might be fatal to its use in a map of Asia. In a map of the world equivalence of area is of less importance than freedom from distortion and correctness of relative position. There have been numerous forms of projection devised, including perspectives and approximative developments. Of these only the more familiar can be described here.

The plane on which the perspective map is drawn is supposed to pass through the centre of the earth, and, according to the distance of the eye, the projection is either of the first, second, or third of the following. (1) In the *orthographic* the eye is assumed to be at an infinite distance from the centre of the earth, so that all rays of light proceeding from every point in its surface are parallel and perpendicular. From the nature of this projection, it is evident that, while the central parts of the hemisphere are fairly accurately represented, the parts towards the

circumference are crowded together and diminished in size. On this account it is of little use for geographical purposes, but most suitable for maps of the moon. (2) In the *stereographic* the eye or point of projection is assumed to be placed on

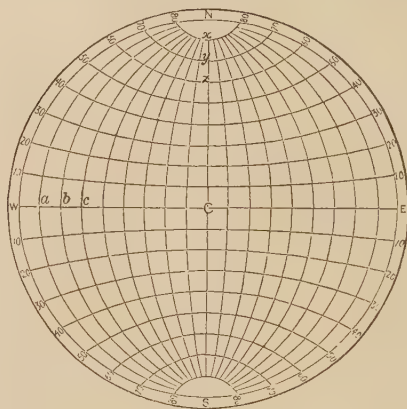


Fig. 1.
Globular, or Equidistant Projection of a Hemisphere.

the surface of the sphere opposite the one to be delineated. If the globe were transparent, the eye would then see the opposite concave surface. Contrary to the orthographic, this method contracts the centre of the map, and enlarges it towards the circumference. Owing to the unequal area of the divisions, and the difficulty of finding the true latitude and longitude of places, this projection is not much employed. (3) In order to rectify the opposite effects of the two preceding, the *globular* projection, a modification of the two, is generally adopted. If we suppose the eye to be removed from the surface to a distance equal to the sine of 45° of the circumscribing circle, the projection is called globular. In other words, if the diameter of the sphere be 200 parts, it must be produced 70 of these parts in order to give the point of projection. All meridians and parallels in this projection are in reality elliptical curves; but as they approach so nearly to circular arcs, they are very rarely shown otherwise.

The construction of the globular or equidistant projection is as follows (fig. 1): Describe a circle, NESW, to represent a meridian, and draw two diameters, NCS and WCE, perpendicular to each other, the one for a central meridian, the other for the equator. Then N and S will represent the north and south poles. Divide each of the quadrants into nine equal parts, and each of the radii, CN, CE, CS, and CW, also into nine equal parts. Produce NS both ways, and find on it the centres of circles which will pass through the three points 80° , 80° , 70° , 70° , &c., and these arcs described on both sides of the equator will be the parallels of latitude. In like manner, find on WE produced the centres of circles which must pass through *a*, *b*, &c., and the poles. Having selected the first meridian, number the others successively to the east and west of it. A map may in this way be constructed on the rational horizon of any place.

The impossibility of getting a satisfactory representation of special parts of the sphere by any of the previous methods leads to the desire for others less defective. Of all solid bodies whose surfaces can be accurately developed or rolled out upon a plane without alteration, the cone and cylinder approach nearest to the character of the sphere. A portion of the sphere between two parallels not far distant from each other corresponds very nearly to

a like conical zone; whence it is that conical developments make the best projections for limited portions of the earth's surface, and even with some modifications for more extensive portions.

A conical projection of Europe (fig. 2) is constructed thus: Draw a base-line, AB; bisect it in E, and at that point erect a perpendicular, ED, to form the central meridian of the map. Take a space for 5° of latitude, and, since Europe lies between the 35th and 75th parallels of latitude, mark off eight of these spaces along ED for the points through which the parallels must pass. The centre from which to describe the parallels will be the point in ED where the top of a cone, cutting the globe at the 45th and 65th parallels, would meet the axis of the sphere. This point will be found to be beyond the North Pole at C. On the parallels of 45° and 65°, where the cone cuts the sphere, mark off equivalents to 5° of longitude, in proportion to the degrees of latitude in those parallels, and if straight lines be drawn through these points from C they will represent the meridians for every 5°. A modification of the conic projection, suitable for more extensive portions of the sphere, such as Asia, is obtained by giving on each parallel of latitude the true meridional proportional distances, which results in a curving of the meridian lines outward from the centre of the map.

In all the projections hitherto described the direction either of the north and south, or of the east and west, is represented by a curved line, so

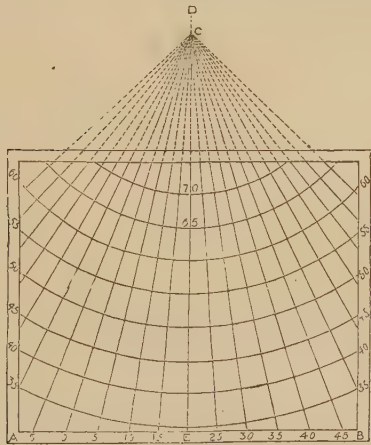


Fig. 2.—Conical Projection of Europe.

that on such a map the course of a vessel would almost always be laid down in a curve, which could only be described by continually laying off from the meridian a line at an angle equal to that made with the meridian by the point of the compass at which the ship was sailing. If the vessel were to steer in a direct north-east course by one of the previous projections, she would, if land did not intervene, describe a spiral. The mariner, however, requires a chart which will enable him to steer his course by compass in straight lines only. This valuable instrument is supplied by Mercator's chart, a cylindrical projection in which all the meridians are straight lines *perpendicular* to the equator, and all the parallels straight lines *parallel* to the equator. It is constructed thus (fig. 3): A line, AB, is drawn of the required length for the equator. This line is divided into 36, 24, or 18 equal parts, for meridians at 10°, 15°, or 20° apart, and the meridians are then drawn through these perpendicular to AB. From a table of meridional parts (a table of the number of times that the length of

a minute of longitude at the equator is to be comprised between that and every parallel of latitude up to 89°) take the distances of the parallels, tropics, and arctic and antarctic circles from the equator, and mark them off to north and south of it. Join these points, and the projection is made.

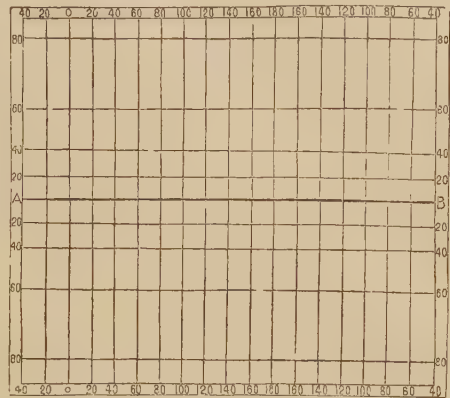


Fig. 3.—Mercator's Projection.

This projection, of course, does not give a natural representation of the earth, its effect being to exaggerate the polar regions immensely. The distortion in the form of countries and relative direction of places is rectified by the degrees of latitude being made to increase proportionably to those of longitude. There are other cylindrical projections of the sphere, but this is the most generally valuable and best known. It gives an unbroken view of the earth's surface with the exception of the poles, which are infinitely remote.

Historical.—The ancient Greeks considered Anaximander (560 B.C.) as the inventor of cartography; but there is evidence that about 1000 years earlier some attempts in that direction had been made amongst the Egyptians. Necessarily these efforts were of the crudest, and were made upon the supposition that the earth was a plane. After Aristotle the spherical theory was adopted, and the application of astronomical observations to geography was first made by Pytheas of Massilia (326 B.C.), and the first attempts at projections by Dicaearchus of Messana (310 B.C.). Ptolemy's (150 A.D.) rational teaching had an ultimate valuable influence in the treatment of cartography, although the Romans made little progress in the art, which during the middle ages also showed almost no advance. In the 14th and 15th centuries a gratifying improvement is observable in Italian nautical charts. In the 15th century the revivals of Ptolemy's teaching produced a revolution in the construction of maps, and laid the foundation of modern cartography. There was great increase in the number and importance of maps. The first attempts to improve and increase the methods of projection known to the Greeks were made by Germans, viz. Johann Stöffer (1452–1536), and Peter Apianus (1495–1552), &c. In the same period that Mercator (Gerhard Kremer, 1512–1594) made his invaluable contributions, the Italians, Germans, and Dutch were active competitors in geographical work. Amongst the increasing host of names connected with the subject are found that of Sebastian Cabot (1544), who produced his map of the world; in Germany, of Johann Baptist Homann (1644–1724) and Tobias Mayer (1723–86); in France, Nicolas Sanson (1600–67), Guillaume de l'Isle (1675–1726), and Jean Baptiste Bouguignon

d'Anville (1697-1782); and in Italy, P. Vincent Cornelli (d. 1718). In the 18th century France led the way in cartography by state survey result-

ing in the *Carte Géométrique de la France*. The British Ordnance Survey was begun in 1784. See CONTOUR LINES, DEGREE, EARTH, GEOLOGICAL



Map of British Islands, reduced from the Latin Ptolemy of 1478.

SURVEY, LATITUDE AND LONGITUDE, MERIDIAN, ORDNANCE SURVEY, SURVEYING.

Map (less correctly, **MAPES**), **WALTER**, a great 12th-century writer, was born on the Welsh marches, perhaps in Herefordshire, about 1137. He studied at the university of Paris, became an intimate friend of Becket, was a justice-in-eyre at Gloucester assize in 1173, attended the king the same year to Limoges, and for many years later, probably as chaplain, and was sent on missions to Paris and to Rome. He was parson of Westbury-on-Severn in Gloucestershire, where he had a long feud for his rights with the Cistercian monks of the neighbouring Flaxley Abbey, and became canon of St Paul's and precentor of Lincoln, but still continued his attendance on the king. In 1197, under Richard I, he became archdeacon of Oxford, and died before 1210. Map, who was perhaps Welsh, was a frank, open-hearted man, with a quick wit, bold humour, and an indignant contempt for hypocrisy. All these qualities are revealed in a number of Latin satirical poems long connected with his name. Criticism has assailed but not yet disproved the attribution. Of these the chief are the *Goliass* series (*Apocalypsis Goliæ*, *Predicatio*, *Confessio*, &c.). In the last named occurs the famous 'Meum est propositum in taberna mori.' In Bishop Goliass the writer has realised by creative imagination a type of the ribald priest, and upon his head he pours out the vials of his wrath and scorn, with humour rich, bold, sometimes coarse, but always honest. Map, if he was the author, seems to have kept the secret well, for even his friend Giraldus Cambrensis did not know their origin, as we find him, with the churchman's proverbial dislike to see the humorist point out the stains upon his cloth, denouncing Goliass as a foul-mouthed scoffer.

In any case, however, Map was not the first Goliardic writer. See **GOLIARDS**.

Sir Galahad, the stainless knight, may have been Map's creation, and there is reason, with M. Paulin Paris, to count him the heart and soul of that contemporary work of Christian spiritualisation which systematised and gave a meaning to the detached Arthurian romances. He wrote most probably the original of Robert de Borron's introductory romance of the *Saint Graal*, and of Ulrich von Zatzikhoven's *Lanzelet*. Manuscripts persistently attribute to him the great French prose *Lancelot*, including the *Lancelot proper*, the *Quest of the Saint Graal*, and the *Mort Artus*.

Undoubtedly Map's is a work of another kind, the *De Nugis Curialium*, a vivacious and entertaining miscellany or note-book of the court-gossip and events of the day, interspersed with theological polemics, anecdotes, and accounts of miracles, fairy legends, or *apparitiones fantasticæ*.

Thomas Wright edited for the Camden Society the *Latin Poems* (1841) and the *De Nugis Curialium* (1850). The latter has been edited by Dr M. R. James (1914), and translated by Tupper and Ogle (1924). See the *Cambridge History of English Literature* (vol. i. 1908), and James Hinton's study of the *De Nugibus* (1917).

Maple (*Acer*), the typical and the principal genus of the natural order *Aceraceæ*. The species are numerous, all are deciduous trees, and natives of the temperate parts of the northern hemisphere, and particularly numerous in North America and the north of India. They have opposite leaves without stipules, usually lobed or palmate. The flowers are in axillary corymbs or racemes of no beauty, but abound in honey, and are very attractive to bees. The fruit is formed of two small winged nuts, each with one or two seeds.—The

Common Maple (*A. campestre*), a small tree, is a native of Britain, and of many parts of Europe and Asia. The wood is compact, fine grained, and takes a high polish; hence it is much used by turners and for carved work, being frequently substituted for the wood of the Holly and Box by mathematical instrument makers. Several nearly-allied species are found in the south of Europe.—The Striped Bark Maple (*A. striatum*) of North



Fig. 1.—a, Common Maple (*Acer campestre*);
b, Japan Maple (*Acer palmatum*).

America, where it often forms great part of the undergrowth in woods, is so named because the smooth bark of the two-year-old branches are beautifully varied with green and white stripes; its wood, which is very white, is used for inlaying in cabinet-work.—The Greater Maple (*A. Pseudo-Platanus*), commonly called *Plane-tree* in Scotland, and *Sycamore* in England, is a native of Europe, but a doubtful native of Britain, in which, however, it has long been common. It attains a height of 70 to 90 feet, has a spreading umbrageous head, and large, palmate, coarsely serrated leaves on long stalks. It is of quick growth, and succeeds well near the sea and in



Fig. 2.—Greater Maple (*Acer Pseudo-Platanus*):
a, fruit.

other exposed situations. The wood is white, compact, and firm, though not hard; it is capable of a fine polish, and is used by wheelwrights, turners, &c. It is not apt to warp. Stair-rails are often made of it, and pattern-blocks for manufactories, as well as bowls, bread-plates, &c. Sugar is sometimes made from the sap of this tree, as from that of several other maples; but the species

which yields it most abundantly is the Sugar Maple (*A. saccharinum*) of North America, a species which much resembles it and abounds in the northern parts of the United States and in Canada, where large quantities of sugar are made from it. To obtain the sap the trees are tapped in February, March, and April, according to the locality and the season, and when warm days and frosty nights occur, which favour its flow. The boiling and refining processes are the same as those in the manufacture of cane-sugar. A single tree yields from two to six pounds in a season. Good vinegar is made from it, and a kind of molasses much superior to that from the sugar-cane, and much used in America with buckwheat cakes, &c. The wood of the Sugar Maple has a satiny appearance, and is used for cabinet-making; it is sometimes finely marked with undulations of fibre, and is then known as *Bird's-eye Maple*, and is used for veneers. The Sugar Maple is not so hardy in the climate of Britain as the Greater Maple, and seems to require a dry and sheltered situation.—The Norway Maple (*A. platanoides*), a native of the north of Europe, although not of Britain, is also found in North America; it much resembles the Great Maple.—A Himalayan species (*A. villosum*), a noble tree, found with pines and birches at great elevations, is sometimes grown in Britain. A large number of interesting and remarkably beautiful forms of several Japan species of *Acer*, such as *A. palmatum*, have been introduced; they have proved hardy in many favoured districts of England and Ireland, but are unsuited to Scotland generally, though they are occasionally seen there in conservatories cultivated in pots. In China and Formosa many new species have been discovered. A dye called Shinnamu is got from a Korean maple.

Maqui (*Aristotelia Macqui*), a plant of the family Elæocarpaceæ (by some united with Tiliaceæ), is an evergreen or sub-evergreen shrub, of considerable size, a native of Chile. The Chileans make a wine from its berry, which they administer in malignant fevers. The Maqui sometimes ripens fruit against a wall in England, and is frequently cultivated as an ornamental shrub. *A. racemosa* (native currant) and *A. fruticosa* (mountain currant) are New Zealand plants of the same genus.

Mar, a district of Scotland between the Dee and the Don, comprising nearly the south half of Aberdeenshire, and subdivided into Braemar, Midmar, and Cromar. In 1014 a Mormaer of Mar was present at the battle of Clontarf; and in 1115 another figures in the foundation charter of Scone priory as 'comes' or earl. The male line of these Celtic Earls of Mar expired in 1377 with Thomas, thirteenth earl, whose sister Margaret married William, first Earl of Douglas. Their daughter, Isabella, in 1404 married Alexander Stewart, the 'Wolf of Badenoch,' who, after her death in 1419, was designated Earl of Mar. The earldom was in 1565 restored, or granted by a new creation, to John, sixth Lord Erskine, who at his death in 1572 had been for a twelvemonth regent of Scotland. John, Earl of Mar (1675-1732), who began life as a Whig, and by his frequent change of sides earned the nickname of 'Bobbing Joan,' headed the rebellion of 1715 (see JACOBITES), and died in exile at Aachen. In 1824 the reversal of his attainder was procured by his grandson, John Francis Erskine, but his grandson dying without issue in 1866, the question arose whether the earldom of Mar could pass through his sister to her son, John Francis Goodeve-Erskine (né Goodeve), or must go to his first cousin, Walter Coningsby Erskine, Earl of Kellie. And the strange solution of that question has been that in 1875 Walter Henry Erskine, thirteenth Earl of Kellie,

was declared by the Committee of Privileges also eleventh Earl of Mar, and that in 1885 the Earl of Mar Restitution Bill declared Mr Goodeve-Edskine twenty-sixth Earl of Mar, claiming creation before 1014, but allowed precedence 1404. See the Earl of Crawford's *Earldom of Mar in Sunshine and Shade* (2 vols. Edin. 1882).

Marabou (*Leptoptilus crumenifer*), an African species of Adjutant (q.v.).

Marabouts, religious devotees or ascetics found chiefly in north Africa, who have at times exercised considerable political influence, as in encouraging opposition to the French conquests in Algeria and Tunis in the 19th century, and in former centuries as the origin and mainstay of the Almoravid dynasty, which held Morocco and Spain for a long period. These devotees are held in great veneration by the Berbers; they frequently officiate at mosques and chapels, and are believed to possess the power to prophesy and work miracles. The dignity is generally hereditary. The name is also applied to the tombs of the devotees.

Maracaibo, a city of Venezuela, is situated on the west shore of the strait which connects the lake and gulf of Maracaibo. It is a handsome town, with many gardens and squares, a college, hospitals, a theatre, a German club-house, the usual government buildings, a custom-house, wharves, and a number of manufactories. The climate is hot, the soil sandy, and the place unhealthy, owing mainly to the unsanitary domestic arrangements. The trade is chiefly in the hands of Germans, Danes, and North Americans. The staple export is coffee. Others are petrol, sugar, quina bark, woods. Pop. 35,000. Zulia state, of which it is capital, produces petroleum. Pop. about 120,000.

The *Gulf of Maracaibo* is a wide inlet of the Caribbean Sea, extending from the peninsulas of Paragana and Guajira to the strait by which it is connected with the lake. The latter forms the floor of a great valley, shut in by lofty mountains. Its waters are sweet, and deep enough for the largest vessels; but bars at the mouth, where a swift current runs, make entrance difficult. The gulf and lake were discovered in 1499 by Ojeda, who found houses built on piles, and so gave the district the name Venezuela ('Little Venice'), afterwards extended to the entire country.

Maragall, JUAN (1860–1912), Catalan lyric poet.

Maragha, a town of western Persia, 55 miles S. of Tabriz and 20 miles E. of Lake Urmia. It is celebrated as the capital of Hulagu Khan, grandson of Genghis Khan, and as the site of the observatory which Hulagu built for the astronomer Nasr ed-Din. Pop. 15,000.

Marajó, an island situated between the estuaries of the Amazon and Para, with an area of nearly 18,000 sq. m. It is for the most part low and covered with grass and bush, but in the east and south with dense forest. The soil is fertile, and large herds of cattle are reared in the north-east.

Maramuresh, a territory of 6258 sq. m. in the NW. of Rumania, acquired in 1919, being the southern part of the old Hungarian county of Máramaros (Marmaros); pop. (1920) 766,666. Chief town Sigheul Marmatsei (Máramaros-Sziget). The northern part went to Carpathian Ruthenia.

Maranhão, or MARANHÃO, a maritime state of Brazil, bounded on the north by the Atlantic Ocean, with an area of 177,566 sq. m. and a population of 874,000. The surface is uneven, but there is no range of mountains. There are numerous rivers, large forests, extensive plains where cattle are reared; the climate is fine, the soil fertile. Agriculture, however, has not prospered. Cotton

and sugar are the principal products.—The chief city is *Maranhão*, or *São Luiz de Maranhão*, on an island between the mouths of the Mearim and the Itapicuru. It is a well-built town, clean, gay, hospitable, and has a pop. of 53,000. It contains a cathedral and bishop's palace, a hospital, a technical school, cotton and sugar factories, and docks.

Marañón. See AMAZON.

Marantaceæ, an order of tropical (chiefly American) monocotyledons nearly allied to Zingiberaceæ and Cannaceæ. The unsymmetrical flowers, which grow in pairs (each a mirror-image of the other), have three sepals, three petals, one fertile stamen, a number of petaloid staminodes. The rhizome of *Maranta arundinacea* yields West Indian arrowroot.

Maraschí'no. See LIQUEUR.

Marash, a town of Turkey, 80 miles NE. of Alexandretta, is a market for Kurd carpets and embroideries. Hittite antiquities have been found. Pop. 50,000.

Marat, JEAN PAUL, French Revolutionary, was born at Boudry in Neuchâtel, 24th May 1743, eldest child of Jean Paul Mara, a native of Cagliari, who had married Louise Cabrol, a Genevan Protestant. He studied medicine at Bordeaux, next went to Paris, to Holland, and to London, where for some time he practised his profession with success, and published a materialistic *Philosophical Essay on Man* (1773), sharply attacking Helvétius, and anonymously a political essay, *The Chains of Slavery* (1774). In 1775 he paid a visit to Edinburgh, and was made on 30th June, on the recommendation of certain Edinburgh physicians, M.D. of St Andrews University. In June 1777 he was made brevet-physician to his guards by the Comte d'Artois, afterwards King Charles X.—an office which he held till 1786. Meantime he continued his scientific work in optics and electricity, attracting the attention of Franklin and Goethe, but the Académie des Sciences refused him admission on account of his attack on Newton. Further writings were his anonymous *Plan de Législation Criminelle* (1780), a translation of Newton's *Optics* (1787), and *Mémoires Académiques, ou Nouvelles Découvertes sur la Lumière* (1788).

But all Paris was now infected with the fever of revolution, and Marat flung himself with characteristic ardour into the war of pamphlets, and at length in September 1788 established his famous paper, *L'Ami du Peuple*. Throughout he fought ever for his own hand, with blear-eyed honesty and indomitable persistence, constantly croaking of treachery in high places, and denouncing with feverish suspiciousness in turn Necker, Bailly, Lafayette, the king, Dumouriez, and the Girondins. His virulence provoked the most vehement hatred, and covered his own head with calumnies which survived for generations; but it placed great power in his hands at some of the most momentous crises of the Revolution. His printing-press had to be cunningly concealed from Lafayette's police, twice at least he had to flee to London, and once he was forced to hide for a time in the sewers of Paris, where he contracted a loathsome skin disease, yet was tended with affectionate faithfulness by Simonne Evrard, whom he had married 'one fine day in presence of the sun.' His sufferings deepened his frienried hatred and suspicion of constituted authority, and there can be no doubt that on his head rests in great measure the guilt of the infamous September massacres. He was elected to the Convention as one of the deputies for Paris, and was perhaps the most unpopular man within the house, where indeed his influence never became more than contemptible. On the

declaration of the republic he started his paper anew under the title *Journal de la République Française*. After the king's death his last energies were spent in a mortal struggle with the Girondins, who subscribed their own downfall when their formal accusation of Marat failed before the tribunal. But it was the tribune's last triumph. He was dying fast of the disease he had contracted in the sewers, and could only write sitting in his bath. There his destiny reached him through the knife of Charlotte Corday (q.v.), in the evening of the 13th July 1793. His body was committed to the Panthéon with the greatest public honours, to be cast out but fifteen months later amid popular execration.

See the various histories of the French Revolution; Bougeart, *Marat l'Ami du Peuple* (2 vols. 1864); Bax, *Marat, the People's Friend* (1900); Phipson, *Marat: his Career in England and France before the Revolution* (1924); but especially the works by F. Chèvremont: *Marat, Index du Bibliophile* (1876), *Placards de Marat* (1877), and *Marat, esprit politique, accompagné de sa vie scientifique, politique, et privée* (2 vols. 1881).

Marathi. See MAHRATTAS, INDIA.

Marathon, a village on the east coast of ancient Attica, 22 miles NE. of Athens, long supposed to be the modern *Marathon*. It stood in a plain 6 miles long and from 3 to 1½ miles broad, with a background of mountains in the west, and a marsh both on the north and south; eastward it reached the sea.—The mountains look on Marathon, and Marathon looks on the sea. Recent investigations by Prussian officers identify the historic village with that of Brana, nearly 2½ miles to the south, and locate the battle in the plain between the mountain Stavrokoraki and the sea, nearly 3 miles north-east of Brana. The name of Marathon is gloriously memorable as the scene of the great defeat of the Persian hordes of Darius by the Greeks under Miltiades (490 B.C.)—one of the decisive battles of the world.

Marattiaceae, a primitive family of large tropical ferns of the Eusporangiate division, including Marattia, Angiopteris, and other genera. See FERNS.

Marave'di, an old Spanish copper coin in use from 1474 to 1848, was worth about ⅓rd of a penny. There were also, at an earlier period, maravedis of gold and of silver.

Marbeck, or MERBECKE, JOHN, organist of St George's Chapel, Windsor, was condemned to the stake in 1544 for favouring the Reformation, but pardoned for favour of Bishop Gardiner. In 1550 he published his famous *Boke of Common Praier Noted*, an adaptation of the plain-chant of the earlier rituals to the first liturgy of Edward VI. He wrote several theological and controversial works; and a hymn for three voices and parts of a mass by him are extant. He died about 1585.

Marble, in its strict and proper sense, is a rock crystallised in a saccharoidal manner, having the fracture of loaf-sugar, and composed of carbonate of lime, either almost pure when the colour is white, or combined with oxide of iron or other impurities which give various colours to it. But many other kinds of stone are popularly included under this title. Indeed any limestone rock sufficiently compact to admit of a polish is called marble. It is only in this vague sense that the indurated amorphous rocks used in Britain can receive this name. Such are the black, red, gray, and variegated limestones of the Devonian system, which are very beautiful from the numbers of exquisitely-preserved corals which abound in them; the marbles of the Carboniferous series from Flintshire, Derbyshire, and Yorkshire, so full of encrinites; the shell marbles from the Oolitic rocks at Rance, Stam-

ford, and Yeovil; and the dark Purbeck and Pétworth marbles, beautifully 'figured' with shells, from the Wealden strata, which were so much used by the architects of the middle ages.

Saccharine or statuary marble is a white fine-grained rock, resembling loaf-sugar in colour and texture, working freely in every direction, not liable to splinter, and taking a fine polish. Of the marbles used by the ancients, the most famous was Parian marble, a finely granular and very durable stone, with a waxy appearance when polished. Some of the finest Greek sculptures were formed of this marble, among others, the famous Venus de' Medici. The marble of Pentelicus was at one time preferred by the Greeks to Parian, because it was whiter and finer grained. The Parthenon was entirely built of it, and many famous statues still remain which were executed in this marble, but they are always more or less weathered, never retaining the beautiful finish of the Parian statues. The quarries at Carrara (q.v.) were known to the ancients, but they have been more extensively wrought for modern sculptors, who use this marble chiefly. It is a fine-grained, pure white marble, but is so often traversed by gray veins that it is difficult to get large blocks free from these. Of coloured marbles, the best known are the Rosso Antico, a deep blood-red, sprinkled with minute white dots; Verde Antico, a clouded green produced by a mixture of white marble and green serpentine; Giallo Antico, a deep yellow, with black or yellow rings; and Nero Antico, a deep black marble.

A true marble is a crystalline granular aggregate of calcite, the granules being of remarkably uniform size. Not infrequently scales of mica or talc occur scattered through the rock. Such a rock is of metamorphic origin: it is simply a limestone which has been rendered entirely crystalline from the effects of heat under pressure, as in the vicinity of large intrusions of igneous rock. Marble may therefore be of any geological age. Many crystalline limestones, which are sometimes entitled to the name of marble, occur associated with gneiss and mica-schist, and are often rich in such minerals as garnet, actinolite, zoisite, mica, &c.

Marburg, (1) a quaint old town in the Prussian province of Hesse-Nassau, on the Lahn, 59 miles by rail N. of Frankfurt and 64 SW. of Cassel. It is built on a terraced hill, whose summit is crowned by a stately castle, dating from 1065. In its Rittersaal (1277-1312) was held in 1529 the conference between the Wittenberg and the Swiss reformers regarding the Lord's Supper. The fine Gothic church of Elizabeth, with two towers 243 feet high, was built in 1235-83 by the Teutonic Knights over the splendid shrine of St Elizabeth (q.v.), and was thoroughly restored in 1850-67. The university occupies Gothic buildings of 1879. It was founded in 1527 in the Reformed interest by Philip the Magnanimous, Landgrave of Hesse; and among its earliest students were Patrick Hamilton and William Tyndale. Pop. 23,000.—(2) A town of Styria (Slovenian name *Maribor*) on the Drave, 30 miles NE. of Graz, assigned in 1919, notwithstanding its German population, to Yugoslavia; pop. 30,000.

Marcantonio, or, in full, MARCANTONIO RAIMONDI, engraver, born at Bologna late in the 15th century. A goldsmith by trade, he early turned to engraving, and received his first great stimulus from woodcuts of Albrecht Dürer, which he saw at Venice about 1505. He copied on copper two sets of plates from the German master's designs for the 'Life of the Virgin' and the 'Passion of Christ' (see DÜRER). At Rome, where he worked from 1510, he was chiefly engaged in engraving

Raphael's works, as 'Lucretia,' the 'Massacre of the Innocents,' the 'Three Doctors of the Church,' 'Adam and Eve,' 'Dido,' 'Poetry,' the 'Judgment of Paris,' &c., and subsequently those of Raphael's pupil, Giulio Romano. On account of the power of his drawing and the purity of his expression he is accounted the best amongst the engravers of the great painter. The capture of Rome by the Constable Bourbon in 1527 drove Marcantonio back to Bologna, where he probably remained until he died, some time before 1534 came to an end. See the essay by Fisher prefixed to the catalogue of his engraved works exhibited in London in 1868, and Delaborde's monograph (Paris, 1887).

Marcasite, an iron ore, a variety of Pyrites (q.v.).

Marceau, FRANÇOIS SÉVERIN DESGRAVIERS, French general, was born at Chartres on 1st March 1769. On the outbreak of the Revolution he was appointed inspector of the national guard in his native town, and in 1792 helped to defend Verdun with a body of volunteers till its surrender. His brilliant military career was ended in four years from this time; but they were four years of stirring activity. Sent in the following year to join the republican army in La Vendée, he was, for his services in the engagements before Saumur and Le Mans, promoted to the rank of general of division. Then, proceeding to the north-east frontier, he commanded the right wing at Fleurus, and after the allies retreated occupied Coblenz. During the campaign of 1796 he was given command of the first division of Jourdan's army, and sat down to invest Mainz, Mannheim, and Coblenz. But whilst covering the retreat of the French at Altenkirchen he was shot, on 19th September, and died of his wound. His body was buried in the entrenched camp at Coblenz but was transferred to the Panthéon in Paris in 1889. He ranks next after Hoche amongst the French generals of the early years of the Revolution, not only for military genius, but also on account of the nobility and uprightness of his personal character. See Lives by Doublet de Boisthibault (1851), Maze (1888), and Captain T. G. Johnson (1896).

Marcello, BENEDETTO, musical composer, born in Venice on 1st August 1686, was a judge of the republic, and a member of the Council of Forty, and afterwards held important administrative offices at Pola and Brescia, where he died on 24th July 1739. He had a passion for music, and is remembered as the composer of music for Giustiniani's version of the Psalms (8 vols. 1724-27), of numerous concertos, canzoni, cantatas, a pastoral, an oratorio, and other pieces, distinguished for their simple yet elevated style, and as the author of a satirical work, *Il Teatro alla Moda* (1720).

Marcellus, the name of two popes, of whom the second deserves special notice, as having, when Cardinal Marcello Cervini, taken a very prominent part in the discussions of the Council of Trent, over which he was appointed to preside as legate of Julius III. He was elected pope 10th April 1555, and survived his elevation but twenty-two days. He did not follow the usual custom of laying aside his baptismal name and assuming a new one.

Marcellus, M. CLAUDIUS, a famous Roman general, of one of the most eminent plebeian families. In his first consulship (222 B.C.) he defeated the Insubrian Gauls, and slew with his own hand their king, Britomartus or Viridomarus, whose spoils he dedicated as *spolia opima* to Jupiter—the third and last occasion in Roman history. In the second Punic war Marcellus took command

after the disaster of Cannæ, and put a check upon the victorious Hannibal at Nola, in Campania (216 B.C.). Again consul in 214 B.C., he gave a fresh impulse to the war in Sicily, but all his efforts to take Syracuse were rendered unavailing by the skill of Archimedes, and he was compelled regularly to blockade the city. Famine, pestilence, and ultimately treachery on the part of the Spanish auxiliaries of the Syracusans, opened its gates (212 B.C.), after which the remainder of Sicily was soon brought under the dominion of the Romans. In his fifth consulship, 208 B.C., he fell in a skirmish against Hannibal.

Marcet, JANE, known as MRS MARCET (1769-1858), was author of a very popular elementary introduction to chemistry entitled *Conversations on Chemistry*, through which Faraday made his first acquaintance with the subject, and of similar books on other branches of science, besides numerous charming *Stories for very Little Children*, in the estimation of many her best work. She was the daughter of a rich London merchant, a Swiss by birth, and was herself born at Geneva. She married Alexander Marcet, a Genevan. See Harriet Martineau's *Biographical Sketches* (1869).

March (Czech *Morava*), the principal river of Moravia, rises on the boundary between that region and Prussian Silesia, and flows 214 miles south to the Danube, which it joins 6 miles above Presburg. It receives on the right the Thaya. In its lower course it forms the boundary between Austria and Czechoslovakia. It is navigable for small boats from Göding, 50 miles from its mouth.

March, an urban district of Cambridgeshire, on the Nen, 14 miles E. of Peterborough and 16 NW. of Ely. Its church has a fine Perpendicular clere-story, with splendid roof. Pop. 9000.

March, the first month of the Roman year, and the third according to our present calendar. In England until 1752 the legal year was reckoned from the 25th March. Scotland had already made the change. Its last three days (old style) were once popularly supposed to have been *borrowed* by March from April, and are proverbially stormy.

March, a musical composition, chiefly for military bands, with wind-instruments and drums, intended to accompany the marching of troops. Marches are also introduced into operas, oratorios, symphonies, sonatas, &c. A march is usually but not always in common time, and like a minuet or a scherzo may have a so-called trio.

Marchantia. See LIVERWORTS.

Marchena, a town of Spain, 47 miles by rail E. by S. of Seville, with a ducal (Arcos) palace and sulphur-baths; pop. 15,000.

Marches, the border districts that run contiguous on each side of the boundary line between England and Scotland, and between England and Wales. The Lords of the Marches were the nobles to whom estates on the borders were given, on condition that they defended the country against the aggressions of the people on the other side. Under the Norman and Plantagenet kings of England there was almost chronic war between the English Lords of the Marches and the Welsh. For the Scottish-English Marches, see BORDERS.—The Mortimers, Earls of March, took their title from the Marches of Wales. In Scotland Dunbars and Lennoxes have been Earls of March, as have also Douglasses.—The corresponding German word *Mark* was in like manner applied to the border countries or districts of the German empire, conquered from neighbouring nations—the marks of Austria, of Brandenburg, Altmark, Steiermark, &c. The governor entrusted with the charge of a mark was called Markgraf (see MARQUIS).

The ancient German tribe of *Marcomanni* were 'Marchmen.' In Italy *The Marches* include the March of Ancona (q.v.) and three other provinces (see ITALY).—*Riding the Marches* is a procession on horseback along the boundary of a municipality (see BOUND).

Marcchetti, FILIPPO, an operatic composer, born at Bolognola in 1831, became in 1881 president of a musical college in Rome. His best-known operas are *Romeo e Giulietta* (1865) and *Ruy Blas* (1869). He died at Rome in 1902.

Marcianise, an agricultural town of Italy, situated in a marshy district, 18 miles by rail N. of Naples; pop. 15,000.

Marcion, the founder of the Marcionites, a rigorously ascetic sect which attained a great importance between the years 150 and 250 A.D. He was born at Sinope in Pontus about 100, became wealthy as a shipowner, and about 140 repaired to Rome. There he laboured to correct the prevailing views of Christianity, which he considered to be a corruption of Jewish errors with the gospel of Christ as expounded by Paul, its best interpreter. The opposition which he encountered drove him to found a new community about 144, and he laboured earnestly propagating his theology until his death about 165. Marcion was hardly a Gnostic, although he had been intimate with Cerdo, and Gnostic speculations certainly influenced the development of the Marcionite theology. Failing to recognise the New Testament God of love in the Old Testament, and profoundly influenced by the radical Pauline antithesis of law and gospel, he constructed an ethico-dualistic philosophy of religion, and proceeded to cosmological speculations which are not free from contradictions. He set aside as spurious all the gospels save Luke, and it, as well as the Pauline epistles, he purged of Judaizing interpolations. He was thus the earliest to make a canonical collection of New Testament writings. From the 4th century the Marcionites began to be absorbed in the Manichæans. See Gnosticism and works there quoted.

Marconi, GUGLIELMO, electrical engineer, was born at Bologna in 1874 (son of an Irishwoman), and educated at Leghorn. After much study of wireless telegraphy and many experiments he successfully communicated across the English Channel in 1899. His system, in use by Lloyd's and the principal shipping companies in England and abroad, was definitely adopted by the British Admiralty in 1900. In 1901 he succeeded in communicating across the Atlantic. In 1907 Marconi began a trans-Atlantic public service. In 1919 he was awarded a Nobel Prize for physics. See WIRELESS TELEGRAPH.

Marco Polo. See POLO.

Marcus Aurelius. See AURELIUS.

Mardi Gras. See SHROVETIDE.

Mardin, a town of Kurdistan, 60 miles SE. of Diarbekir; pop. 30,000.

Mare, WALTER DE LA. See DE LA MARE.

Maree, LOCH, a beautiful lake of Ross-shire, 40 miles W. of Dingwall. Lying 31 feet above sea-level, it is 1½ miles long, over 2 miles broad, 367 feet deep, and 11 sq. m. in area. It is overhung by mountains 3000 feet high; sends off the Ewe, 2 miles long, to the sea; and contains many islets.

Maremma (Lat. *Maritima*), a marshy region of Italy, extending along the sea-coast of Tuscany, and embracing an area of about 1000 sq. m. In Roman times and earlier the Maremma was a fruitful and populous plain; but the decay of

agriculture, consequent upon unsettled political history, fostered the encroachments of malaria. Leopold II. of Tuscany directed especial attention (1822-44) to the drainage and amelioration of the Maremma, and his efforts and subsequent measures have been attended with considerable success. Crops are now grown in the summer on the fertile soil of the infected area by the inhabitants of the adjoining hill-country, who go down only to sow and to reap their crops. During winter the Maremma is healthier and yields good pasture.

Marengo, a village of Northern Italy, in a marshy district near the Bormida, 3 miles SE. of Alessandria. Here on 14th June 1800 Napoleon, with 33,000 French, defeated 30,500 Austrians under Melas. It was the cavalry charge of the younger Kellermann that turned what looked like certain defeat into a decisive victory, though the French lost 7000 in killed and wounded, the Austrians only 6400 (besides 3000 prisoners).

Mareotis, or MAREIA, LAKE, the modern *El Mariût*, a salt lake or marsh in the north of Egypt, extends southward from Alexandria, and is separated from the Mediterranean, on its north-west side, by a narrow isthmus of sand. In the 15th and 16th centuries it was a navigable lake; in 1798 it was found by the French to be a dry sandy plain; but in 1801 the English army cut the dikes of the canal that separated the Lake of Aboukir from Mareotis, to cut off the water-supply of the French, and Mareotis became once more a marsh. The like happened in 1803, 1807, and 1882; but 'Mariût' has been partly drained again.

Mare's Tail (*Hippuris vulgaris*), a tall erect marsh-plant, with whorls of narrow leaves. See HALORAGACEÆ.

Margaret, St, Scottish queen, was born about 1045, probably in Hungary, daughter of the exiled Atheling Edward (son of Edmund Ironside), and of Agatha, said to be a kinswoman of Gisela, queen of St Stephen of Hungary, and sister of the Emperor Henry II. It is not certain when she came to England, or how long she had been there when in 1068, with her mother and sister (Christina) and her brother, Edgar the Atheling (q.v.), she fled from Norman England and was driven ashore at the place now called St Margaret's Hope. Young, lovely, learned, and pious, she won the heart of the rude Scottish king, Malcolm Canmore (q.v.), who wedded her at Dunfermline. 'Perhaps,' says Skene, 'there is no more beautiful character recorded in history than that of Margaret. For purity of motives, for an earnest desire to benefit the people among whom her lot was cast, for a deep sense of religion and great personal piety, for the unselfish performance of whatever duty lay before her, and for entire self-abnegation she is unsurpassed.' Other historians are less ecstatic. She did much to civilise the northern realm, and still more to assimilate the old Celtic church to the rest of Christendom on such points as the due commencement of Lent, the Easter communion, the observance of Sunday, and marriage within the prohibited degrees. She built, too, a stately church at Dunfermline, and re-founded Iona. She bore her husband six sons and two daughters, and died three days after him, in Edinburgh Castle, on 16th November 1093. Innocent IV. canonised her in 1250. Her head, which had found its way from Dunfermline to Douai, was lost in the French Revolution; but her remaining relics are said to have been enshrined by Philip II. in the Escorial.

See the Latin Life attributed to her confessor Turgot, Bishop of St Andrews, but perhaps by a less-known monk Theodoric (Eng. trans. by Fr. Forbes-Leith, 1884); English Lives by Cowan (1911), and Lucy Menzies (1925);

Skene's *Celtic Scotland* (vol. ii. 1877); Bellesheim's *History of the Catholic Church of Scotland* (trans. 1887).

Margaret, queen of Denmark, Norway, and Sweden, was the second daughter of Waldemar IV. of Denmark, and wife of Haakon VIII. of Norway, and was born in 1353. On the death of her father without male heirs in 1375, the Danish nobles offered her the crown in trust for her infant son Olaf. By the death of Haakon in 1380 Margaret became ruler of Norway as well as of Denmark. When Olaf died in 1387 Margaret nominated her grand-nephew, Eric of Pomerania, as her successor. The Swedish king, Albert of Mecklenburg, having so thoroughly alienated the affections of his subjects that the nobles, declaring the throne vacant, offered in 1388 to acknowledge Margaret as their ruler, she sent an army into Sweden, which defeated the king's German troops near Falköping, and took Albert and his son prisoners. Albert remained in prison seven years, during which time Margaret, in spite of the efforts of the Hanseatic League and its allies, wholly subjugated Sweden. In the following year (1396) Eric of Pomerania was crowned king of the three Scandinavian kingdoms, and though he was proclaimed king *de facto* next year, the power still remained in the hands of Margaret. In May 1397 was signed the celebrated Union of Kalmar, by which it was stipulated that the three kingdoms should remain for ever at peace under one king, though each should retain its own laws and customs. Before her death at Flensburg on 28th October 1412, Margaret had enlarged the territories she held for her grand-nephew by the acquisition of Lapland and part of Finland. She was a woman of masculine energy and strong will, and ruled her subjects with a firm hand. See a Life by M. Hill (1898).

Margaret of Anjou, the queen of Henry VI. of England, was daughter of René of Anjou, the titular king of Sicily, and of Isabella of Lorraine, and was born at Pont-à-Mousson, in Lorraine, 24th March 1429. She was married to Henry VI. of England in 1445; and her husband being a person whose naturally weak intellect was sometimes darkened by complete imbecility, she exercised an almost unlimited authority over him, and was the virtual sovereign of the realm. A secret contract at her marriage, by which Maine and Anjou were relinquished to the French, excited great dissatisfaction in England, and the war with the French which broke out anew in 1449, in the course of which all Normandy was lost, was laid by the English to the charge of the already unpopular queen. In 1450 occurred the insurrection of Jack Cade, and soon after the country was plunged in the horrors of that bloody civil war known as the Wars of the Roses. Margaret took an active part in the contest, braving disaster and defeat with the most heroic courage. At length, after a struggle of nearly twenty years, Margaret was finally defeated at Tewkesbury, and flung into the Tower, where she remained four years, till Louis XI. redeemed her for fifty thousand crowns. She then retired to France, and died at the château of Dampierre, near Saumur, in Anjou, 25th August 1492. Mrs Hookham's *Life* (1872) is not altogether satisfactory as history.

Margaret of Navarre, in her youth known as Marguerite d'Angoulême, sister of Francis I. of France, and daughter of Charles of Orleans, Comte d'Angoulême, was born at Angoulême, 11th April 1492. She was carefully educated, and early showed remarkable sweetness and charm added to unusual strength of mind. In 1509 she was married to Charles, Duke of Alençon, who died in 1525; and in 1527 she was married to Henri d'Albret, titular king of Navarre, to whom she

bore Jeanne d'Albret, mother of the great French monarch, Henry IV. She encouraged agriculture, the arts, and learning, and sheltered with a courageous generosity such advocates of freer thought in religion as Marot and Bonaventure des Périers. Accusations entirely unfounded have been brought by interested bigotry against her morals. She died 21st December 1549. Her writings include a series of remarkably interesting Letters (ed. by Génin, 2 vols. 1842-43), a miscellaneous collection of poems gracefully entitled *Les Marguerites de la Marguerite* (ed. by Frank, 4 vols. 1873), and especially the famous *Heptaméron des Nouvelles* (1558; ed. by Leroux de Lincy, 3 vols. 1855), modelled on the *Decameron* of Boccaccio, but worked out in an original manner. A company of ladies and gentlemen returning from Canterbury are detained by bad weather, and beguile the time by telling stories, seventy-two in number, which are separated by interludes introducing the persons. The subjects of the stories are similar to those of the *Decameron*, but the manners delineated are more refined; and they reflect closely the strange combination of religious fervour with religious free-thinking and refined voluptuousness so characteristic of the time. Most critics believe the work to be partly by Des Périers (q.v.). Her *Dernières Poésies*, discovered in the Bibliothèque Nationale in 1895, were published in 1896. See Lives by Durand (1848), Miss Freer (1854), and Lotheisen (Berlin, 1885); and Saintsbury's introduction to the new translation of the *Heptaméron* (1894).

Margaret of Scotland (1425?-45), an unfortunate and accomplished princess, daughter of James I. (q.v.) of Scotland, married in 1436 to the Dauphin, afterwards Louis XI. of France, who proved a heartless and callous husband. She sought solace for her husband's neglect in books and in poetry, spending sleepless nights in writing rondeaux. An impossible legend makes her the too kind patron of the famous poet, Alain Chartier (q.v.), who was of the commission that went to Scotland to solicit her hand, but was probably dead before her wedded troubles began. See Jusserand's *English Essays from a French Pen* (1895); Rait's *Five Stuart Princesses* (1902); and a book by Barbé (1917).

Margarine. See BUTTER, ADULTERATION. — MARGARIC ACID is a mixture of palmitic and stearic acids; see FATS.

Margarita, an island in the Caribbean Sea, belonging to Venezuela; area, 380 sq. m. Discovered by Columbus in 1498, Margarita has revived its pearl-fisheries, but now its chief export is salted fish.

Margary, AUGUSTUS RAYMOND (1846-75), the son of an English officer in India, was for six years in the diplomatic service in China. In August 1874 he was sent to meet a British mission seeking to open the overland route between Burma and China, and, as interpreter, was returning with the mission when in February 1875 he was murdered by the Chinese at Manwyne. See his *Journal*, edited by Sir R. Alcock (1876).

Margate, a seaport and municipal borough of England, in the Isle of Thanet, Kent, 3 miles W. of the North Foreland and 74 E. by S. of London, has for many years been the favourite seaside resort of cockney holiday-makers, who, during the season, by rail and by steamer, pour into the town in their thousands. Possessed of many natural advantages in its bracing air, good bathing, and excellent firm sands, Margate offers besides all the customary attractions of a watering-place, with its pier (900 feet long), jetty (upwards of a quarter of a mile in length), theatre, assembly-rooms, baths, zoological gardens, &c. It contains also two interesting

churches—one exhibiting traces of Norman and Early English work, and the other with a tower of 135 feet, forming a conspicuous landmark; the Royal Sea-bathing Infirmary, founded 1792 and enlarged 1882; a town-hall (1820); and an extensive deaf and dumb asylum (1875–80–86). Turner the painter (one of whose earliest known sketches is a view of Margate church) was at school in Margate for a short time. Pop. (1801) 4766; (1891) 18,419; (1911) 27,086; (1921) 46,475.

Margaux, a village near the Gironde, 15 miles NNW. of Bordeaux, is famous for its wines.

Margay (*Felis tigrina*), a species of cat or tiger-cat, a native of the forests of Brazil and Guiana, smaller and less handsome than the ocelot, which in general appearance it much resembles, though its spots are smaller. It is little larger than the domestic cat. It is capable of domestication, and of being made very useful in rat-killing.

Marghilan. See FERGHANA.

Marginal Credit, or more correctly **MARGINAL LETTER OF CREDIT**, is a letter issued usually by a banker and attached to or printed in the margin of a Bill of Exchange (q.v.) authorising the person to whom it is addressed to draw on the banker the annexed bill of exchange and undertaking to honour the bill if drawn in accordance with the terms of the letter. This service the banker undertakes for a client who is desirous of making payment abroad, but whose financial position is not sufficiently well known there to allow of bills drawn upon him being saleable, or saleable at the most favourable rate. His client having deposited cash or securities, the banker lends, as it were, the credit of his name, charging a commission for the risk involved.

Margrave. See MARCHES, MARQUIS.

Marguerite. See MARGARET.

Marguerite. See CHRYSANTHEMUM.

Marheineke, PHILIPP CONRAD (1780–1846), Protestant theologian, born at Hildesheim, was professor and university preacher at Erlangen in 1805, and subsequently held theological chairs at Heidelberg (from 1807) and Berlin (from 1811). After Hegel's death he was the chief figure among the right wing of that philosopher's disciples.

Mari, or **CHEREMISSES**, a Finnish people of the Volga basin. An autonomous Mari territory was set up in 1920; area, 7300 sq. m.; pop. 400,000; capital, Krasnokokshaik ('red Kokshaik'; formerly called Tsarevokokshaik; pop. 2000).

Maria Christina, queen of Spain, born at Naples, 27th April 1806, was a daughter of Francis I., king of the Two Sicilies. In 1829 she became the fourth wife of Ferdinand VII. of Spain, and in October of that year gave birth to a daughter, Isabella II. Ferdinand died 29th September 1833, and by his testament his widow was appointed guardian of her children—the young Queen Isabella and the Infanta Maria Louisa, Duchess de Montpensier—and also regent. A civil war broke out (see CARLISTS); but the queen-mother seemed indifferent to everything except the company of Don Fernando Muñoz, whom she made her chamberlain, and with whom she was united, in December 1833, in a morganatic marriage. She had ten children by him. A conspiracy, which broke out on the night of the 13th August 1836, led the queen-mother to concede a constitution to Spain. In 1840 a popular commotion ensued, and she gave to the new prime-minister, Espartero, a renunciation of the regency, and retired to France, whence she returned in 1843. Her participation in the

schemes of Louis-Philippe as to the marriage of her daughters in 1846, and the continual exercise of her influence in a manner unfavourable to constitutional liberty, made her hateful to the patriotic party in Spain. At length, in July 1854, a revolution expelled her from the country, and she again took refuge in France, but returned to Spain in 1864, only to retire again in 1868. She died at Le Havre, August 1878. See CARLISTS, and SPAIN.

Maria Louisa, the second wife of Napoleon I., born 12th December 1791, was the daughter of the Emperor Francis I. of Austria. She was married to Napoleon after the divorce of Josephine, 2d April 1810. On 20th March following she bore a son, who was called King of Rome. At the beginning of the campaign of 1813 Napoleon appointed her regent in his absence, but under many limitations. On the abdication of Napoleon, being advised not to follow him into exile, she went with her son to Schönbrunn, where she remained till 1816, when she received the duchies of Parma, Piacenza, and Guastalla. In 1822 she contracted a morganatic marriage with Count von Neipperg. She died at Parma, 17th December 1847.

See *Lives by Helfert* (1873) and *Imbert de Saint-Amand* (trans. 1886), her *Correspondance* (1887), the *Mémoires* of Mme Durand (1885), and Mrs Cuthell's (apologetic) *An Imperial Victim* (1911).

Mariana, JUAN, a Spanish historian, was born at Talavera in 1536, entered at eighteen the then rising order of the Jesuits, and afterwards taught in the Jesuit colleges at Rome (where Bellarmine was one of his scholars), in Sicily, and finally in Paris. After seven years of labour in Paris he was driven by ill-health to Toledo, and there he lived in unbroken literary labours till his death, at an extreme old age, in 1624. His *Historiæ de Rebus Hispaniæ* first appeared in 20 books in 1592, and was supplemented by 10 additional books, carrying the narrative down to the accession of Charles V., in 1605. Its admirable Latinity and undoubted historical merits give it an abiding value. Mariana himself published a Spanish translation (1601–9), which still remains one of the classics of the language. His *Tractatus VII. Theologici et Historici* (1609) roused the suspicion of the Inquisition. But the most celebrated of the works of Mariana is his well-known treatise *De Rege et Regis Institutione* (1599), which raises the question whether it be lawful to overthrow a tyrant, and answers it in the affirmative, even where the tyrant is not a usurper but a lawful king. This tyrannicide doctrine drew much odium upon the entire order of Jesuits, especially after the murder of Henry IV. of France by Ravaillac in 1610; but it is only just to observe that, while, upon the one hand, precisely the same doctrines were taught in almost the same words by several of the Protestant contemporaries of Mariana, on the other, Mariana's book itself was formally condemned by the general Acquaviva, and the doctrine forbidden to be taught by members of the order. See a study by Cirot (1905).

Mariana Islands. See LADRONES.

Marianus Scotus (1028–c. 1082), an Irish chronicler, who, quitting his country in 1052, became a Benedictine at Cologne in 1058, and settled in the monastery at Fulda. Ten years later he removed to Mainz, where he taught mathematics and theology. He left a *Chronicon Universale*, which began at the creation and came down to 1082. It was published at Basel in 1559, and by Waitz in 'Monumenta Germaniæ.'—Another **MARIANUS SCOTUS**, famous as a copyist and calligrapher, was abbot of St Peter's at Ratisbon in 1088.

Maria Stella (d. 1843), claimed to be a daughter of Philip of Orleans, for whom Louis-Philippe had been substituted at birth.

Maria Theresa, or **MARIA THERESIA**, empress, daughter of the Emperor Charles VI., was born at Vienna, 13th May 1717. By the Pragmatic Sanction (q.v.), her father appointed her heir to his hereditary thrones. In 1736 she married Francis of Lorraine, afterwards Grand-duke of Tuscany. On the death of her father, 21st October 1740, she became queen of Hungary and of Bohemia, and Archduchess of Austria. At her accession the monarchy was exhausted, the finances embarrassed, the people discontented, and the army weak; whilst Prussia, Bavaria, Saxony, and Sardinia, abetted by France, put forward claims to her dominions. Frederick II. of Prussia claimed Silesia, and poured his armies into it; Spain laid hands on the Austrian dominions in Italy; and the Bavarians, assisted by the French, invaded Bohemia, and, passing on into the archduchy of Austria, threatened Vienna, the Elector of Bavaria being crowned king of Bohemia and emperor as Charles VII. (1742). The young queen was saved by the Hungarians, with the assistance of Britain, but most of all by her own resolute spirit. The war of the Austrian Succession, after lasting more than seven years, was terminated by the peace of Aachen in 1748. The empress-queen lost the duchies of Parma, Piacenza, and Guastalla to Spain, and some Milanese districts to Sardinia, while her cession of Silesia and Glatz to Prussia, made in the treaty of Dresden (1745), was guaranteed. On the other hand, her titles were fully recognised, as well as that of her husband, who had been nominated emperor (1745), Charles of Bavaria having in the meantime died. During the years of peace that ensued Maria Theresa instituted important financial reforms, did her utmost to foster agriculture, manufactures, and commerce, and improved and nearly doubled the national revenues, whilst the burdens were diminished. At the same time she charged Marshal Daun to reorganise and rediscipline her armies. In Kaunitz (q.v.) she had a minister possessed of wisdom and energy, and in his hands she left for the most part the management of the foreign relations of the empire. But the loss of Silesia, especially the conduct of Frederick the Great, which had brought upon her that loss, rankled deeply in her mind; and, France having been gained as an ally through the address of Kaunitz, she renewed the contest with the Prussian king. But the issue of the Seven Years' War (q.v.) was to confirm Frederick in the possession of Silesia. On the conclusion of hostilities the empress renewed her efforts to promote the national prosperity, ameliorating the condition of the peasantry, mitigating the penal code, founding schools, organising great charitable societies, in short promoting the welfare of her subjects by all the wise arts of peaceful progress. Her son Joseph, elected king of the Romans in 1764, she associated, after the death of her husband (1765), with herself in the government of her hereditary states, but in reality committed to him the charge only of military affairs. She joined with Russia and Prussia in the first partition of Poland (1772), whereby Galicia and Lodomeria were added to her dominions. She also obtained from the Porte Bukowina (1777). On the death of the childless Elector of Bavaria Austria successfully asserted her claim to the 'quarter of the Inn' and one or two other districts. Maria Theresa died 29th November 1780. Personally a woman of majestic and winning appearance, she was animated by truly regal sentiments and an undaunted spirit; and by this rare union of feminine tact with masculine energy and restless activity, she not only won the affection and even enthusiastic admiration of her subjects, but she raised Austria from a most wretched con-

dition to a position of assured power. Her reign marks the transition of Austria from a medieval to a modern state; and by her efforts the beginning was successfully made of fusing into one sovereignty the heterogeneous lands ruled over by the House of Hapsburg. Although a zealous Roman Catholic, Maria Theresa maintained the rights of her own crown against the court of Rome, and endeavoured to correct some of the worst abuses in the church. Of her ten surviving children, the eldest son, Joseph II., succeeded her; Leopold, Grand-duke of Tuscany, followed his brother on the imperial throne as Leopold II.; Ferdinand became Duke of Modena; and Marie Antoinette was married to Louis XVI. of France. See *History* by Arneth (10 vols. 1863-79, an Austrian version); other works by Arneth, by Duller, Ramshorn, Wolf, and J. F. Bright (1897); the book on the Empress and Frederick by the Duc de Broglie (trans. 1883); Miss Moffat's *Life of her* (1911); and works quoted under **FREDERICK II.**

Mariazell, the most famous place of pilgrimage in Austria, in the extreme north of Styria, 25 miles N. of Bruck and 60 SW. of Vienna, amidst romantic scenery. It is visited by hundreds of thousands of pilgrims annually. The image of the Virgin (brought here in 1157), the object of the pilgrimages, is enshrined in a magnificent church, built in 1644 on the site of an older one. Four miles from the village are important ironworks. See the history by Eigner (1901).

Maribor. See **MARBURG**.

Marie Amélie, queen of Louis-Philippe (q.v.).

Marie Antoinette, **JOSEPHÉ JEANNE**, queen of France, was born at Vienna on the day of the great earthquake at Lisbon, 2d November 1755, the fourth daughter of Maria Theresa and the Emperor Francis I. From her cradle she was destined by her ambitious mother to be queen of France, and to that end was educated, although but indifferently, by the Abbé de Vermond. The marriage was negotiated by the Duc de Choiseul early in 1770, and took place on May 16, but was darkened a fortnight later by an ill-omened panic during the great fête of fireworks given in its honour by the city of Paris, in which some hundreds of people perished. The beautiful young dauphiness soon found her position full of difficulties, and the stiff and stately etiquette of the old French court wearied her to death. A mere child in years, married to a dull, decorous, and heavy husband, who was, moreover, for some years indifferent to her person, she found relief in a capricious recklessness of conduct and a disregard for conventions, and so from the first laid herself open to serious scandals for which there never was any real ground but her own indiscretion. Her night drives to Paris, her appearance at masked balls, her extravagance and undisguised love for the card-table, and her open favour to handsome and profligate young men, were misread into shameless immoralities, and she had lost her reputation long before she awoke to a sense of her responsibilities. In May 1774 the death of Louis XV. made her queen of France, and she soon deepened the dislike of her subjects by her undisguised devotion to the unpopular Franco-Austrian alliance, as well as by her reckless opposition to all the measures devised by Turgot and Necker for relieving the financial distress of the country. The miseries of France became in the popular imagination identified with the extravagant pleasures of the queen, and in the affair of the Diamond Necklace (q.v.) her guilt was at once taken for granted, and 'the Austrian' became the object of the frenzied hatred of a starving

people. The act of accusation against Calonne (q.v.) was in the eyes of the mob that of the court and of the queen. Showers of virulent pamphlets rained from all sides, and 'Madame Dédit' and 'Madame Veto' were some of the names in which a maddened people shrieked their hatred against the queen.

Meantime the frivolity of the girl had changed into the courage and obstinacy of the woman who made herself a centre of opposition to all new ideas, and prompted the poor vacillating king into a retrograde policy to his own undoing. She was capable of strength rising to the heroic—as Mirabeau once said, the only man the king had about him was his wife. And she possessed the power of inspiring enthusiasm, as is evidenced by the personal influence she exercised over Fersen, Mirabeau, and Barnave. Amid the horrors of the march of women to Versailles (October 5-6, 1789) she alone maintained her courage, and she showed herself on the balcony to the raging mob with a serene heroism that for a moment overawed the fiercest into respect. That same day the royal family and the Assembly left Versailles for Paris. But Marie Antoinette lacked consistency even in the part she essayed to play, and to the last she failed to understand the nature of the troublous times into which she had been flung. She had an instinctive abhorrence of the liberal nobles like Lafayette and Mirabeau, and, if she professed to consult them, she also consulted other men, and refused to trust them altogether. Again the indecision of Louis and his dread of civil war hampered her plans, and the intrigues of the Émigrés (q.v.) did her cause more harm than all her domestic enemies together.

The queen was at length prevailed on by Comte de Mercy-Argenteau, at the instigation of Comte de la Marck, to make terms with Mirabeau, and to him she gave an interview at Saint-Cloud, 3d July 1790. But she was too self-willed and independent frankly to follow his advice, for she abhorred his dream of a constitutional monarchy based on the free consent of an enfranchised people. His death in April 1791 removed the last hope of saving the monarchy, and less than three months later occurred the fatal flight to the Marquis de Bouillé at the frontier, intercepted at Varennes, against which Mirabeau had ever pleaded as a fatal step. The storming of the Tuileries and slaughter of the brave Swiss guards (10th August 1792), the transference to the Temple, the trial and execution of the king (21st January 1793), quickly followed, and ere long her son was torn from her arms, and she herself sent to the Conciergerie (2d August 1793). After eight weeks more of brutal confinement the 'Widow Capet' was herself arraigned before the Revolutionary Tribunal. Under the ordeal of her trial, even in the face of a charge of incestuous intercourse with her son of eight years old, brought against her by Hébert, she bore herself with calm dignity and resignation. After two days and nights of questioning she was found guilty of having lent counsel to the foreign enemies of France, and of having fomented civil war; that in the interests of the monarchy she had intrigued abroad against the existing government there can be no question, while from her very position she was at home necessarily an enemy of the republic. The inevitable sentence followed, and on the same day as its pronouncement, 16th October 1793, Marie Antoinette was guillotined.

There is a bibliographical study by Tournoux, *Marie Antoinette devant l'histoire* (Paris, 2d ed. 1901). See the *Histories of the French Revolution* by Thiers, Mignet, Michelet, Louis Blanc, Carlyle, Von Sybel, H. Morse Stephens *passim*, and, where much that has been written

is biased either for or against, a good estimate in vol. ii. (*passim*) of Sorel's *L'Europe et la Révolution Française* (1885-1911); see also Madame Campan's *Mémoires sur la Vie privée de Marie Antoinette* (1823); De Lescure's *La vraie Marie Antoinette* (1863); D'Hunolstein's *Correspondance inédite de Marie Antoinette* (1864); Feuilleton des Conches's *Louis XVI., Marie Antoinette, et Madame Élisabeth, Lettres et Documents inédits* (1865), a work which with the preceding contains many forgeries; Arneth and Geffroy, *Marie Antoinette: Correspondance secrète entre Marie-Thérèse et le Comte de Mercy-Argenteau* (1874); studies by De Nolhac (1890; trans. 1898) and De la Rocheterie (1890; trans. 1893); works by Anna Bicknell (1898), Clara Tschudi (1898), and C. N. Scott (1905); M. C. Bishop, *The Prison Life of Marie Antoinette* (1893); and for the affair of the Diamond Necklace, G. C. D'Est Ange's *Marie Antoinette et le Procès du Collier* (1889). For an account of her portraits, about 500 in number, see Lord Ronald Gower's *Iconographie de Marie Antoinette* (Paris, 1883); and for the closing scenes in her life, Campardon's *Tribunal Révolutionnaire* (vol. i.) and *Marie Antoinette à la Conciergerie* (1863), Lord Ronald Gower's *Last Days of Marie Antoinette* (1885), and L. de Saint-Amand, *Les dernières Années de Marie Antoinette* (1889; Eng. trans. 1891).

Marie de France, a poetess of whom but little is known with any degree of certainty, save that she lived in England under Henry III., and translated into French from an English version of a Latin translation of the Greek the *Ysopet*, a collection of 103 moralised fables, in octosyllabic couplets, 'for the love of Count William' (supposed to be William Longsword of Salisbury). These fables are natural and happy, as well as graceful in versification, and give their authoress a place in that line of descent which ended with La Fontaine. But her greatest work was the twelve (or fourteen) *Lais*, delightful and genuinely poetic narrative poems, mostly amatory in character, in octosyllabic verse, the longest nearly twelve hundred lines, the shortest just over a hundred. The word *Lai* is of Breton origin, and most probably referred originally to the style of music with which the harper accompanied his verse. The titles of Marie's *lais* are *Guigemar*, *Equitan*, *Le Fraisne*, *Bisclavret*, *Lanval*, *Les Dous Amanz*, *Yonec*, *Laustic*, *Milun*, *Chaitivel*, *Chievrefoil*, *Eliduc*; and to these most add *Graelent* and *L'Espine*. Of the *lais* the best edition is that of Karl Warnke (Halle, 1885; new ed. 1900), forming vol. iii. of Suchier's *Bibliotheca Normannica*, enriched with invaluable comparative notes by Reinhold Köhler. The fables, by the same editor, form the sixth volume (1898). The *lais* were paraphrased rather than translated by O'Shaughnessy as *Lays of France* (1872). A third work sometimes ascribed to Marie is a poem of 2300 verses on the purgatory of St Patrick.

Marie de' Medici, wife of Henry IV. of France, was the daughter of Francis I., Grand-duke of Tuscany, and was born at Florence, 26th April 1573. She was married to Henry, 16th December 1600, and in the following September gave birth to a son, afterwards Louis XIII. The union, however, did not prove happy. Marie was an obstinate and passionate woman, and her quarrels with the king soon became the talk of Paris. She was wholly under the influence of her favourites, Leonore Galigai and her husband Concini, and was by them encouraged in her dislike to her husband. The murder of Henry (May 14, 1610) did not greatly grieve her, although it is not true that she was privy to the plot. For the next seven years she governed as regent, but proved as worthless a ruler as she had been a wife. After the murder of Concini (24th April 1617), whom she had created Marquis d'Ancre, a domestic revolution took place, and the young Louis XIII. assumed royal power. The queen was confined to her own house, and her son refused to see her. Her par-

tisans tried to bring about a civil war, but their attempts proved futile; and by the advice of Richelieu, then Bishop of Luçon, she made her submission to her son in 1619, and took her place at Court. Marie hoped to win over Richelieu to her party, but she soon found out that he had no mind to be ruled by her, whereupon she tried to undermine his influence with the king. Her intrigues for this purpose failed; she was imprisoned in Compiègne, whence she escaped and fled to Brussels in 1631. Her last years were spent in utter destitution, and she is said to have died in a hayloft at Cologne, 3d July 1642. She loved the fine arts, and Paris owes to her the Luxembourg. See books by Zeller (1877-99), Miss Pardoe (new ed. 1902), and Batiffol (1906; Eng. trans. 1908).

Marie Galante, a French island, discovered by Columbus in 1493, 17 miles SE. of Guadeloupe. Area, 58 sq. m. It is mostly wooded, and surrounded by coral reefs. Sugar, coffee, cocoa, and cotton are exported. Pop. 20,000. Chief town, Grandbourg, or Marigot, on the south-west coast.

Mariénbad (Czech, *Marianské Lázně*), a Bohemian spa, 47 miles by rail NW. of Pilsen, 2057 feet above sea-level, is surrounded by wooded heights. The springs have long been used by the people of the neighbourhood, but it is only since 1807-8 that it has become a place of resort for persons from distant parts of the world. The springs are numerous, varying in temperature from 48° to 54° F. They are saline, containing sulphate of soda and various alkaline ingredients, but differing considerably in their composition and qualities. The waters are used both for drinking and for bathing. Great quantities are exported.

Marienburg, an old town of Prussia, on the Nogat, 30 miles by rail SSE. of Danzig. It was long the seat of the Grand Masters of the Teutonic Order (q.v.), who removed from Venice hither in 1309. The fortress of the Knights, however, was founded here about 1274. Marienburg remained in their hands till 1457, when it was taken by the Poles, and by them it was held till 1772. The castle, in which seventeen Grand Masters resided, a noble edifice in a style of Gothic peculiar to the neighbourhood of the Baltic, was thoroughly restored in 1817-42. Pop. 14,000.

Marienwerder, a town of Prussia, is picturesquely situated 3 miles E. of the Vistula and 55 by rail S. of Danzig. It was founded in 1233 by the Teutonic Knights, and has an old castle and a cathedral (1384). Pop. 13,000. In 1920 a region of West Prussia, including Marienwerder and Marienburg, decided by a 97 per cent. vote to be German rather than Polish.

Marietta, capital of Washington county, Ohio, on the Ohio River, 105 miles SE. of Columbus. Founded in 1788, it is the oldest town in the state, is the seat of Marietta College (1835), and has varied manufactures and a trade in the petroleum found near by. Remarkable traces of the mound-builders are visible here. Pop. 15,000.

Mariette Pasha, FRANÇOIS AUGUSTE FERDINAND, Egyptian explorer, was born at Boulogne, 11th February 1821, and was educated at the municipal college of the town. He became French master at a school at Stratford-on-Avon in 1839, and in 1840 a pattern-designer at Coventry. But he soon returned to Boulogne, and after taking his degree at Douai (1841) was appointed professor in his native college. His connection with Nestor l'Hôte, the companion of Champollion, directed Mariette's attention to the hieroglyphic monuments; in 1849 he entered the Egyptian department of the Louvre, and in 1850 was despatched to Egypt in search of Coptic MSS. Whilst there

he made his famous discovery of the Serapeum, the long-buried cemetery of the Apis bulls, and brought to light a host of important monuments and inscriptions in Memphis, Sakkara, Giza, and the neighbourhood. In 1858 he was appointed Keeper of Monuments to the Egyptian government, and thenceforward his life was devoted to archaeological exploration in the Nile valley. With indefatigable industry he dug out the Sphinx and the temples of Dendera and Edfu, revealed the marvellous sculptures of Mejdûm and Giza, and the courts and inscriptions of Medinet Habu, Deir-el-Bahri, Karnak, and Abydos, and began the excavation of Tanis. Nor was he less active with pen and pencil. In 1856-57 appeared his *Sérapéum de Memphis* (also ed. Maspero, i. 1882); four editions of his *Aperçu de l'Histoire d'Égypte* came out between 1864 and 1874, and six of the *Catalogue du Musée de Boulak* (which he founded in 1863, and which is full of the results of his labours) from 1864 to 1876; he published sumptuous descriptions in many volumes, with folio plates of the chief temples—*Dendérah* (1870-75), *Abydos* (1869-80), *Karnak* (1875), *Deir-el-Baharî* (1877), *Monuments Divers* (1872 ff.); while his *Itinéraire de la Haute Égypte* was translated by his brother (*Monuments of Upper Egypt*, 1877), and his *Mastabas* edited by Maspero (1882). Besides the Bulaq (now Kasren-Nil) Museum, which owes its existence to its first director, Mariette founded the French School of Egyptology and the Egyptian Institute. He died at Cairo, 19th January 1881.

See E. Deseille, *Aug. Mariette* (1882); H. A. Wallon, *Notice*, Inst. de France (1883); and a biographical notice by Maspero in Mariette's *Œuvres diverses* (i. 1904).

Marignano. See MELEGNANO.

Marigold, a name given to certain plants of the natural order Compositæ, chiefly of the genera *Calendula* and *Tagetes*. Pot Marigold (*Calendula officinalis*) is an annual, a native of France and the more southern parts of Europe, with an erect stem, 1 to 2 feet high, the lower leaves obovate on long stalks, and large, deep yellow flowers. It has long been very common in British gardens; there are varieties with double flowers. The whole plant has a slightly aromatic odour and a bitter taste. The genus *Tagetes* consists of annual and perennial herbaceous plants, natives of the warmer parts of America, although *T. erecta*, one of those most frequently cultivated in Britain, bears the name of African Marigold; and *T. patula*, another annual well known in British flower-borders, is called French Marigold. Both species are Mexican. They have been long in cultivation, are much admired, and require the assistance of a hotbed in spring in the colder parts of Britain. Corn Marigold is a *Chrysanthemum* (q.v.). Marsh Marigold (q.v.) has no botanical affinity with the true marigolds. See also BUR-MARIGOLD.

Marines, or the ROYAL MARINE FORCES, are that body of the military forces of the crown which is under control of the Admiralty for service at sea or on land. The badge of the Royal Marines is the Globe and Laurel, with motto 'Per mare, per terram.' Their colonel-in-chief is the king. A regiment of marines was first raised by the Admiralty in 1664; previous to this troops had been embarked for temporary duty on board ship. In 1755 three divisions were established at Chatham, Portsmouth, and Plymouth. A fourth division was established at Woolwich in 1805, and disbanded in 1869. In 1802, as a reward for its services the corps was, by royal command, created 'the Royal Marines.' In 1855, in consequence of services in the Crimea, the title of 'Light Infantry' was added. In 1804 the Royal Marine Artillery was first authorised, artillery companies being

formed and attached to each division. In 1866 a Royal Marine Artillery division was established at Eastney. An Order in Council of 11th October 1923 amalgamated the Royal Marine Artillery and Royal Marine Light Infantry into the corps of 'Royal Marines.' The titles of 'Gunner R.M.A.' and 'Private R.M.L.I.' were changed to 'Marine.' The recruit depot is at Deal.

When serving in H.M. ships the marines are employed as guns' crews and in gunnery control, the size of the detachment being regulated by the number of guns' crews they are required to provide. In addition they are employed as sentries and in the general duties of the ship. They are equipped in a similar manner to the army, and are always ready for landing for service on shore. They combine the handiness of the sailor with the training of the soldier. They are skilled gunners, and highly trained infantrymen. In order to give marines the necessary training a long-service system is necessary: marines are, therefore, engaged to serve for twelve years, with option of re-engaging for another nine years, when they receive a pension. The result of this is that an unlimited supply of recruits can be obtained. They are carefully selected, both for physique and education. The original number of marines was 1200. The strength of the corps has varied considerably since its formation: at the time of the Napoleonic wars it was 31,000; immediately prior to the European War it was 18,000; at the date of the armistice the strength had reached 58,339.

The marines have been engaged in every war, both large and small, by land and sea, with few exceptions, and have always shown courage and loyalty. In the European War the marines more than upheld the traditions of the corps; 6000 were present in the battle of Jutland. Large numbers were employed as gunners in merchantmen and 'Q' boats. Four battalions of marines were hastily despatched for the defence of Antwerp, but were driven back, eventually composing the rearguard in the retreat of the Naval Division. Early in the war the 63d (Royal Naval) Division was formed, organised, and administered by Headquarters R.M. Forces. Originally there were four battalions of marines in this division; but, after service in Gallipoli, at Seddul Bahr, and Kum Kale, being greatly reduced in strength, the four battalions became two, and were transferred to France with the Naval Division, where they took part in some of the hardest fighting, their casualties being very heavy. Marine battalions were present in the battles of the Somme, Ancre, Arras, Paschendaele, and Cambrai. Their most famous service during the European War was the landing of a battalion on the mole at Zeebrugge to cover the operations by seamen of blocking the canal. Marines also took part in operations in German East and West Africa, Serbia, and North and South Russia. The marines during the war organised the following units: Heavy howitzer brigades (15-inch) with armies in France, battalion in the Aegean islands, armoured-car squadrons, marine engineers, marine submarine miners, marine labour corps, various anti-aircraft, anti-submarine, and coast defence batteries.

See Edye's *Historical Records of the Royal Marines*; Gillespie's *History of the R.M. Corps, 1803*; and Field's *Britain's Sea Soldiers*.

Marinetti, FILIPPO TOMMASO, Italian poet, born at Alexandria in 1881, studied at the Sorbonne, Pavia, and Genoa, edited *Poesia*, and advocated Futurism (q.v.).

Marini, GIAMBATTISTA, an Italian poet, born at Naples in 1569. Abandoning jurisprudence for poetry against his father's will, he was befriended

by various noble patrons, and was carried by Cardinal Pietro Aldobrandini to Turin, where a poem, *Il Ritratto*, procured him the office of ducal secretary. At Paris he enjoyed the patronage of Catharine of Valois, and after her death of Marie de' Medici. Here he wrote his best work, the *Adone* (1622), and after its publication revisited Italy, and died at Naples in 1625. The licentiousness that mars his verse was but an echo of his life. His imitators form the so-called Marinist school, of which the essential features are florid hyperbole and false overstrained imagery. See GONGORA, LYL, and METAPHYSICAL POETS.

Marino, a town on the Alban Hills, 12 miles SE. of Rome, has a castle belonging to the Colonnas, who took it from their rivals, the Orsinis, in 1424, and a cathedral and churches with pictures by Guido, Domenichino, and Guercino. It grows wine, and manufactures soap, leather, &c. Pop. 10,000.

Mario, GIUSEPPE, the famous tenor, was by birth the Cavaliere di Candia and son of General di Candia. He was born probably at Cagliari (not Genoa or Turin) about 1808, and served in the army for some years. But a youthful escapade led to his forsaking Italy for Paris, where he quickly won his way into the most exclusive circles both by the charm of his manners and his exquisite voice. Having contracted debts, however, he accepted the appointment of first tenor of the Opéra, with a salary of 1500 francs per month, changing his name at the same time from De Candia to Mario. After two years' study at the Conservatoire Mario made his début, on the 2d December 1838, as Robert in *Robert le Diable*, and achieved the first of a long series of operatic triumphs in Paris, London, St Petersburg, and America. His repertoire embraced all the great works of Rossini, Bellini, Donizetti, and Verdi. By his wife, the famous singer Giulia Grisi (q.v.), he had several daughters. In private he was esteemed for his large-handed liberality and for his noble assistance to struggling artists. In his later years after his retirement from the stage he lost his fortune through disastrous speculations. He died at Rome, 11th December 1883. See Judith Gautier, *Le Roman d'un Grand Chanteur* (1912).

Mariolatry. See MARY.

Marion, capital of Marion county, Ohio, 46 miles by rail N. of Columbus, with manufactures of machinery, farming implements, and other wares; pop. 28,000.

Marionettes, little jointed puppets of wood or cardboard, especially those moved by means of cords or springs by a concealed agent. From the Greeks they passed to the Romans. In Italy the *Fantoccini* reached a very respectable degree of artistic merit, and still hold their ground. The marionette theatre was carried to France under Charles IX. Thence it passed quickly to England, where it became known as a *motion*, or *motion of puppets*, or *puppets* only. The favourite resort of puppet-plays in London seems to have been Bartholomew Fair, and in Elizabethan times they played set pieces. We find allusions so frequent as to prove wide popularity in Shakespeare, Ben Jonson, Pepys's *Diary*, Pope, Swift, and the Essayists. Marionettes are still exhibited occasionally, but the only very familiar marionette-play we have is the Punch and Judy of our streets. A marionette *Faust* had for many generations been played in Germany, and Goethe tells us that it gave him the first suggestion of his greatest work. Plays have been written in French for the marionette stage by Maeterlinck. In the East the showmen are very frequently Gypsies. Gypsies used to show

marionettes in Germany, and already are spoken of as actors in Scotland in the 16th century. See PUNCH.

Mariotte, EDMÉ, a French physicist, born in Burgundy during the first half of the 17th century—the year is not known—was prior of St Martin-sous-Beaune, and died at Paris, 12th May 1684. He was one of the earliest members of the Academy of Sciences at Paris, and wrote original papers on percussion, the nature of air and its pressure, the movements of fluid bodies and of pendulums, on colours, &c. What is on the Continent called Mariotte's Law is rather Boyle's Law, and is an empirical law stated by Boyle (q.v.) in his *Defence of the Doctrine touching the Spring and Weight of the Air* (1662), and by Mariotte in his *Discours sur la Nature de l'Air* (1676). See GAS AND GASES. Mariotte's collected works were published at Leyden in 1717, and at The Hague (2 vols.) in 1740.

Mariposa, a central county of California, bordering on the Sierra Nevada. It contains the Yosemite Valley (q.v.) and a Sequoia (q.v.) grove.

Maris, JAKOB (1837-99), one of the greatest modern Dutch painters of landscape and genre, was one of three brothers, all born at The Hague. After studying at Antwerp and Paris he settled in Holland. In his earlier stages he painted interiors notable for their great minuteness of detail. His sojourn in Paris developed and broadened his art, however, and it is as a landscape painter of uncommon merit that he is known to fame. In this his later style he subordinated detail to a general grandeur of design, and nowhere is this more strikingly manifest than in 'Dordrecht,' where the massing of light and shade overwhelms detail and leaves the essential grandeur of the scene before us. 'The Stone Mill,' 'Grey Tower, Old Amsterdam,' and 'A Village Scene,' are others of his masterpieces. In all he delighted in showing the effect of light through a silvery mist.—His brother MATTHIJIS (1839-1917) studied with him at Antwerp and Paris, where he was enrolled in the National Guard during the siege. There he painted 'Feeding Chickens' (which shows how the romantic buildings of central France had affected him) and 'Montmartre.' In 1872 he went to London, where he helped the decorative artist Daniel Cottier, but nothing was able to keep the artist in harness. He insisted on painting when he liked and what he liked, and as a result the works of his maturity number only about thirty. He chose to live apart from the world in one of his own making, a world of dreams and poverty. 'The Girl at the Well,' 'Enfant Couché,' 'The Spinner,' and 'The Flower,' are examples of his work which show the great blending of romantic imagination and realistic treatment to which he attained.—WILLEM (1844-1910), the third brother, worked in a different style. Cattle in full daylight, and landscapes with sand-hills and meadows, much brighter and more full of colour than the work of his brothers, were his favourite subjects.

Marischal. See MARSHAL, KEITH.

Marists, a modern French Catholic Congregation (q.v.). The Marist Fathers date from 1815, the Marist Brothers from 1817, and the Marist Sisters from 1834.

Maritza (Gr. *Hebros*), a river of Europe, rises in the Balkans, and flows E. by S. through Bulgaria past Philippopolis, then between Greece and Turkey. At Adrianople it bends and flows S. by W. to the Gulf of Enos in the Ægean. It is 270 miles long, and is navigable for small boats to Adrianople.

Mariupol, or MARIAMPOL, a seaport of the Ukraine, on the Sea of Azov, 65 miles W. of

Taganrog. It was founded in 1779 by Greek emigrants from the Crimea, and exports coal, grain, rape-seed, and iron, and has metallurgical works. Pop. 68,000.

Marius, GAIUS, a famous Roman general who was seven times consul, was born of an obscure family at the village of Cereatæ, near Arpinum, 157 B.C. He served with great distinction at the siege of Numantia (134) under the younger Scipio Africanus, who is said to have hinted that in him the Romans would find a successor to himself. In 119 he was elected tribune of the plebs, and already he had made himself a great popular leader by his vigorous opposition to the nobles. In 114 he went to Spain as proprætor, and cleared the country of the robbers who infested it. He now married Julia, the sister of the father of the great Cæsar. He served in Africa as legate to Q. Cæcilius Metellus during the war against Jugurtha, and was elected consul for the year 107. He took for his province Numidia, and closed the Jugurthine war in the beginning of 106. The honour of capturing the beaten king fell to his quæstor L. Sulla, and from this period dates the birth of that jealousy out of which were to flow so many horrors. Meanwhile, an immense horde of Cimbri, Teutones, and other northern barbarians had burst into Gaul, and repeatedly defeated the Roman forces with great slaughter. Marius was again called to the consulate for the year 104, and for the third, fourth, and fifth time in the following years, 103-101, for it was felt that he alone could save the republic. The war against the Teutones in Transalpine Gaul occupied him for more than two years; but he finally annihilated them in a terrible battle of two days' duration at Aquæ Sextiæ, now Aix, in Provence. That 200,000—or even 100,000—Teutones were slain is of course a gross exaggeration. After this he turned to the Cimbri in the north of Italy, and them he also overthrew at Campi Raudii near Vercellæ, with a like destruction (101). The people of Rome knew no bounds to their joy. Marius was declared the saviour of the state, the third founder of Rome, and was made consul for the sixth time in 100.

When Sulla as consul was entrusted with the conduct of the Mithradatic war, Marius attempted to deprive his patrician rival of the command, and a civil war began (88). Marius was soon forced to flee, and, after the most frightful hardships, and numerous hairbreadth escapes, he made his way to Africa. Two romantic incidents stand out among these days of peril. His place of hiding in the marshes of Liris had been discovered, and he had been flung into prison at Minturnæ, when a Cimbrian slave was sent to despatch him. 'Wretch, darest thou slay Gaius Marius?' said the old hero as he glared upon him out of the gloom. The slave fled in terror saying, 'I cannot kill Marius,' and the citizens recognising the omen allowed the exile to escape. Scarcely had he reached the shore of Africa, when the Roman governor sent him a summons to leave the country. Said Marius, 'Go, tell the prætor that you have seen Gaius Marius a fugitive sitting on the ruins of Carthage.' Here he remained until a rising of his friends took place under Cinna. He then hurried back to Italy, and, along with Cinna, marched against Rome, which was obliged to yield. Marius was delirious in his revenge upon the aristocracy; a band of 4000 slaves carried on the work of murder for five days and nights. Marius and Cinna were elected consuls together for the year 86, but the former died after he had held the office seventeen days. On the triumph of Sulla his body, which had been buried, not burned, was torn from its grave on the banks of the Anio and cast into the stream. Lucan tells us

how the troubled ghost haunted the spot and scared the peasants from the plough on the eve of impending revolutions.

Marivaux, PIERRE CARLET DE CHAMBLAIN DE, was born at Paris, February 4, 1688. He belonged to a good Norman family and devoted himself to letters. He received but a slight education and in his early writings affected a disdain of the Greek and Latin authors, declaring, for example, that he preferred Gregory of Tours to Tacitus and Vincent Ferrier to Demosthenes. He published *L'Homère Travesti*, a burlesque of the *Iliad*, in 1716, and brought out his best comedy, *Le Jeu de l'Amour et du Hasard* in 1730. He received a pension from Helvétius, and another, of 1000 crowns a year, from Madame de Pompadour. His romance of *Marianne* came out in 11 parts between 1731 and 1741, but was never concluded by him, the twelfth part being added by Madame Riccoboni. He followed up his first dramatic success by numerous comedies: *L'Épreuve*, *Les Fausses Confidences*, *Le Legs*, *Les Sincères*, *La Méprise*, *Le Triomphe de l'Amour*, &c. They are the work of a clever analyst rather than a dramatist; the dialogue, says Sainte-Beuve, is a perpetual 'moral skirmish'; the writer sacrifices character and situation to an ingenious playing with words. Marivaux, said Voltaire, knew all the bypaths in the human heart, but he did not know the highway. He died at Paris, February 12, 1763. His title to fame rests on *Marianne*, one of the best novels of the 18th century. Its interest does not lie in exciting adventures, but in the subtle analysis of character and

the delicate picturing of contemporary manners. From the peculiarities of Marivaux's finicking style the term *Marivaudage* was at one time current as a synonym for affected or 'precious' writing. His other romances, *Pharamond* and *Le Paysan parvenu*, are greatly inferior to *Marianne*. See Sainte-Beuve's *Causeries du Lundi IX.*, and Arsène Houssaye's *Galerie de Portraits du dix-huitième Siècle*.



Common Marjoram
(*Origanum vulgare*).

Marjoram (*Origanum*), a genus of plants of

the natural order Labiatae. Several of the species are familiar as pot and sweet herbs in gardens. *O. vulgare* is the Common Marjoram, a native of Britain, and is aromatic with a bitter and slightly acrid taste. The dry leaves have been used instead of tea, and they are also used in fomentations. The tops of the plant have been used to dye woollen cloth purple; and, by a process of macerating the material first in alum water and then in a decoction of crab-tree bark, they also dye cotton cloth a reddish-brown. *Oil of Marjoram* is obtained from this and other species by distillation. The oil of marjoram is so caustic as to be used by farriers as a stimulating liniment. A little cotton moistened with it placed in the hollow of an aching tooth relieves pain. *O. heracleoticum* is the Winter

Sweet Marjoram of gardeners; *O. Onites* is the Pot Marjoram; and the Knotted Marjoram is *O. Majorana*. The dittany of Crete, a plant with round leaves clothed with thick white down and purple trailing stems, which is frequently cultivated as a window-plant in Britain, is *O. Dictamnus*. Several species have been used as sources of thymol and of carvacrol.

Mark, the standard weight of the money system in various countries of Europe, especially in Germany, where in the middle of the 11th century the Cologne mark = half a Cologne pound, or 233·812 grammes, was adopted as the standard, and as such continued in use till 1857. The mark gradually acquired a monetary value as well; as such it has been since 1875 the standard of currency in the German Reich, being normally equal to 11½d. English and 24 cents United States currency. The mark is divided into 100 pfennigs. The Lübeck mark or mark current, a coin formerly in use at Hamburg, was worth 1s. 2d.; the *mark banco* there, a money of account, was worth 1s. 6d. In England marks are first heard of in the treaty between Alfred and Guthrum the Dane, and are supposed to have been then a Danish reckoning. But these marks were not coins, only money of account, or rather a weight. In 1194 the coined mark had the nominal value it ever after retained, 160 pennies or 13s. 4d., two-thirds of the nominal 'pound.' The gold noble, first struck by Edward III., was worth half a mark—6s. 8d. As late as 1703 Defoe was fined 200 marks. In Scotland the mark or *merk* was a weight for gold and silver, or common money reckoning, and also a coin; originally of the same value as in England, it depreciated till in 1625 it had only one-twelfth of the English value. There were two-merk, one-merk (4½ to the oz.), half, and quarter merk pieces. The French standard weight mark weighed 244·75 grammes.

Mark, a signature. See DEED, ILLITERATES.

Mark. See MARCHES, VILLAGE COMMUNITIES.

Mark, the evangelist and reputed author of the second gospel. His original name was John, and Mark (Marcus) was a Latin prænomen used in Gentile circles. In the New Testament he is sometimes called John Mark, sometimes simply John, and sometimes Mark. Little is known about his early life. His mother's name was Mary. She owned a house in Jerusalem, which was used as rendezvous for the early Christians. Mark was the cousin of Barnabas, and, like his distinguished relative, may possibly have been a native of Cyprus and a member of a Levitical family. Through the influence of his mother and his cousin Mark soon came into prominence in the primitive Christian community. When Paul and Barnabas went from Antioch to Jerusalem to bring monetary assistance to the Christians there, on their return they took Mark with them back to Antioch (Acts, xii. 25). Soon afterwards the first missionary journey was planned by the two apostles, and they took Mark with them 'as their attendant' (Acts, xiii. 5). The exact meaning of this phrase is obscure. Chase has suggested that the common interpretation of the words is wrong. The term 'attendant' represents not Mark's relationship to Paul and Barnabas, but his office as 'synagogue attendant.' ('They had with them also John, who was a synagogue official.' Mark was with the apostles during their missionary tour through Cyprus; but when they returned to the mainland, and proposed to extend their work into the interior of Asia Minor, Mark left them and returned to Jerusalem (xiii. 13). No reason is given for his conduct, but we know that Paul deeply resented his defection. Possibly Mark's courage failed him. He was not of the

stuff of which heroes are made. Possibly, as Chase suggests, he did not altogether approve of the policy adopted by the two apostles of accepting Gentile converts into the church. Mark's desertion was all the more serious, because Paul was ill at the time and needed his presence and assistance. It is easy to understand, therefore, how it was that when Barnabas proposed to take Mark on the second missionary journey, Paul refused to have as his companion the man 'who withdrew from them from Pamphylia and went not with them to the work.' A sharp altercation arose between the two apostles on the point, with the result that they separated, and Barnabas returned with Mark to Cyprus, where he is lost to sight for some time. There can be no doubt, however, that the estrangement between Mark and Paul was afterwards removed. In Paul's later epistles we find that Mark was one of Paul's companions during his imprisonment at Rome, and he speaks of him in terms of praise and affection (Coloss. iv. 10-11; Philemon, 24). In the second epistle to Timothy, too, Paul urges Timothy to bring Mark to him with all speed, 'for he is useful to minister to my needs' (iv. 11). We can only conclude from these references that Mark had been completely restored to favour, and was once more warmly attached to the apostle Paul. There may also be a reference to Mark in the salutation of 1 Peter, v. 13, where the writer sends greetings from the church in Rome and 'Mark my son,' and if this be so, it confirms the early tradition preserved in Papias and elsewhere which associates Mark with Peter and describes him as 'Peter's interpreter,' though the meaning of this phrase is not easy to explain. Some scholars, e.g. Zahn, maintain that the word 'interpreter' is used loosely, and refers to the fact that Mark embodied the oral teaching of Peter in a book. Others, on the contrary, hold that the phrase must be used in a natural sense, and that Mark helped Peter by translating his message into Greek and Latin. Later tradition connects Mark with Alexandria. 'He was the first,' says Eusebius, 'to found churches in Alexandria itself.' Two later apocryphal works, (a) the Acts of Mark, (b) the Periods of Barnabas, attempt to fill up the details of tradition. The former describes Mark's work in Alexandria, the latter gives an account of the missionary labours of Barnabas and Mark in Cyprus. Both are unreliable, and it is difficult to sift the grains of fact from the immense overgrowth of legend. The Acts of Mark declare that Mark finally suffered martyrdom at Alexandria, and this statement is endorsed by Jerome, but the tradition is so late (4th century) that it cannot be regarded as trustworthy. It is not likely that such an event would be passed over without mention by the great Alexandrian fathers, and their silence about Mark's work in Alexandria throws discredit on the whole tradition.

Mark, GOSPEL OF. It is now generally agreed amongst modern scholars that the gospel of Mark is the most primitive of the synoptics, and one of the sources which lie at the base of Matthew and Luke (see GOSPELS). This view, however, is of comparatively recent origin. The traditional theory, which goes back to Augustine and Jerome, maintained that Mark was the 'abbreviator and follower' of Matthew. This position was first challenged by G. C. Storr in an essay *Ueber den Zweck der evangelischen Geschichte Johannes*, published in 1786. Storr's hypothesis of the priority of Mark did not at first secure much support. The Tübingen school, for reasons of its own, clung to the traditional view. And even in recent times the position of Augustine has found an ardent champion in Zahn. The modern investigation of the synoptic problem has, however, convinced the

vast majority of present-day scholars that the belief in the priority of Mark rests on irrefragable evidence. Practically the whole of the narrative of Mark (with the exception of a few unimportant sections) is embodied in either Matthew or Luke, or both. The outline followed by Mark is accepted by the other two evangelists, and they never both diverge from it at the same time. Mark's arrangement of incidents, too, is also, generally speaking, followed by Luke and Matthew. The linguistic resemblances are best explained by supposing that Mark was the earliest writer, for it is comparatively rarely that Matthew and Luke agree in phraseology against Mark. The priority of Mark may therefore be regarded as one of the assured results of modern criticism. There is general agreement, too, that Mark's gospel is based upon the reminiscences of Peter. Our earliest testimony upon this point comes from Papias (130-140 A.D.), who says, 'Mark, who had been Peter's interpreter, wrote down accurately all he remembered of the words and acts of Christ, but not in order. For neither did he hear the Lord nor was he one of his followers. He was a follower, as I have said, at a later time of Peter, who arranged his addresses as occasions dictated, without any intention of putting together a complete statement of the Lord's sayings: for of one thing, he (i.e. Mark) was most careful, not to omit anything he heard, nor to misrepresent anything in it.' The only criticism of importance which has been brought against this statement is upon the phrase 'not in order.' As it stands, Mark's chronological arrangement of the narrative seems to be more satisfactory than that of either of the other synoptists, and it seems strange that Papias should pass this stricture upon it. Possibly what Papias means is that Mark did not narrate the events in the order in which they were arranged in Peter's speeches. Possibly, too, he may have had another chronological standard in his mind. He may, for instance, as Lightfoot and others have maintained, be drawing a contrast between the arrangement in Mark and the arrangement in the fourth gospel to the detriment of the former. Burkitt supposes, on the other hand, that the phrase translated 'not in order' does not refer to arrangement at all, but is used in a technical sense, and means 'not with rhetorical display.' The statement of Papias regarding the connection between Mark and Peter is accepted without question by many later patristic writers, and there seems to be no doubt that upon this point tradition is unassailable.

The question which really divides scholars to-day is: Does our present gospel represent the original work of Mark, or is it a later version expanding and embellishing the narrative actually written by Mark? In other words, was there an Ur-Marcus from which our gospel was developed either by Mark himself or more probably by some later writer? This theory has assumed many forms; one of the most interesting hypotheses is the suggestion of Dr A. Wright that the gospel of Mark passed through three stages in the process of its evolution: (1) The first edition, known as Proto-Mark, represents the version of Mark used by Luke; it is difficult to account for Luke's omissions, especially 'the great omission' which extends from Mark, vi. 42 to Mark, viii. 19 if he had our gospel of Mark before him in its entirety as he wrote; (2) the second edition or Deutero-Mark, which represents the version used by Matthew; (3) the third edition or Trito-Mark is equivalent to our present gospel. This theory has been substantially accepted by Professor Stanton, who holds that the three stages in the evolution of the gospel are a demonstrated fact. On the other hand, such important authorities as Sir John Hawkins

and Dr Sanday deny entirely the validity of the theory.

Another question in debate is, Did Mark know and use the collection of Logia, generally described as Q, which formed the source from which Matthew and Luke derived their knowledge of the teaching of Jesus? The affirmative position is maintained by B. Weiss and Streeter, the negative by Harnack, Wellhausen, and Burkitt. On the whole, it may be said that the evidence favours the negative rather than the affirmative position, and it is very difficult to deny Harnack's statement in summing up his discussion of the problem, 'that the evangelist made use of Q no one will be able to prove.' On the kindred problem as to the relative value of Mark and Q, there has been a great controversy within recent years between Harnack and Wellhausen. Wellhausen contends that the supremacy rests with Mark, which is thus our chief and most reliable source, while Harnack, on the other hand, is equally vigorous in maintaining the authority of Q. The conflict of opinion is, however, chiefly of academic interest, since the material of Harnack has very little in common with that of Q, inasmuch as Mark deals mainly with external events, and Q is chiefly occupied with the teaching of Jesus. It is a noteworthy fact, however, that Mark should have found so stalwart and convinced a defender as Wellhausen.

The gospel of Mark consists of a number of graphic and vivid pictures or cartoons of the life of Christ. The writer is fond of introducing pictorial details, as in the account of the healing of the palsied man (ii. 1-12), or the Gadarene demoniac (v. 1-20), or the boy possessed with the evil spirit (ix. 14-25). In the parallel passages of Matthew and Luke the narrative is much balder and more concise. The first nine chapters of Mark are occupied entirely with an account of the Galilean ministry of Jesus. The gospel throughout is a gospel of action rather than of teaching. Comparatively little space is devoted to the words of Jesus, and all the stress is laid upon his deeds. Hence the story is much more dramatic than that of the other synoptics. The present ending of the gospel (xvi. 9-20) is undoubtedly a later addition, and is possibly the work of Aristion, whose name is attached to it in an Armenian MS. discovered by Conybeare. What happened to the original ending cannot be determined. Possibly a papyrus leaf was torn off the roll by accident. Possibly, however, it may have been designedly omitted in order to remove evidence which seemed to conflict with the Johannine account of the Resurrection. A shorter ending is found in some MSS. and printed in many editions of the Greek text as an alternative to the present conclusion of the gospel. Still a third ending is given in the Washington MS., which was discovered in 1907 and published in 1912. The date at which the gospel was written is difficult to determine. The opinion of patristic writers is divided on the point. Irenæus tells us that it was 'after the decease of Peter and Paul' that Mark undertook to embody Peter's teaching in writing. Clement and Origen, on the other hand, state that the gospel was written during the lifetime of Peter, who gave his approval to the book. The *terminus ad quem* is fixed, of course, by the date of Matthew and Luke, but these books unfortunately cannot be exactly dated. There is a good deal of force, however, in the argument of Harnack that Luke must have been written not long after the date at which the narrative in Acts ends (62 A.D.). This position would make 60 the latest possible date for Mark. The eschatological discourses, too, seem to imply a date earlier than the destruction of Jerusalem. The gospel was probably written at Rome (though tradition also assigns it to Alexandria), and was

certainly intended for Gentile readers. This seems to be conclusively proved by the fact that Aramaic terms (e.g. *Talitha cumi*, v. 41; *Effatha*, vii. 34; *Golgotha*, xv. 22) are always explained, and by the presence of frequent Latinisms in the Greek text. Jewish customs and practices, too, are always described in a way which would not have been necessary if the book had been intended for Jewish readers, who were familiar with them.

The best modern commentaries are those of Swete, Gould (*International Critical*), Menzies (*The Earliest Gospel*), Montefiore and Bruce (*Expositor's Greek Testament*), J. V. Bartlet (*Century Bible*). See also Bennett, *The Life of Christ according to St Mark*; J. M. Thompson, *Jesus according to St Mark*. The most valuable modern German commentaries are those of Holtzmann, B. Weiss, Klostermann, and Wellhausen. In French the best commentary is that of Loisy.

Mark Antony. See ANTONIUS.

Market-Drayton, a town of Shropshire, on the Tern, 18 miles N.E. of Shrewsbury. It has a grammar-school, county grammar-school, and a church dating from the 12th century, up whose spire Clive (q.v.) clambered as a boy. At Bloreheath, 3 miles to the east, the Yorkists won a victory in 1459. Pop. 4700.

Market-Harborough, an urban district of Leicestershire, on the river Welland and the Union Canal, 16 miles S.E. of Leicester, has traces of a Roman camp; a fine Perpendicular church, built by John of Gaunt as an atonement for his intrigue with Catharine Swynford, with a broad spire 154 feet high; and the highly picturesque old grammar-school (1614; restored 1869). A famous hunting-centre, it gives title to one of Whyte-Melville's novels. Pop. 8600.

Markets. See FAIRS.

Markham, SIR CLEMENTS ROBERT (1830-1916), son of a canon of Windsor, was born at Stillington, near York, and educated at Westminster. He served in the navy, was in the Franklin Arctic expedition, held posts in the Board of Control and the India Office, and was secretary and (1893-1905) president of the Royal Geographical Society. He travelled much in Peru and India, and from South America introduced the cultivation of cinchona into India (1860); and he was geographer to the Abyssinian expedition (1867). He wrote *Lives of Lord Fairfax, Columbus, John Davis, Major Rennell, and M'Clintock*; histories of Peru, Persia, the Indian surveys, missions to Tibet, and the Abyssinian expedition; travels in Peru and India, and an Inca grammar and dictionary, besides translations. He edited over 20 volumes for the Hakluyt Society, and contributed to *Chambers's Encyclopedia*.

Markham, GERVASE (1568?-1637), earliest English hack writer, served as a soldier in the Netherlands, and wrote copiously on innumerable subjects, as on horsemanship, *Country Contentments*, and the story (in verse) of Sir Richard Grenville, and imported the first Arab horse into England.

Markham, MRS., was the pen-name of Mrs Elizabeth Penrose (1780-1837), who wrote school histories of England and France, and other works for the young. Her father was Edmund Cartwright (q.v.); her husband, vicar of Thorney near Newark, wrote over a dozen theological works.

Markhor. See GOAT.

Marking Ink, Nut. See INK, SEMECARPUS.

Markirch (Fr. *Ste-Marie-aux-Mines*), a town of Upper Alsace (Haut Rhin), on the Leber, 40 miles S.W. of Strasburg by rail, with important cotton and woollen mills; pop. 12,000.

Marl, a mixture, naturally existing, of clay and carbonate of lime. Marls are found in very

different geological formations, but everywhere seem to owe their origin to deposition by water. The name is sometimes applied to friable clays, or mixtures of clay and sand, in which there is almost no trace of lime; but the presence of a notable proportion of carbonate of lime is essential to marls, properly so called. This proportion varies from 6 to 20 per cent. Marly soils are in general of great natural fertility. Marl is very advantageously used as a manure, acting both chemically and mechanically; but different kinds of marl are of very different value in this respect. The use of marl as a manure has been practised from ancient times. An English statute of 1225 (10 Henry III.) gave every man a right to sink a marl-pit on his own ground, and there is other evidence that the application of marl to land was common in England in the 13th century. The quicker action and greater efficiency of lime have led to its use in many cases instead of marl, although some kinds of marl are extremely useful in some soils. The bulkiness of marl confines its use to the neighbourhood in which it is found. Marl is sometimes indurated into a rock; a slaty variety, containing much bitumen, is found in Germany. See also LIAS.

Marlborough, an old and interesting market-town of Wiltshire, pleasantly situated in the valley of the Kennet, 75 miles from London; near by is the Savernake Forest, and north of the town lies the wide expanse of the Wiltshire Downs. The broad High Street, with picturesque old houses, has a charm of its own. At the eastern end is St Mary's Church, rebuilt in 1790, but bearing still on its tower the marks of Cavalier bullets. To the west is St Peter's, and a stone's-throw beyond it is the well-known Marlborough College. Pop. 4400. —Marlborough College was incorporated in 1845, and obtained an additional charter in 1853; the nucleus of the college buildings is the 18th-century mansion of the Seymour family, an excellent example of early Georgian domestic architecture, afterwards famous as the Castle Inn. In the college grounds stands a mound which once supported the keep of the Norman castle of Marlborough, and is generally believed to be of Neolithic origin. Among the more recent additions the chapel, opened in 1886, is most worthy of mention. See local histories by Waylen (1854) and Hulme (1881), and the *History of the College* (2d ed. 1923).

Marlborough, a provincial district of New Zealand (q.v.), in the north-east corner of the South Island, 130 miles long by 30 broad.

Marlborough, JOHN CHURCHILL, DUKE OF, the ablest general and diplomatist of his time, was born on the 24th June 1650, at Ashe, in Devonshire, an old manor-house, which can still be seen between Axminster and Seaton. His father, Sir Winston Churchill, had been an enthusiastic adherent of the Stuarts, and on the accession of Cromwell to power his estates had been consequently sequestered. At the Restoration, however, Winston recovered possession of his lands, but his poverty prevented him from giving his children an education befitting their position, so that young Churchill and his brother George had to face the world with little Latin and less Greek, and a knowledge of English history gathered from the plays of Shakespeare. During his engagement as a page to the Duke of York, John was fortunate enough to secure a commission as ensign in the Guards, and at the age of sixteen, in the year 1667, he was sent to Tangiers, then besieged by the Moors. It is said that he was sent to Tangiers on account of the king's jealousy of his favour with the Duchess of Cleveland; and the story is told that on one occasion, being nearly surprised by the king, he leapt out

of a window and was presented by the duchess with £5000, £4500 of which he invested in an annuity of £500 a year. The papers with regard to the annuity transaction are still in existence. At Tangiers Churchill had little opportunity of distinguishing himself. Recalled to England by the Duke of York, he was promoted to a captaincy, and in command of a grenadier company he was despatched to join Turenne, to assist Louis XIV. in the reduction of the fortresses on the Dutch frontier. Here his brilliant courage and ability at once gained him a colonelcy, although his promotion would not have been so rapid had he not called into requisition the influence of his sister, Arabella, mistress of the Duke of York. His prosperity was further advanced by his marriage with Sarah Jennings, a lady as remarkable for her talents and imperious disposition as for her beauty. In 1682 he was created Baron Churchill of Eyemouth, in Scotland. On the accession of the Duke of York to the throne as James II., the services of Colonel Churchill to his master were not forgotten, as he was raised to the English peerage under the title of Baron Churchill of Sandridge, in Hertfordshire. Promoted to be general, Churchill took an active part in quelling the rebellion of Monmouth; but, on the landing of the Prince of Orange, he joined the invader. James's daughter, the Princess Anne, accompanied by Lady Churchill, also fled to join the rebels in the north. William, on his accession, showed his gratitude for the assistance given him by Churchill by creating him Earl of Marlborough. Notwithstanding the conspicuous service rendered by Marlborough in reducing Ireland to subjection, and as commander of the troops employed against the French in the Netherlands, in 1689-91, William III. could not rid himself of a certain not altogether ungrounded suspicion of his new earl, till in 1692 he fell into disfavour, and was dismissed from all his offices. As the result of the discovery of a plot with which a clever forger named Young associated the name of Marlborough, the earl was arrested and lodged in the Tower. In ten days he was released, however, but for five years he was without any public employment, till the death of Mary, when he was restored to the favour of the king, and he retained it till the death of William in 1702.

At the accession of Queen Anne he was entrusted with the command of the British army in the Netherlands on the declaration of the war of the Spanish succession, in which he was to show his unrivalled strategical genius during one of the greatest series of military operations in which England has ever been engaged. Anne showered honours on the head of the fortunate earl and his wife, her closest friend. Marlborough was made a knight of the Garter, Commander-in-chief, and Master General of the Ordnance, while his lady was appointed Groom of the Stole, Mistress of the Robes, and Keeper of the Privy Purse. Marlborough, in fact, became regent in all but name. His wife governed the queen, and he himself directed Godolphin, the Lord High Treasurer, whose son had married his daughter. At the opening of the campaign, Marlborough, on his arrival at The Hague, was named commander-in-chief of the combined English and Dutch forces, with a salary of £10,000. The campaign was one long series of triumphs for the allies. In 1702, for driving the French out of Spanish Guelders, the reward was a dukedom and £5000 per annum 'from the post-office.' He was summoned to the campaign in the Low Countries, in which he was so much disgusted with the Dutch that he returned to England, seriously thinking of throwing up his command. Next year, however, we see him supporting the German Emperor and joining Prince Eugene of Savoy, in July

of that year storming successfully the French and Bavarian lines at Donauwörth, and on the 13th August gaining a glorious but bloody victory over the enemy at Blenheim. Of 56,000 men, the French and Bavarians lost 40,000, and the victors' killed and wounded numbered fully 12,000. The result of this decisive battle stamped Marlborough as the first general in Europe. Parliament bestowed upon him the estate of Woodstock, the queen caused Blenheim Park (q.v.) to be built for him, and the emperor created him a prince of the Holy Roman Empire. Diplomatic negotiations occupied the principal part of Marlborough's time and attention in 1705, but in 1706 he resumed that career of victory which broke the force of the spell surrounding the great power of France under Louis XIV., who gloried in calling himself the 'Invincible.' On the 23d May 1706 the battle of Ramillies was fought, when the French were obliged to desert the line of the Scheldt and evacuate the whole of Spanish Flanders. The campaign of 1707 was an almost wholly inactive one; but in 1708 the attempt by the French under Vendôme to recover Flanders led to the battle of Oudenarde—the only battle of Marlborough's engaged in front of a fortified town—fought on July 11, and resulting in the total defeat of the French forces. Marlborough then laid siege to Lille and Ghent, and the surrender of these two towns ended the long and arduous campaign. The year 1709 was distinguished by the battle of Malplaquet—in Marlborough's words, 'a very murdering battle.' The numbers were practically equal, but the French had an infinite superiority of position. There are few battles in history of which it can so certainly be said that the best men won. The carnage was tremendous—20,000 on the side of the allies and 8000 on that of the French. The blood of Malplaquet—the last of the four engagements which gave Marlborough's name a unique position in the roll of generals—did not bring about peace; and in 1711 he was afield again, taking town after town from the French. This eventually led to the treaty of Utrecht, which gave thirty years of peace to Europe.

Meanwhile important events were taking place in Britain. The queen, tired of the tyranny exercised by the Duchess of Marlborough, shook off the yoke, dismissed her ministers, Godolphin and Sunderland, paving the way for the elevation to power of the Earl of Oxford and the Tories. Thereupon a charge was preferred against Marlborough of having embezzled public money, and he was deprived of his offices, till the accession of George I., when, in a day, he was restored to the position in which he stood after the battle of Blenheim. A stroke of apoplexy on 28th May 1716, although it impaired his speech, did not preclude his attendance in parliament till within six months of his death, which occurred on 16th June 1722. His funeral obsequies in Westminster Abbey were celebrated with great magnificence, and all ranks and all parties in the state joined in doing him honour. Charges of avarice and peculation have been brought against Marlborough—among others, by Hallam, Mahon, Macaulay, and Thackeray. Despite this, and the certainty that he thought more of his own interest than the cause in which he was engaged, his character had many elements of excellence. He was generous in action, gentle in temper, a devoted husband, and a man of religious fervour.

His wife, SARAH JENNINGS, was born on 29th May 1660, and when about twelve years of age entered the service of the Duchess of York, and became the chosen and most intimate friend of her step-daughter the Princess Anne. Like Marlborough

himself, Sarah came of an ancient but ruined royalist family. On the accession of Anne to the throne, the duchess exercised over the young queen the influence due to a superior and singularly active mind. Her power was almost boundless; the Whig ministry relied upon her support, and she disposed of places and offices at her pleasure. Her rule, which lasted for a considerable time, at last became unbearable, and she was supplanted in the favour of the queen by her own cousin, Mrs Masham, whom she herself had introduced to court. She retired from the queen's service in January 1711; and for nearly a quarter of a century she survived her husband, living in complete retirement. She was of a very pugnacious disposition, only happy when quarrelling with her friends or engaged in lawsuits, such as those arising out of the completion of Blenheim. She died on 29th October 1744, leaving a fortune of three millions—sterling, of which she bequeathed £10,000 to William Pitt. As the Marquis of Blandford, the only son of the Duke and Duchess of Marlborough, died young, the title was inherited by the descendants of one of their daughters, the Countess of Sunderland.

See the *Memoirs* by Coxé (1819), the short Life by Saintsbury (1885), Leslie Stephen in *Dict. Nat. Biog.*, and the early life by Lord Wolseley (1894); the *Stuart Papers* (i. and ii. Hist. MSS. Comm.) for the intrigue with the Duke of Berwick; books by Thomas (1915), and on the Duchess by Katherine Thomson (1839), F. Molloy (1901), Olivia Colville (1904), and S. J. Reid (1913).

Marlitt, E., the pseudonym of EUGENIE JOHN, German novelist, who, born at Arnstadt in Thuringia 5th December 1825, was educated by the Princess of Schwarzburg-Sondershausen for the stage. She appeared first at Vienna, after three years of study there; but a successfully-begun career was cut short by an affection of the ear, and thereafter she acted as reader to her patroness till 1863. Retiring in that year into private life, she spent her time in writing romances, interesting enough, but with strong didactic tendencies and somewhat unreal. She died at Arnstadt on 22d June 1887.

Marlow, GREAT, a town of Buckinghamshire, on the Thames, 29 miles W. of London by rail, has a brewery and paper-mills, an iron suspension bridge, a house where Shelley lived in 1817, and a grammar-school (formerly a blue-coat school). It sent two members to parliament down to 1867, and one till 1885. Pop. 5000.

Marlowe, CHRISTOPHER, Shakespeare's greatest predecessor in the English drama, a shoemaker's son, was baptised at Canterbury, 26th February 1563-64. From the King's School, Canterbury, he was sent to Benet College (now Corpus Christi), Cambridge, and proceeded B.A. in 1583. How he employed himself after taking his bachelor's degree is not known. Absence from Cambridge and rumours concerning him were apparently influencing the university authorities against him and threatening to delay his commencing M.A.; but the Privy Council interposed (1587) with a certificate of good behaviour and valuable service to the state, and he graduated a few days later.

The earliest of Marlowe's extant plays is *Tamburlaine the Great*, in two parts, first printed in 1590, and probably produced in 1587. In spite of its bombast and violence it is infinitely superior to any earlier tragedy of the English stage. By his energy and fervour, his aspiring imagination and majestic utterance, he confounded his rivals and won immediate supremacy. Very noticeable is the proud self-confidence displayed by the young poet in the prologue:

From jiggling veins of rhyming mother-wits,
And such conceits as clownage keeps in pay,
We'll lead you to the stateliest tent of war,
Where you shall hear the Scythian Tamburlaine
Threatening the world with high astounding terms.

Earlier dramatists had employed blank verse, but it had been stiff and ungainly: Marlowe was the first to discover its strength and variety. The popularity of *Tamburlaine* was extraordinary. A ludicrous line in the Scythian conqueror's address to the captive monarchs whom he has harnessed to his chariot—'Holla, ye pampered jades of Asia!'—was constantly parodied for half a century. Doubtless the extravaganzas of the play contributed to its success. The part of *Tamburlaine* was originally taken by the famous actor, Edward Alleyn, who afterwards personated Faustus and Barabas.

The Tragical History of Dr Faustus was probably produced soon after *Tamburlaine*. The earliest edition is dated 1604; in the edition of 1616 additional comic matter is inserted by an inferior hand, but it also appears to preserve some genuine passages that were dropped from the earlier edition. *Faustus*, as it has come down, is rather a series of detached scenes than a finished drama; and some of these scenes are evidently not by Marlowe. One playwright after another was employed to furnish 'additions.' But the nobler scenes are marvellously impressive; nowhere is Marlowe's genius shown more vividly than in Faustus's glorious description of Helen's beauty and in the terrible soliloquies that prepare us for the catastrophe. *Faustus* held the stage, and was revived at the Restoration. Edward Phillips, Milton's nephew, quaintly remarks that 'Of all that Marlowe hath written to the stage his *Dr Faustus* hath made the greatest noise, with his devils and such like tragical sport.' A German version was acted by English players at Gratz during the carnival in 1608, and at Dresden in 1626. Goethe expressed his admiration for Marlowe's work.

The Jew of Malta, produced after December 1588, was first published in 1633, with a prologue by Thomas Heywood. It is a very unequal play. The first two acts are conducted with masterly skill and vigour; but the last three are absurdly extravagant, degenerating into vulgar caricature. If Marlowe's hand had not faltered, if the later part had been equal to the earlier, Barabas would have been worthy to stand alongside of Shylock.

Edward II., produced about 1590, is the maturest of Marlowe's plays. It has not the magnificent poetry that we find in *Faustus* and in the first two acts of *The Jew of Malta*, but it is planned and executed with more firmness and solidity—in a more temperate and patient spirit. The various characters are skilfully discriminated, and the action is never allowed to flag. Many critics have preferred it to Shakespeare's *Richard II.*; it is certainly no whit inferior. Charles Lamb declared that 'the reluctant pangs of abdicating royalty in Edward furnished hints which Shakespeare scarce improved in his *Richard II.*'; and the death-scene of Marlowe's king moves pity and terror beyond any scene, ancient or modern, with which I am acquainted.

The Massacre at Paris is the weakest of Marlowe's plays, and has descended in a mutilated state. It was written after the assassination of Henry III. of France (2d August 1589), and was probably one of the latest plays. An early MS., a fragment of an original playhouse transcript, preserves part of scene xix.; and a comparison of the MS. text with the text of the printed copy shows that the play was mangled in passing through the press.

The Tragedy of Dido is stated on the title-page of the first edition (1594) to have been written by 'Christopher Marlow and Thomas Nash, Gent.' Probably it was left in a fragmentary state by Marlowe and was finished by Nash. It is of slight value; but contains some fanciful poetry (and extraordinary bombast). There can be little

doubt that Marlowe had a hand in the three parts of *Henry VI.*; and it is probable that he was concerned in the authorship of *Titus Andronicus*. A wild, shapeless tragedy, *Lust's Dominion*, was published in 1657 as the work of Marlowe. It deals with historical events that happened after Marlowe's death, but may nevertheless have been adapted from one of Marlowe's lost plays.

The unfinished poem, *Hero and Leander*, composed in heroic couplets of consummate beauty, was first published in 1598; a second edition, with Chapman's continuation, followed in the same year. Ben Jonson is reported to have said that Marlowe's verses were examples fitter for admiration than for parallel. From a passage in the Third Sestiad it appears that Marlowe had enjoined upon Chapman the task of finishing the poem; but neither Chapman nor any other poet could have taken up the story with any hope of success. *Hero and Leander* passed through numerous editions, and won universal applause. Shakespeare quoted in *As You Like It* the line, 'Who ever loved that loved not at first sight?' and feelingly apostrophised the poet as 'Dead Shepherd.' Nash, in *Lenten Stuffe*, speaks of 'divine Musæus, and a diviner poet than him, Kit Marlowe.' The watermen sang couplets from it as they plied their sculls on the Thames. Henry Petowe, a poor versifier but enthusiastic admirer of Marlowe, tells how

Men would shun their sleep in still dark night
To meditate upon his golden lines.

Marlowe's translations of Ovid's *Amores* and of the first book of Lucan's *Pharsalia* add nothing to his fame. The pastoral ditty 'Come, live with me and be my love,' to which Sir Walter Raleigh wrote an Answer, was imitated, but not equalled, by Herrick, Donne, and others. Izaak Walton pronounced it to be 'choicely good.' It was first printed in *The Passionate Pilgrim* (1599), without the fourth and sixth stanzas. In *England's Helicon* (1600) it appeared complete, with the author's name, 'C. Marlowe,' subscribed. Another anthology, Allot's *England's Parnassus* (1600), preserves a fragment by Marlowe, beginning 'I walked along a stream for pureness rare.'

In May 1593, at the age of twenty-nine, Marlowe was stabbed at Deptford in a quarrel (about a tavern reckoning) with one Ingram Frizer, 'gentleman,' and 'then and there instantly died' according to the coroner's jury. Highly-coloured accounts of his death were given by Puritanical writers. Thomas Beard, in the *Theatre of God's Judgement*, declares that 'hee even cursed and blasphemed to his last gaspe, and together with his breath an oath flew out of his mouth.' In Harleian MS. 6848 is a note 'containing the opinion of on Christopher Marly concerning his damnable judgment of religion and scorn of Gods word,' drawn up (shortly before Marlowe's death) by a certain Richard Baines, who was hanged at Tyburn, 6th December 1594. The same manuscript contains fragments of a theological disputation which Thomas Kyd, seeking to clear himself of the charge of atheism, asserted to have been written by Marlowe and to have been shuffled among his own papers. Marlowe's atheism seems to have been rather a variety of unitarianism or theism.

Had his life been lengthened, Marlowe would doubtless have written more perfect tragedies, but he could hardly have left a better poem than *Hero and Leander*. Comedy he would never have attempted; he had no humour. In tragedy he prepared the way for Shakespeare, on whose early work his influence is firmly stamped.

Dyce's scholarly edition of Marlowe's works (3 vols. 1850; revised ed. 1 vol. 1858) has not been superseded. Cunningham's edition (1 vol.) is useful but inaccurate. In 1885 A. H. Bullen, and in 1910 Tucker-Brooke,

brought out editions. Marlowe's best plays are included in the 'Mermaid' series, ably edited by Havelock Ellis. *Dr Faustus* was elaborately edited by Sir A. W. Ward. See, besides Ward's *History of Dramatic Literature* (2d ed. 1899) and Symonds's *Predecessors of Shakespeare* (1884), books on Marlowe by Verity (1886), Lewis (1891), J. H. Ingram (1904), Fischer (Munich, 1889), Hotson (1925, for new facts), and the texts of several plays edited in Germany by Wagner and others.

Marmion, SHACKERLEY, minor dramatist, was born in Northamptonshire, January 1602, studied at Wadham College, Oxford, and took the degree of M.A. in 1624. He squandered his fortune, fought in the Low Countries, and joined Sir John Suckling's troop for the expedition against the Scots, but fell sick at York and returned to London, where he died early in 1639. He left behind an epic, *Cupid and Psyche* (in Saintsbury's *Caroline Poets*), and three comedies, *Holland's Leaguer*, *A Fine Companion*, and *The Antiquary*. The last form a volume (1875) in Maidment and Logan's *Dramatists of the Restoration*. The ancient family of the Marmions of Scrivelsby were the former hereditary champions at English coronations. They came in with the Conqueror and settled at Tamworth, but became extinct with the fifth baron under Edward I. Scott says of the hero of his poem, 'I have not created a new family, but only revived the titles of an old one in an imaginary personage.'

Marmont, AUGUSTE FRÉDÉRIC LOUIS VIESSE DE, Duke of Ragusa and Marshal of France, was born 20th July 1774 at Châtillon-sur-Seine, entered the army at an early age, and made the acquaintance of Napoleon at Toulon. He accompanied him to Italy, where his courage at Lodi, Castiglione, and San Giorgio, earned him the rank of general of brigade in the campaign of Egypt. He returned with Bonaparte to France, supported him in the revolution of the 18th Brumaire, and commanded his artillery at Marengo, after which he became general of division. He was sent to Dalmatia in 1805 to defend the Ragusan territory against the Russians, defeated them at Castelnovo, and was made Duke of Ragusa. Hence he was summoned to join the great army in 1809, the day before the battle of Wagram, was entrusted with the pursuit of the enemy, won the battle of Znaim, and earned a marshal's baton. He was thereafter for eighteen months governor of the Illyrian provinces; and in 1811 succeeded Masséna in the chief command in Portugal, where he showed skilful strategy in the presence of Wellington. A severe wound, received at the defeat of Salamanca, compelled him to retire to France. In 1813 he commanded a *corps d'armée*, fought at Lützen, Bautzen, and Dresden, and maintained the contest with great spirit in France in the beginning of 1814, till further resistance was hopeless, when he concluded a truce with Barclay de Tolly, which compelled Napoleon to abdicate, and earned himself from the Bonapartists the title of the traitor. The Bourbons loaded Marmont with honours. On the return of Napoleon from Elba he was obliged to flee. After the second restoration he lived in retirement till the revolution of 1830, when, at the head of a body of troops, he endeavoured to reduce Paris to submission, and finally retreating with 6000 Swiss, and a few battalions that had continued faithful to Charles X., conducted him across the frontier. From that time he travelled much and resided chiefly in Vienna and Venice, where he died, 2d March 1852. He was the last survivor of the marshals of the first French Empire. His chief work is his *Esprit des Institutions Militaires* (1845). His *Mémoires* fill nine volumes (1856-57). See Sainte-Beuve, *Causeries du Lundi*, vol. vi.

Marmontel, JEAN FRANÇOIS, a famous but

hardly a great French writer, was born of an obscure family at Bort, in the Limousin, 11th July 1723. He made his studies in a Jesuit college, and found employment in a seminary at Toulouse, but early turned to literature, and went to Paris in 1745 by advice of Voltaire. Here he wrote successful tragedies and operas, and was fortunate enough in 1753 to get a secretaryship at Versailles through the influence of Madame Pompadour. Soon after he received a more lucrative appointment, the official journal, *Le Mercure*, being entrusted to his charge. In its columns he commenced the publication of his finished and oft-translated *Contes Moraux* (1761). Marmontel was elected to the Academy in 1763, and became its secretary in 1783, as well as Historiographer of France. After the Revolution he retired to the village of Abbeville, near Évreux, where he died, 31st December 1799. His most celebrated work was the well-known *Bélisaire*, a dull and wordy political romance, containing a chapter on toleration which excited the most furious hostility on the part of the Sorbonne, to which Marmontel replied in *Les Incas* by ascribing the cruelties in Spanish America to religious fanaticism. In 1787 appeared his interesting, but completely uncritical, *Éléments de Littérature*, consisting of his contributions to the *Encyclopédie*. A selection from his *Moral Tales* was edited by Professor Saintsbury (1895). His *Mémoires* is an interesting survey of his whole life, brightened by glimpses of all the great figures he had seen cross the stage from Massillon to Mirabeau.

His own edition of his complete works fills 17 volumes (1786-87), to which must be added 14 volumes published posthumously. Good editions are those of Villeneuve (1819-20) and Saint-Surin (1824-27). See Sainte-Beuve's *Causeries du Lundi*, vol. iv., and a book by Lenel (1902).

Marmora, LA. See LA MARMORA.

Mar'mora, SEA OF, the *Propontis* of the ancients, separating Europe from Asia, and connecting the Aegean Sea by the Dardanelles (anc. *Hellespont*) with the Black Sea by the Bosphorus. It is of an oval form, is 175 miles in length by 50 in breadth, has an area of 4499 sq. m., and a maximum depth of 4250 feet. The Gulf of Ismid extends about 30 miles eastwards into Asia. The sea contains several islands, the largest of which is Marmora or Marmara (area, 50 sq. m.), famous for its quarries of marble and alabaster.

Marmoset, a name given to a group of American monkeys which are always of small size, and which differ in various particulars from other American monkeys (see MONKEY). The popular name of Ouistiti has been given to these monkeys on account of the sharp whistling sound which they make when frightened or irritated. There are a good many species of marmosets which are placed in two genera, *Midas* and *Hapale*, both confined to Central and South America. These creatures are easily kept in captivity, and are usually of an affectionate disposition.

Marmot (*Arctomys*), a genus of rodents, belonging to the family Sciuridae, resemble squirrels in their dentition, although in form and habits they more closely resemble rats and mice. They have two incisors and two premolars in each jaw, four molars on each side above, and three below.—The Common Marmot, or Alpine Marmot (*A. marmotta*), is a native of the Alps, the Pyrenees, and the more northern mountains of Europe, up to the limits of perpetual snow, and is found also in Asia. It is about the size of a rabbit, grayish-yellow, brown towards the head; feeds on roots, leaves, insects, &c.; and is gregarious, often living in large societies. Marmots spend the winter in their burrows, in one chamber of which is a store of dried grass;

but the greater part of the winter is passed in a torpid condition. The Alpine Marmot is easily tamed. There are three kinds of marmots in



The Alpine Marmot (*Arctomys marmotta*).

North America, all popularly termed 'Woodchucks.' The 'Prairie Marmot' (see PRAIRIE DOG) is nearly allied, but not of the same genus.

Marne, a river of France, the most considerable tributary of the Seine, rises in the plateau of Langres, flows north-west past Châlons to Épernay, and thence west, joining the Seine at Charenton, a few miles above Paris. Its length is 326 miles, and it is navigable for 126 miles up to St Dizier. Its stream is rather rapid, and in most places has a wide bed. It is connected by canals with the Rhine, the Aisne, and the Seine. It gives name to two battles (September 1914, July 1918) in the Great War (q.v.).

Marne, a department in the north-east of France, formed out of the old province of Champagne, is traversed by the river Marne, and to a less extent by the Seine and the Aisne. Area, 3159 sq. m.; pop. (1921) 366,734. It is in the dry and chalky soil of the north that the best varieties of Champagne Wine (q.v.) are grown, and much of this is exported. The rearing of sheep is an important industry, and extensive woollen manufactures are carried on. Cereals, beetroot, and potatoes are grown; honey and wax are produced; building stone is quarried; and metal works, tanneries, &c., are in operation. Marne is divided into the five arrondissements of Châlons-sur-Marne (the capital), Épernay, Reims, Sainte-Ménéhould, and Vitry-le-François.

Marne, HAUTE, a department in the north-east of France, formed chiefly out of the old province of Champagne, and embracing the upper basins of the Marne and the Meuse. It rises in the south into the plateau of Langres and the Monts Faucilles (1500 to 1600 feet). Area, 2402 sq. m.; pop. (1921) 198,865. Cereals, wine, fruits, and potatoes are the principal products. The department yields iron ore, and there are numerous furnaces. The cutlery is in high repute. There are three arrondissements of Chaumont, Langres, and Vassy; capital, Chaumont.

Marnix, PHILIP VAN, Lord of St Aldegonde, Dutch writer and patriot, was born at Brussels in 1538. A pupil at Geneva of Calvin and Beza, on his return home he took an active part in promoting the Reformation, and in 1566 a no less active part in the revolt of the Netherlands against Spain. An intimate friend of William of Orange, he was appointed by him to be his representative at the first meeting of the Estates of the United Provinces, held at Dort in 1572, and on subsequent occasions was sent on special missions to the courts of France and England. After helping to cement the Union of Utrecht and visiting

the diet at Worms, he was nominated in 1583 burgomaster of Antwerp. This city he defended thirteen months against the Spaniards; but, having then capitulated, he incurred so much ill-will that he retired from public life. The leisure of his retirement he utilised for literary work, besides taking an active interest in the newly-founded university of Leyden. From his pen came the *Wilhelmus* song, the hymn of Dutch liberty and Protestantism; the epoch-making prose satire on the Roman Catholic Church, entitled *The Roman Bee-hive* (1569); a metrical translation of the Psalms from the Hebrew (1580); and the beginning of a prose translation of the Bible. Marnix died at Leyden, 15th December 1598. His works were edited in 7 vols. (Brussels, 1855-59); his religious works in 2 vols. (The Hague, 1871-78). See *Lives in Dutch* by Broes (1840) and *Frédéricq* (1882), and the French monograph by Juste (1858).

Marocco. See MOROCCO.

Marochetti, CARLO, BARON, an Italian sculptor of respectable talent, was born at Turin in 1805, and trained in Bosio's studio. Settling at Paris, he produced 'Young Girl sporting with a Dog,' 'Fallen Angel,' relief on the Arc d'Étoile, an altarpiece for the Madeleine, a memorial work for Bellini's tomb, a statue of Latour d'Auvergne, &c. On the outbreak of the revolution in 1848 he repaired to London. In Britain his best works were statues of Queen Victoria for Glasgow, of Richard Cœur-de-Lion and of Lord Clyde in London. Mounted figures of Emmanuel Philibert and Charles Albert of Savoy were chiselled by him for North Italy. He died at Passy, near Paris, on 29th December 1867.

Maronites, a Christian sect of Syria, generally regarded as the descendants of a remnant of the Monothelite sect (see MONOTHELISM), who settled on the slopes of Lebanon in the 7th century. They take their name from a monk Maro, who lived in the 5th century, or more probably from their first patriarch Moro (701). These people maintained their independence against the followers of Islam; but in the 12th century, on the establishment of the Latin kingdom of Jerusalem, they abandoned their distinctive monothelite opinions, and recognised the authority of the Roman Church. In 1445 they entered into a formal act of union with the Roman Church; in 1584 a college was founded in Rome by Pope Gregory XIII. for the education of the Maronite clergy; and in 1736 they formally subscribed the decrees of the Council of Trent. Nevertheless, they retain their distinctive national rites and usages, and use the ancient Syriac language in their liturgy; their clergy, if married before ordination, are permitted to keep their wives; and they have many festivals and saints not recognised in the Roman calendar. The Maronites, a sturdy, warlike race of mountaineers number about 400,000 (half in Lebanon). Their patriarch (of Antioch), who is elected by their bishops, subject to the approval of Rome, resides at Bekorki in Lebanon. Many convents for both sexes are spread over the country, especially in the neighbourhood of Bsherreh, above Tripoli; the inmates follow the rule of St Anthony. The relations of the Maronites with their implacable foes, the Druses, have been already detailed under DRUSES and LEBANON.

Maroons, the name (derived from the Span. *cimarrón*, from *cima*, 'a mountain top') given in Jamaica and Guiana to fugitive negro slaves. When the British took Jamaica from the Spaniards in 1655, numbers of slaves took refuge in the uplands. They and their descendants, called Maroons, maintained a constant warfare with the colonists for 140 years; but in 1795-96 they were

subdued, and a portion of them removed to Nova Scotia, and afterwards to Sierra Leone. The remnants after 1834-35 fraternised with their brethren, in these years manumitted. The Maroons of Guiana, who are generally called Bush Negroes, form a number of independent communities. See Dallas, *History of the Maroons* (1803).

Maros-Vásárhely, capital of the Szekler districts in Transylvania, stands on the Maros, 28 miles SE. of Klausenburg. It contains a fortified castle, an old Gothic church (Reformed), a library, and a collection of minerals and antiquities, and has a trade in timber, tobacco, wine, corn, and fruit (particularly melons). Pop. 18,000.

Marot, CLÉMENT, a distinguished French poet of the time of Francis I., was born at Cahors in 1496 (?). Largely owing to the influence of his father, who was both poet and courtier, he began at an early age to write verses, and, abandoning his legal studies, entered the service of Margaret, Duchess of Alençon, afterwards Queen of Navarre, to whom many of his poems are addressed. He was wounded at the battle of Pavia in 1525, and at the end of the year was imprisoned on a charge of heresy, but was liberated in the spring of 1526. Having a witty pen and a satiric turn, and not being particularly prudent either in speech or conduct, he made many enemies and gave his royal patrons considerable trouble. During his absence from Paris in 1535 his house was searched, and compromising literature was found in his library. His claim that a poet should be permitted to read everything being disallowed, he fled, first to the court of the Queen of Navarre, and later found refuge with the Duchess of Ferrara. He returned to Paris in 1536, and in 1538 began to translate the Psalms, which in their French dress became very popular, especially at the court, where they were sung to favourite secular airs, and helped to make the new views fashionable at least. He was encouraged by the king to continue his translation, but the part published in 1541 having been condemned by the Sorbonne, he had again to flee in 1543. He made his way to Geneva, but, finding Calvin's company uncongenial, he went to Turin, where he died in 1544. His poems consist of elegies, epistles, rondeaus, ballads, songs, sonnets, madrigals, epigrams, nonsense verses, and longer pieces of a general character; and, though he himself tells us that love was above all his master, his special gift lay in the direction of badinage and graceful satire. Marot has a singularly light touch, and a great power of simple natural expression, and in all his poems—if we except some early rhetorical exercises—there is the distinctive style *Marotique* which has had an important influence on French literary language. Though he was persecuted for his religious views, he expressly declares that he was not a Lutheran, and probably like many of his friends—Dolet for instance—he had no very definite theological beliefs.

See *Œuvres Complètes* (4 vols. Paris, 1873-75); *Œuvres Choiesies*, an admirable selection (Paris, 1826); *Life by Vitet* (1868); Douen, *Clément Marot et le Psautier Huguenot* (2 vols. 1879); and Guiffrey's elaborate edition (vols. i.-iii. 1876-1909).

Marozia, a Roman lady of noble birth, but of infamous reputation in the scandalous chronicles of her age, daughter of the equally notorious Theodora, was born in the close of the 9th century. As the mistress of Pope Sergius III., and mother of Pope John XI., she exercised the greatest influence on the political affairs of her time in Italy. She was also grandmother of Pope John XII. She was married three times, and, if we may credit the narrative of Luitprand, had skill and address enough to procure the deposition and

death of Pope John X., and subsequently the elevation of her son as John XI. Marozia's later years brought on her the punishment of her crimes. She died in prison at Rome in 938.

Marprelate Controversy, a bitter war of vigorous and often scurrilous pamphlets, waged against official Episcopacy by a few Elizabethan Puritans. Many of these were written by deprived ministers, but were published under the comprehensive name of Martin Marprelate. The time of greatest activity was about 1589, and the books were printed in spite of severe government repression, successively at Moulsey near Kingston-on-Thames, Fawsley in Northamptonshire, Norton, Coventry, Welstone in Warwickshire, and in or near Manchester. The chief writers were, according to some, John Penry (hanged), John Udall (left to rot in jail), Fenner, John Field, and Job Throckmorton, who wrote *Hay any Work for Cooper?* One of the best attempts to answer the Marprelate writers was Bishop Cooper of Winchester's *Admonition to the People of England*. Other writers on the same side were John Lyly and Thomas Nash. Bacon presented to the ministry in 1590 his wise paper entitled *An Advertisement touching the Controversie of the Church of England*, an admirable argument for moderation and mutual concession in things indifferent. 'First of all,' he says, 'it is more than time that there were an end and surcease made of this immodest and deformed manner of writing lately entertained, whereby matters of religion are handled in the style of the stage.'

See Arber's reprint of the tracts; Maskell's *Marprelate Controversy* (1845); the *Cambridge History of English Literature*; and for the theory that Sir Roger Williams wrote the 'Cooper' tracts, J. Dover Wilson's *Martin Marprelate and Shakespeare's Fluellen* (1912).

Marque. See LETTER OF MARQUE.

Marquesas Islands, or MENDANAS, are a Polynesian group N. of Tuamotu or Low Archipelago. The name strictly applies to four or five islands discovered by Mendaña in 1595, but usually includes now the Washington group of seven islands to the north-west. Total area, 492 sq. m. The whole archipelago is volcanic. Hiva-oo and Nuka-hiva are the largest islands. Nearly all are shaped into several narrow valleys, in which the bulk of the population live. In Cook's time there were 100,000 inhabitants, but they have steadily decreased in numbers till now they are barely 3000. They are perhaps the finest race of the brown Polynesian stock, and, though courteous, are cruel and revengeful. Since 1842 the islands have been a French protectorate. Herman Melville sojourned in Nuka-hiva (see *Typee* and *Omoo*); and Gauguin partly assimilated himself to the natives of Hiva-oo. A little cotton is grown by Chinese immigrants.

Marquetry. See INLAYING.

Marquette, capital of Marquette county, Michigan, is on the southern shore of Lake Superior, 430 miles by rail N. of Chicago. It has foundries, blast-furnaces, &c., besides sawmills and machine-shops. Iron ore in very large quantities is mined in the county and shipped from here. Marquette is the seat of a Roman Catholic bishop. Pop. 13,000.

Marquis, or MARQUESS, the degree of nobility which in the peerage of England ranks next to duke. Marquises were originally commanders on the borders or frontiers of countries, or on the sea-coast, which they were bound to protect. In England there were marquises or lords-marchers of the borders of Scotland and Wales in the reign of Henry III., and the equivalent *Markgraf* was common on the Continent; but the

first English marquis in the modern sense was Robert de Vere, Earl of Oxford, who was created Marquis of Dublin by Richard II. in 1385. The title was first introduced into Scotland in 1599, when the Marquises of Huntly and Hamilton were created. For the coronet of a marquis, see CORONET. The mantle is scarlet, with three and a half doublings of ermine. A marquis is styled 'The Most Honourable'; his wife is a marchioness; his eldest son takes by courtesy the next lower title in the peerage, except where that is identical with the title of the marquise, in which case he must take the next lower still. The younger sons of a marquis are styled 'Lord,' and daughters 'Lady,' with the addition of Christian name and surname.

Marr. See MAR.

Marrakesh, or MOROCCO, southern capital of Morocco, in the French protectorate, stands 5 miles from the left bank of the Tensift, 1447 feet above the sea. A dilapidated wall, more than 5 miles in circumference and between 20 and 30 feet high, includes not merely narrow, unpaved, filthy streets, flanked by flat-roofed, windowless houses, but ill-kept gardens, open areas, and 'soks,' or market-places; the eight large cemeteries are outside the walls. In the bazaar and merchants' quarter—the 'Kaiseria,' a partially-covered area—a considerable local trade is carried on with the country-people, the mountaineers from the neighbouring Atlas, and with Sus, Tafilet, Mazagan, Saffi, and Mogador, though the commercial importance of Morocco is much less than that of Fez. Marrakesh possesses many mosques, one of which, the Kutubia, has a tower after the model of the Hassan in Rabat and the Giralda in Seville, 230 feet high; all three towers are said to have been designed by the same architect, Jabir. There are several tanning and leather-dyeing establishments of considerable extent. The population according to the census of 1921 was about 140,000, including 2000 Europeans. On the south, outside the walls, stands the imperial palace, an irregular conglomeration of gardens and buildings covering about 180 acres.

Marrakesh was founded in 1072 by the Emir Jusef ben Tachefyn, and reached the summit of its prosperity in the 13th century. In those days it is affirmed to have contained more than 700,000 inhabitants. But for several centuries, owing to civil wars, during which the rebellious Berbers more than once sacked it, the city, like all the interior towns of Morocco, rapidly retrograded. However, owing to its excellent situation in sight of the Atlas, from which cool streams are always flowing, its genial healthy climate, and its command of the trade routes across the mountains, its possibilities of development are great.

Marriage (from Lat. *mas*, male; *maritus*, married—literally, provided with a male, and so must originally have been used of women only; *maritus*, husband; *marita*, married woman), the union of man and woman in the relation of husband and wife, as recognised by law or custom. Westermarck has defined marriage (rather from the point of view of natural history than anthropology) as a more or less durable connection between male and female, lasting beyond the mere act of propagation till after the birth of the offspring.

In addition to European (monogamous) marriage, numerous other forms of sexual relationship are found, and others are assumed by theorists to have existed. It was postulated by Lewis Morgan and J. F. M'Lennan that promiscuous sexual intercourse was originally the rule. From this state of *Promiscuity* they derived another form, *Regulated Promiscuity*, in which restrictions of various kinds, classed together under the head of exogamous rules, limited the choice of both men and women by

excluding near kin (either in the male or in the female line in any given tribe). Neither of these stages can properly be denominated marriage, and neither has been shown to exist, except (as in Melanesia) as a secondary stage of development, or a purely temporary condition.

As the first kind (in logical, not historical order) of marriage we may distinguish *Polygamy*, the union of several men with several women, found among the Dieri of Australia and elsewhere. This stage is subdivided into (i.) simple and (ii.) adelphic; in the adelphic stage the male spouses are brothers or the female spouses sisters, or both these conditions may be found. It is further classified according to the position of the husbands, for it may happen that one husband or one wife holds a position superior to his or her mates.

Of more importance than the foregoing is *Polyandry*, which J. F. M'Lennan attributed to the scarcity of women caused by infanticide. In this form of marriage one woman is the wife of several men, who form one household; they may be brothers, as in the Tibetan form, but may also be unrelated. In Tibet, at the present day, scarcity of women is not the cause of polyandry, which probably depends on economic causes, for a large number of women are unable to find husbands. The so-called Nair polyandry of the Malabar coast is really a form of promiscuity, now apparently almost extinct (see Thurston, *Tribes and Castes*, 1909; s.v. NAYAR).

In *Polygyny*, widely spread outside Europe, one man is the husband of several women simultaneously.

Finally we have *Monogamy*, in which one man and one woman are united in marriage, though, owing to facilities for divorce, the bond is now far from permanent in many countries. Even in countries where polygyny is practised, the large majority of men must usually be monogamous, and it is no uncommon thing in West Africa to find men who have never married at all.

Among primitive peoples there are periods of ritual licence, in which ordinary marriage rules and ties are disregarded. These free unions may be classed, according to the circumstances, under the heads of promiscuity, free love, *cicisbeism*, &c.

All known peoples recognise marriage prohibitions, dependent on (a) kinship regulations (see KIN), or (b) exogamous rules. In the former case, consanguinity and affinity are the bars to marriage; in the latter, it is forbidden to members of a totem clan or of the moiety of a tribe to marry within their own social group (see TOTEMISM).

As a correlative to Exogamy we have Endogamy, the rule of the Indian caste, which forbids a man to marry outside a certain social group. It should be noted that the social groups to which the rules of exogamy and endogamy apply are not the same. The Todas, for example, are organised in two endogamous groups, subdivided into exogamous clans; a man may therefore choose among a portion only of the women of his own half of the tribe. The rules of exogamy and endogamy are obligatory, and it is erroneous to term a tribe endogamous when all that is meant is that a tribesman usually marries a fellow-tribeswoman.

At least six kinds of endogamy may be distinguished—ethnic, linguistic, local, functional, sectarian, and social; in theory, all the members of each of these groups are a body of kindred. Another important rule is known as Hypergamy; this is the custom which forbids a woman to marry a man of a group lower than her own. It is a custom of great antiquity, and was one of the causes of infanticide. Other important usages in India are: (a) Infant marriage, which implies the marriage of a woman before puberty; this custom is not infre-

quent in West Africa also; (b) the prohibition of marriage of widows, which led to the rite called *suttee* or *sati*; the word really means a widow who immolates herself on her husband's funeral pyre. In India, it is clear, the accident of birth determines irrevocably the whole course of a man's and, still more, of a woman's domestic relations.

Marriage ceremonies may be almost unknown, as in Australia, where one way of obtaining a wife, though an unusual one, is to knock the woman on the head with a club and drag her off. More normal methods are betrothal, often in infancy, exchange of sisters, purchase, and elopement.

A. E. Crawley (*Mystic Rose*, 1902) was the first to lay stress on the magical significance of marriage ceremonies, which he explained as intended to neutralise the dangers associated by primitive peoples with sex and sexual acts. In these beliefs we may see the origin of the religious ceremony of marriage.

Marriage has, however, also a legal aspect; accordingly, there are also legal requirements to be fulfilled which may entirely replace the religious ceremony. The Romans recognised three modes of taking a wife—*confarreatio*, the religious ceremony; *coemptio*, a legal ceremony of wife-purchase; and *usus*, simple cohabitation, uninterrupted for a year. By all of these methods a wife originally became one of her husband's family. In the marriage *sine conventionione*, consent only was necessary, and the wife remained a member of her own family (see FAMILY).

Much stress was laid by M'Lennan on marriage by 'capture,' which he supposed to result from scarcity of women, and to lead to the existence of exogamy. The scarcity of women is not proven, still less the steps by which M'Lennan imagined that a group which supposed its women to be too valuable to give to strangers, and hence married them to group-mates, eventually reached a stage in which group-mates were forbidden to intermarry. Dr Rivers showed that in Melanesia marriage by capture, which is rarely more than formal, may well have been a means of deceiving the old men of the husband's moiety in order to escape from their monopoly of the younger women; the claim of the old men may have been evaded by a show of force in seizing the girl, and the pretence kept up, long after the trick was apparent, for magical or other reasons. In other cases, as we have seen above, violent capture is known. Capture must also always have been an episode of warlike operations, but in this last comparatively frequent case we do not find a motive for the formal capture on which most of the theories have been built up. Formal marriage by capture is clearly a part of the internal regulations of a tribe or group, and quite unconnected with an original hostile attitude of two distinct groups.

See Bibliography to KIN; Westermarck, *History of Human Marriage* (1921), *Marriage Ceremonies in Morocco* (1914); Malinowski, *Family among Australian Aborigines* (1913).

The nature of marriage, as a social and legal institution, has varied with varying civilisation. The union of a man and woman, to be recognised as a marriage, must be concluded in accordance with the rules laid down by custom or law. Polygamy, in the form of polygyny or of polyandry, has been and is recognised as marriage in many parts of the world. But the only kind of marriage which the law of Christian countries recognises is one which is essentially the voluntary union for life of one man with one woman to the exclusion of all others. A marriage which is not strictly monogamous, though it may pass by the name of marriage, is not the status which the law of Christendom contemplates as marriage. Thus, when a system of

law allows polygamy, a marriage contracted under that system, even in the case of a first wife, is a different relation from monogamous marriage, and is not regarded by English law as a marriage.

In primitive times marriage very often consisted in the forcible capture of the woman by the man. This ancient practice left traces in the ceremonies observed in the celebration of marriage in later generations. Thus, in many of the forms of marriage in use within historical times among the most civilised peoples, sham fighting between the bridegroom or his family and the bride's family, or some form of resistance offered by the bride, continued to form part of the wedding ritual. But, while marriage by capture was undoubtedly a widespread practice, and recognised as a form of marriage, it is doubtful whether it ever was the normal method of contracting marriage among any people. The evidence points rather to its being an incident of war or a method of procuring a wife when it was difficult or inconvenient to get one in the ordinary manner. Marriage by purchase, or the practice of giving the father or other relatives of the bride some valuable consideration in the form of money or goods, seems to have been an almost universal practice. In some cases, as illustrated in the story of Jacob and Laban, the prospective husband, instead of paying money or delivering goods, might work for the woman's father for a certain period. In early times the purchase, or the giving of some valuable consideration for the consent of the bride's father or relatives, was a real transaction, and marriage by actual purchase still obtains among various primitive peoples. But with the progress of civilisation it tended more and more to become merely symbolic. The forms of marriage by purchase long survived among the Egyptians, the Babylonians, the Hebrews, the Greeks, and the Romans. Among the higher races of mankind the tendency, from very early times, has been wholly in the direction of regarding the consent of the parties as the essential element in the constitution of marriage. Marriage by mutual consent of competent persons, possible only when the individuality of the woman has received recognition, takes the form of a mutual and voluntary conveyance, or dedication, of the one to the other. The interchange of consent has been very generally associated with some religious observance. In most modern systems of law—the law of Scotland being in this respect exceptional—marriage is, as a rule, valid only when performed in the manner prescribed, and in the presence of persons recognised, by the state. While the matrimonial status is entered upon, in modern times, in pursuance of an agreement between the parties, accompanied by certain religious or civil formalities, the incidents of the status and the rights of the persons invested with it are regulated by fixed rules of law, and in no sense depend upon the agreement of the parties either at the time of the marriage or subsequently.

From the earliest times certain bars or prohibitions in respect of intermarriage have been enforced by custom or law. On the one hand, there were rules—known as 'endogamous' rules—forbidding the members of a particular tribe or class to marry any one who was not a member of that tribe or class. Thus among the Hindus the intermarriage of persons belonging to different castes is forbidden. In the Mosaic law marriages between Israelites and Canaanites were prohibited—a prohibition subsequently extended so as to include the other Gentile nations. In early times there could be no valid marriage between a Roman citizen and a woman who was not herself a Roman citizen, or who did not belong to a community possessing the privilege of *connubium* with Rome. On the other

hand, there were rules—known as ‘exogamous’ rules—forbidding the members of a particular group to marry any other member of that group. In the evolution of the more civilised peoples the endogamous rules tend to become relaxed and to disappear, and the exogamous rules undergo gradual transformation, and become narrowed down to a prohibition of marriage between near relatives.

Mutual promises to marry or engagements to marry are plainly distinguishable from marriage itself. In Rome marriage was generally preceded by the ceremony of betrothal (*sponsalia*). The betrothal in early times took the form of a verbal contract (*sponsio*). Hence the betrothed persons were *sponsus* and *sponsa*. Afterwards it seems to have been usual for the father of the woman to enter into a stipulation with the man, giving a right of action in case of non-performance. In the later Roman law *sponsalia* were entered into without any formalities, and could be repudiated at will by either party. If, however, *arrhæ* had been given as evidence of the engagement, the party who broke off the engagement without good reason forfeited the amount of the *arrhæ*. In Roman law an engagement to marry does not seem to have been in itself actionable. In Canon law *sponsalia per verba de futuro* created an obligation to marry enforceable by ecclesiastical censures. In England and Scotland promise of marriage, given in exchange for the promise of the other party, is binding. Performance is not enforced, but damages may be recovered for breach of promise. It is not necessary that the promise should be proved by writing, nor even that the mutual promise should be made in express words. The plaintiff cannot recover unless his or her testimony is corroborated by some other material evidence. A general promise to marry is construed as a promise to marry within a reasonable time on request. If a promise to marry is made by a person who, to the knowledge of the other party, is already married, an action for damages for non-fulfilment of the promise will not lie. It is a defence that the promise was induced by fraud or serious misrepresentation on the part of the plaintiff in regard to his or her circumstances and previous life. The unchastity of the woman after the date of the promise, or before the date of the promise, provided the defendant was not aware of it at that date, justifies the non-fulfilment of the promise.

Roman Law.—The essentials of monogamous marriage are tersely expressed in the definition in Justinian's Institutes: *Viri et mulieris conjunctio, individuum vitæ consuetudinem continens.*

Marriage in early Roman law was intimately associated with *manus*—the power over the wife. It is indeed probably true that in Rome, from the earliest historic times, marriage was constituted by the mutual consent of the parties, and that the forms of marriage *cum manu* were modes of creating *manus* rather than modes of constituting marriage. But under the old rules of *jus civile* it was only a marriage *cum manu* that was recognised as a lawful Roman marriage (*justæ nuptiæ*). The forms of marriage *cum manu* were (1) *confarreatio*, (2) *coemptio*, (3) *usus*. *Confarreatio* was a religious ceremony, competent only to patricians, carried out in the presence of the *pontifex maximus* and *flamen dialis* as well as of ten citizen witnesses. *Coemptio* was a purely secular proceeding, consisting in the formal sale (*mancipatio*) of the wife to the husband in the presence of five witnesses. *Usus* was a mode of acquiring *manus* on the principle of *usucapio* (possession). If a woman lived with a man as his wife continuously for one year she at the end of that period came in *manum viri*, and a valid marriage *ex jure civili* was thereby constituted. A wife in *manu* was in entire subjection

to the power of her husband as the head of the family. All the property which she had at the date of the marriage, and anything she acquired during the marriage, passed to her husband.

It was through the form of marriage *usu* that marriage was dissociated from the *manus* which in early times accompanied it. The Twelve Tables provided that a woman by absenting herself from the conjugal home for three consecutive nights (*trinoctium*) in the year could interrupt the *usucapio*, and so prevent *manus* being established. Such a *trinoctium* of absence, repeated year by year, permanently prevented *manus* from arising in respect of the cohabitation. Before the end of the republican period marriage *sine manu* was not only recognised by law as valid, but had become the normal form of marriage among citizens. In the marriage *sine manu* the central principle, as regards the personal relations of the spouses, was that of partnership, *consortium omnis vitæ*. Each of the spouses was the consort of the other, the *consortium* involving a true reciprocity of rights and duties. Marriage, in the classical era of Roman law and down to the time of Justinian, was constituted simply by the mutual consent of the parties, *Nuptias non concubitus sed consensus facit* (Dig. 50, 17, 30, 1). The ordinary methods by which the consent was publicly manifested were *deductio in domum*, the bringing of the bride to the bridegroom's house; the drawing up of *dotalia instrumenta*, constituting the *dos* and containing other marriage contract provisions; and, under the Christian emperors, celebration *in facie ecclesiæ*. The consent not only of the parties but also of their respective *pateres familiae* was necessary. Both the parties must have attained the age of puberty, which, in the time of Justinian, was finally fixed, in the case of males, at fourteen years, and, in the case of females, at twelve years. No legal marriage could be contracted unless there was *connubium* between the parties. Until the Lex Canuleia (445 B.C.) there was no *connubium* between patricians and plebeians. In the classical law the *jus connubii* was a privilege pertaining only to citizens. In the mature law, when all free inhabitants of the empire were citizens, the *connubium* lost its former importance. Marriage was prohibited between persons related to each other by blood in the direct line or in the collateral line nearer than the fourth degree. Propinquity of relationship between two persons in the collateral line was computed by reckoning the number of generations from the one person up to the common ancestor and from the common ancestor down to the other person—each generation counting a degree. Marriage, speaking generally, was lawful between persons related to each other collaterally in the fourth or any more remote degree. Marriage was prohibited between persons related by affinity in the direct line and, under Constantine, between a man and the widow of his deceased brother or the sister of his deceased wife. In the earlier law there existed certain impediments to marriage based on a difference in the rank of the respective parties, but such impediments were swept away by Justinian (Nov. 117, c. 6). Other impediments were based on public policy—e.g. a provincial governor or his son could not marry any woman domiciled in that province during his term of office.

Canon Law.—The Canon law made important contributions to, and changes in, the law governing the forms, attributes, and conditions of marriage. Under the Roman Empire the marriage law of the church was subordinate to the civil law and civil jurisdiction; and for some centuries after the fall of the empire the same conditions continued, and the church only exercised a disciplinary power with

regard to marriage. After the 10th century the church acquired legislative control and complete jurisdiction over marriage. After the Reformation the Canon law rules continued to be a guiding force, not only in Catholic countries but also, subject to certain modifications and differences of interpretation, in Protestant countries. Thus in England, after the Papal jurisdiction was abolished it was enacted that the king might appoint a Royal Commission to examine the Canon law, but that meantime the existing canons should stand in so far as not contrary to the laws of the realm; and, as the contemplated revision was never carried out, the Canon law, as it stood, remained binding. The Christian Church had from the first recognised the validity of Roman law, and the Canon law of marriage was based largely on Roman law, modified by principles developed from interpretations of Christian doctrines. Under the Canon law marriage is a sacrament, indissoluble under any circumstances. The church, however, adopting from Roman law the maxim *consensus facit matrimonium*, upheld as valid marriages resting merely on the agreement of the parties. Marriages not celebrated *in facie ecclesiæ* were, however, irregular, and visited with ecclesiastical penalties. Finally, the Council of Trent, which met at intervals from 1536 to 1563, laid down that for a valid marriage consent must be declared before a priest and in the presence of witnesses. The 'irregular' marriages of Scots law (*vide infra*) are survivals of the older Canon law obtaining prior to the decrees of the Council of Trent. Under the Canon law there were numerous disabilities which prevented the formation of a valid marriage. In England the disabilities resulting from consanguinity and affinity, which were formerly canonical, were made civil disabilities by the Marriage Act, 1835. The only disability which continues in England to rest on Canon law is the physical incapacity of either of the parties to consummate the marriage.

England.—For a valid marriage the full and free consent of the parties is necessary. A marriage, though in form duly celebrated, can be set aside by decree of the court if there is no real consent to the marriage. The age at which a person is capable of giving the necessary consent to marriage is fourteen years in the case of males and twelve years in the case of females. Where either of the parties is a minor—i.e. above the age of matrimonial consent and under twenty-one—the consents required to his or her marriage are now regulated by the Guardianship of Infants Act, 1925 (15 and 16 Geo. V.), sect. 9 and relative schedule (see PARENT AND CHILD). But the consent of the proper person has been held to be directory only, and the want of it does not render the marriage celebrated without it invalid. Where the parent or guardian of a person under twenty-one (not being a widower or widow) openly expresses dissent at the time of proclamation of banns, the publication of banns is void. Lunatics and persons of unsound mind are incapable of consent. Unsoundness of mind in one of the parties at the time when a marriage purports to be contracted is a ground on which the marriage may be declared null, provided that it is such as to render him or her incapable of understanding or appreciating the nature of the contract and the duties and responsibilities thereby created. In such a case a decree of nullity may be obtained at the instance either of the sane or of the insane party. The physical incapacity of either of the parties to consummate the marriage may be made the ground of a suit at the instance of the other party for annulling the marriage. Undue proximity of relationship between the parties, whether by blood or by marriage, renders the marriage null and void (see AFFINITY, CONSANGUINITY). By

the Marriage Act, 1835 (5 and 6 Will. IV. chap. 54), marriage is prohibited (1) between persons lineally related; (2) between collaterals, whether of the whole blood or of the half-blood, to the third degree inclusive, according to the Roman law mode of computation—viz. brother and sister, uncle and niece, nephew and aunt; (3) between persons who, by reason of the previous marriage of one of them, are related by affinity within the corresponding degrees, lineal or collateral. Marriage with a deceased wife's sister was rendered legal by the Deceased Wife's Sister's Marriage Act, 1907, and the marriage of a woman with her deceased husband's brother was rendered legal by the Deceased Brother's Widow's Marriage Act, 1921; but both these statutes contain provisions relieving clergymen from the duty of celebrating such marriages. A valid subsisting marriage of either of the parties renders void any form of marriage between them (see BIGAMY). This is so although there is an honest belief in the death of the existing wife or husband, or although the circumstances are not such as would sustain an indictment for bigamy.

The forms and ceremonies necessary to the validity of a marriage are now regulated by statute. There are two main forms of marriage, viz. (1) marriage by a minister of the Church of England after the publication of banns or the grant of a licence by a Church of England authority; (2) marriage upon obtaining the certificate of the superintendent district registrar of marriages, with or without a licence.

(1) In a marriage according to the religious rites and ceremonies of the Church of England the preliminary to the celebration of the marriage is, either the publication of Banns (q.v.) upon three successive Sundays in the church or churches of the parish or parishes wherein the parties reside; or, in lieu thereof, a licence from the proper ecclesiastical authority. Such a licence may be a 'special' licence, granted by the Archbishop of Canterbury through his vicar-general, or a 'common' licence, granted by the bishop of the diocese through his surrogate. A marriage, after publication of banns, must be solemnised in the church or chapel, or one of the churches or chapels, in which the banns were published, and a marriage by common licence in the church or chapel specified in the licence. The marriage must take place within three months after banns, or grant of a common licence, in the presence of two or more witnesses in addition to the minister, and between the hours of eight in the forenoon and three in the afternoon. A special licence may authorise the marriage to be solemnised at any convenient hour or place, as, for instance, in a private house. Before a licence for marriage is granted one of the parties must make a declaration on oath that there is no legal impediment to the intended marriage; that one of the parties has resided for the space of fifteen days immediately preceding within the parish; and that, in the case of persons under twenty-one, the necessary consent to the marriage has been obtained. Prior to the Marriage Act, 1836, all marriages taking place in England, except where both the parties were Quakers or Jews, had to be solemnised according to the rites of the Church of England, after publication of banns or the procurement of a licence from the proper ecclesiastical authority dispensing with the publication of banns. Under the act of 1836 a marriage may, on production of a superintendent registrar's certificate, be solemnised according to the rites of the Church of England without banns, the certificate standing in the place of the publication of banns; but a minister of the Church of England is not obliged to accept such certificate in the place of the publication of banns, nor may a marriage be solemnised

in pursuance of such certificate in any church or chapel of the Church of England without the consent of the minister thereof (Marriage and Registration Act, 1856, sect. 11).

(2) The Marriage Act, 1836 (6 and 7 Will. IV. chap. 85), amended in subsequent acts, enables all persons to be married according to such religious rites as they deem fit, or without any religious rites, upon obtaining the certificate of the superintendent district registrar of marriages. The superintendent registrar may issue certificates for marriages, without the publication of banns, according to the rites of the Church of England; or for marriages according to the usages of the Quakers or of the Jews; or for marriages in buildings duly registered for the solemnisation of marriages; or for purely civil marriages, without religious ceremony, in the superintendent registrar's office. The certificate may be either a certificate without licence or a certificate with licence.

Where a marriage is intended to be solemnised under a registrar's certificate without licence, notice of the marriage must be given in the prescribed form to the superintendent registrar of the district or districts in which the parties reside. If both the parties reside in the same registration district, and have both resided there for seven days immediately preceding the giving of the notice, the notice may be given by either party. If the parties reside in different registration districts, notice must be given by each to the registration officer of the district in which he or she resides, and the preliminary residential qualification of seven days' residence must be fulfilled by each before the notice is given. The notice of marriage states the names and descriptions of the parties, the dwelling-place of each party, and the length of time during which he or she has resided there, and the church or other building in which the marriage is to be solemnised. It also sets out that the marriage is to be without licence. The notice contains a declaration, subscribed by the person giving the notice, that there is no legal impediment to the marriage; and when either party, not being a widower or widow, is under the age of twenty-one, that the consent of the persons whose consent to the marriage is required by law has been duly given. The notice is entered by the registrar in a Marriage Notice Book, which is open to public inspection. The notice, or a copy of the notice, is suspended or affixed by the registrar in a conspicuous place in his office during twenty-one successive days next after the day on which it was entered in the Marriage Notice Book. If during this period no valid objection is stated, the registrar issues a certificate. The marriage may then take place within three calendar months from the date of the entry of the notice. The building in which the marriage takes place must be that specified in the notice and certificate. The marriage may be solemnised according to the rites of the Church of England. The church in which the marriage takes place must be situated within the district of the superintendent registrar by whom the certificate is issued, the consent of the minister being obtained. Or the marriage may be solemnised in some building certified as a place of religious worship and registered for the solemnisation of marriages. There must be present, in addition to two witnesses, either the registrar or some duly 'authorised person.' Under the Marriage Act, 1898, the presence of a registrar of marriages is not necessary at marriages in Nonconformist registered buildings. That act, which does not apply to marriages according to the usages of the Jews or of the Society of Friends, makes provision for the appointment of an 'authorised person' (usually the minister of the chapel). The rules now govern-

ing the registration of buildings for the solemnisation of marriages and the appointment of 'authorised persons' are set out in Statutory Rules and Orders, No. 1332, dated 4th October 1909. If the presence of a registrar is required at a marriage in a registered building for which an authorised person has been appointed, the fact must be stated when notice of the marriage is given, and the consent of the minister or trustees to the registrar's attendance must be obtained. The ceremony must take place with open doors between the hours of eight in the forenoon and three in the afternoon. The parties must, at some part of the ceremony, declare, in prescribed words, that they take each other as husband and wife. If the marriage is solemnised according to the usages of the Jews or of the Society of Friends it is not necessary that the building in which the marriage is celebrated should be registered or be situated within the district or either of the districts in which the parties reside, and the provisions as to open doors, the presence of witnesses, and the hours during which the marriage may be solemnised have no application. If both parties are Jews they may marry, according to their usages, in a synagogue or private dwelling-house at any hour. If both the parties are members of the Society of Friends, or if, not being members, they have been authorised by the Society of Friends to solemnise their marriage in accordance with its usages, they may be married in a Friends' meeting-room. The presence of a registrar of marriages is not necessary at such marriages of Jews or Quakers. Where the marriage is to be solemnised without religious rites it may take place at a register office in the presence of the superintendent registrar and of a registrar of marriages of the district. It must be solemnised with open doors, in the presence of two witnesses, and between the hours of eight in the forenoon and three in the afternoon, and the same declaration and prescribed form of contracting words must be used as in the case of a marriage at a registered building. No religious service may be used at a marriage in a register office; but if the parties desire to go through a religious ceremony afterwards, they may do so on production of a certificate of the register office marriage.

Where a marriage is intended to be solemnised on a registrar's certificate with licence, notice is given to that effect and a certificate is obtained. But the procedure is different in important respects from that required in the case of a marriage on a registrar's certificate without licence. One notice only is necessary, whether the parties live in the same or in different registration districts, and either party may give the notice. The declaration subscribed to the notice must state that the person giving it has, for the space of fifteen days immediately preceding, had his or her usual place of residence within the district of the registrar to whom the notice is given. When the parties live in the districts of different superintendent registrars it is sufficient that the notice be given to the superintendent registrar of the district in which one of the parties resides, and it is not necessary to state how long each of the parties has resided in his or her dwelling-place, but only how long the party residing in the district in which the notice is given has so resided. The notice need not be suspended in the office of the registrar. After the expiration of one whole day from the day of the entry of the notice of marriage, the certificate, together with a licence to marry, will be issued, provided that no lawful impediment has been shown and the issue of the certificate has not been forbidden. The marriage may take place within three calendar months from the date of the entry of the notice of marriage. No licence can be granted by the super-

intendent registrar for a marriage in any church or chapel in which marriages may be solemnised according to the rites of the Church of England.

A marriage upon the certificate of a registrar (whether with or without licence) cannot be solemnised in any building registered and certified for religious worship without the consent of the minister or one of the trustees or managers thereof, or, in the case of the Church of Rome, of the officiating minister thereof. As to registration of marriages, see REGISTRATION.

Statutory provision is made in the Foreign Marriage Act, 1892 (55 and 56 Vict. chap. 23), for the solemnisation in foreign countries of marriages between persons, one of whom at least is a British subject, by or before marriage officers. Marriages under this act are now regulated by the Foreign Marriages Order in Council, 1913. The persons entitled to act as marriage officers are British ambassadors or members of the diplomatic service authorised in writing by the ambassador, and British consuls or other officers authorised by a warrant from the Secretary of State. A marriage may also be solemnised under the act on board one of His Majesty's ships on a foreign station before the commanding officer of the ship. The act further expressly recognises the validity of marriages celebrated within the lines of a British army serving abroad, by a chaplain or officer or other person officiating under the orders of the commanding officer. The Marriage of British Subjects (Facilities) Acts, 1915-1916, passed to facilitate marriages between British subjects resident in the United Kingdom and British subjects resident in other parts of His Majesty's dominions and in British protectorates, provides for the mutual recognition of certificates of the publication of banns or of notice of marriage issued in the United Kingdom or in those dominions to which the acts have been applied.

The English doctrine on the international validity of marriages is that the law of the parties' domicile decides the question whether, apart from forms and ceremonies, the marriage is valid, and that the law of the place of celebration governs the forms and ceremonies with which the marriage must be solemnised. The law of the domicile of each party must be satisfied as regards capacity to contract the marriage, whether absolute or relative in respect of the prohibited degrees of consanguinity or affinity. Where, however, the domicile of one of the parties is English and the marriage is celebrated in England, the English courts do not regard the validity of the marriage as affected if the law of the domicile of the other party imposes an incapacity not recognised by English law.

Scotland.—The law of Scotland with regard to the conditions or disabilities which prevent the formation of a valid marriage is substantially identical with that of England. In Scotland, however, the consent of the parents or guardians is not necessary to the validity of the marriage of persons who are in minority. Again, an old Scots Act, 1620, chap. 20, declares null a marriage contracted by a divorced spouse with the person with whom he or she has been declared in the decree of divorce pronounced by the Judge Ordinary to have committed adultery; but in practice it is usual to omit the name of the paramour in the decree. As regards the forms of marriage or the methods of contracting marriage, the rules of Scots law are in important respects markedly different from those of English law.

In Scotland a 'regular' marriage is one celebrated *in facie ecclesie*, i.e. in presence of a minister of religion, after either proclamation of banns or publication in accordance with the Marriage Notice Act, 1878. For proclamation of banns each of the

parties intending to marry hands to the session-clerk of the parish in which he or she has resided for at least fifteen days immediately preceding an application, giving the requisite particulars, and a certificate of residence signed by two householders. If the parties reside in different parishes, proclamation must be made in the churches of both parishes. After proclamation has been duly made a certificate to that effect is issued by the session-clerk, and is authority to a clergyman of any denomination to celebrate the marriage. The marriage may be solemnised at any time within three months thereafter. The marriage must take place before at least two witnesses. It need not be celebrated in a church, but may be in a dwelling-house or elsewhere, and at any hour. As an alternative to proclamation of banns the Marriage Notice Act, 1878, enables a regular marriage to be celebrated after publication of notice, as prescribed in the act, and upon production of a registrar's certificate of such publication. Both parties must have resided in Scotland for at least fifteen days prior to publication of the notice. The notice to the registrar states the name, the rank or profession, the condition (whether a bachelor or spinster, widower or widow), the age, and the dwelling-place of the parties, and contains a declaration that the party giving the notice knows of no impediment to the marriage, and has resided within the registrar's parish or district for fifteen days immediately preceding. Two householders in the parish or district must sign a declaration that they believe the statements contained in the notice to be true. When both the parties reside in the same parish or district a single notice is sufficient. The registrar must post up in a conspicuous place at his office a public notice, in the statutory form, of the intended marriage, and must keep it so posted up for seven consecutive days. After these seven days, unless written objections have been lodged and subscribed by the person stating them, the registrar issues a certificate of publication, which is equivalent in effect to banns. As to registration of regular marriages, see REGISTRATION.

Any marriage not celebrated by a minister of religion after proclamation of banns or publication under the Marriage Notice Act, 1878, is, though valid, 'irregular.' 'Clandestine' marriage, in the proper use of the term in Scots law, denotes a marriage with a religious ceremony, celebrated by a layman professing to act as a religious celebrant or by a minister of religion without due proclamation of banns or registrar's certificate of publication. Such a marriage is valid as an irregular marriage; but the celebrant, the parties, and the witnesses are liable in penalties. Other forms of irregular marriage are contracted without any religious ceremony. Such a marriage may be constituted in one of three ways: (1) Marriage *per verba de presenti*. When a man and a woman mutually declare that they take each other there and then as husband and wife a valid marriage is constituted. The interchange of consent makes the marriage. The consent must be mutual, *de presenti*, and unconditional. Where the consent is qualified by a condition, e.g. the subsequent performance of a ceremony, or the birth of a child, or by a reference to a future time, there is no marriage. The consent may be given in any form of words, and either verbally or in writing. (2) Marriage by promise *subsequente copulâ*. Where a woman proves that a man promised to marry her, and that, on the faith of the promise, she allowed him to have sexual intercourse with her, she is entitled to a decree of declarator of marriage. The promise can be proved only by the writ or oath of the defender. The *copula*, following on the faith of the promise of marriage, constitutes marriage; and

accordingly a declarator of such a marriage can be competently brought after the death of one of the spouses. (3) Marriage by cohabitation with habit and repute. Strictly speaking, this is a mode of proving the fact of marriage rather than a mode of contracting marriage. The cohabitation must be at bed and board. The length of time during which the cohabitation has continued must be considerable—a period of years, not of months. The repute of marriage must exist among the neighbours and friends of the parties.

The facility of contracting marriage in Scotland by *de presenti* consent, without the preliminaries requisite to a valid marriage by the law of England, used to be taken advantage of by runaway couples from England, who, crossing the border, contracted marriage by interchange of consent at Gretna Green (q.v.) or elsewhere in Scotland. This practice was checked by an act—known as Lord Brougham's Act—passed in 1856, which provides that no irregular marriage contracted in Scotland by declaration, acknowledgment, or ceremony shall be valid unless one of the parties had, at the date thereof, his or her usual place of residence there, or had lived in Scotland for twenty-one days next preceding such marriage. If this statutory condition as to residence in Scotland has not been implemented, decree of nullity of the marriage can be obtained. The usual method of obtaining registration of an irregular marriage *per verba de presenti* is that introduced by the act of 1856. Under that act the parties may, within three months after the date of the marriage, make a joint application to the sheriff or sheriff-substitute of the county where the marriage was contracted for a warrant to register the marriage. The joint application must be accompanied by a 'Schedule of Particulars,' in the form set out in the Marriage (Scotland) Act, 1916. The statutory schedule is procured from the registrar of the parish or district in which the irregular marriage was contracted, who fills it up according to the information supplied by the parties. The sheriff, on proof that the marriage has been contracted and that one of the parties had lived in Scotland for twenty-one days next preceding the marriage, grants a warrant for the registration of the marriage. The joint application, the schedule of particulars, and the warrant to register, are transmitted by the sheriff-clerk to the registrar of the parish or district in which the marriage was contracted, who must forthwith register it. The application to, and the proceedings before, the sheriff are often believed by the parties to be a civil ceremony of marriage, and, in popular language, spoken of as marriage by or before the sheriff; but the fact is that the parties have married themselves and apply to the sheriff merely to obtain the registration of their marriage. The method of securing registration by the parties appearing before a magistrate or justice of the peace, and being convicted, on their own confession, of having contracted an irregular marriage, has been abolished by the act of 1916. When decree of declarator of a marriage has been obtained the clerk of court is bound to send notice to the registrar.

As to the relation of husband and wife, see article HUSBAND AND WIFE. As to the dissolution of marriage, see article DIVORCE.

See also the articles

Adultery.	Concubinage.	Legitimation.
Affinity.	Consanguinity.	Polygamy.
Banns.	Fleet Prison.	Registration.
Bastardy.	Illegitimacy.	Ring.
Bigamy.	Jointure.	Wedding Ceremonies.
Celibacy.	Judicial Separation.	

Marrow is a substance of low specific gravity filling the cells and cavities of the bones of mammals. There are two varieties, which are known

as *red or watery marrow* and *yellow or oily marrow*. In some of the short bones, as the bodies of the vertebrae and the sternum, the marrow has a reddish colour, due to the presence of cells which have this colour and are supposed to be transition forms between the proper marrow cells and red blood-corpuscles. On analysis it is found to contain 75 per cent. of water, the remainder consisting of albuminous and fibrinous matter, with salts and a trace of oil. In the long bones of a healthy adult mammal the marrow occurs as a yellow, oily fluid, contained in vesicles like those of common fat, which are imbedded in the inter-spaces of the medullary membrane—i.e. a highly vascular membrane lining the interior of the bones. This marrow consists of 96 per cent. of oil and 4 of water, connective tissue, and vessels.

Marrow Controversy, one of the most strenuous and memorable struggles in the religious history of Scotland, took its name from a book entitled the *Marrow of Modern Divinity* (1645), written by a Puritan soldier or an illiterate barber. The highly evangelical character of this work, and especially its doctrine of the free grace of God in the redemption of sinners, had made it a great favourite with the few zealous and pious ministers then to be found in the Church of Scotland, and in 1718 an edition was published by the Rev. James Hog of Carnock. A committee of the General Assembly reported against the work as too free in its offer of salvation, and the Assembly formally condemned the book. Twelve ministers, amongst whom were Thomas Boston (q.v.) and the Erskines (q.v.), protested against this decision, and were ultimately rebuked by the Assembly, the national sympathy being on the whole with the 'Representers' or 'Marrow-men.' The controversy was substantially the same that, in 1733, resulted in the deposition of Ebenezer Erskine, and the origination of the 'Secession' body.

Marrum. See REED.

Marryat, FREDERICK, born in Westminster, 10th July 1792, the son of an M.P., in 1806 sailed as midshipman under Lord Cochrane, and spent some years of dangerous service off the French and Spanish coasts and in the Mediterranean. After visiting West Indian waters, he cruised as lieutenant (1812-15) on the north coast of South America, and was twice invalided home. Now a commander, he had command of a sloop cruising off St Helena to guard against the escape of Napoleon (1820-21); he also did good work in suppressing the Channel smugglers, and some hard fighting in Burmese rivers. On his return to England (1826) he was made C.B., and was given the command of the *Ariadne* (1828). He resigned in 1830, and thenceforth led the life of a man of letters. *Frank Mildmay*, his first novel, appeared in 1829, and the *King's Own* in 1830. In 1832-35 he was editor of the *Metropolitan Magazine*, to which he contributed *Newton Forster* (1832), *Peter Simple* (1833), *Jacob Faithful*, *Japhet in Search of a Father*, and *Mr Midshipman Easy* (1834). *Snarleyyow* and *The Pasha of Many Tales* came out in 1836, and in 1837 Marryat set out for a tour through the United States, where he wrote *The Phantom Ship* (1839) and a drama, *The Ocean Waif*. He received £1200 for *Mr Midshipman Easy* and £1600 for his *Diary in America* (1839), but was extravagant and unlucky in his speculations, and at last was deeply embarrassed. *Poor Jack*, *Masterman Ready*, *The Poacher*, and *Percival Keene* appeared before he settled (1843) on his small farm of Langham, Norfolk, where he spent his days in farming and in writing stories for children, including *Settlers in Canada*, *The Mission*, *The Privateer's Man*, and the *Children of the New*

Forest (Valerie was only partly Marryat's; and *Rattlin the Reefer* was written by E. Howard). He died at Langham, 9th August 1848. For improvements in signalling, &c., he had been made F.R.S. (1819) and a member of the Legion of Honour (1833). As a writer of sea-stories of his own particular type Marryat has no superior; his sea-fights, his chases and cutting-out expeditions, are told with irresistible gusto. See the *Life and Letters* by his daughter (1872) and *Life by Hannay* (1889).—The daughter mentioned, FLORENCE (1838–99), successively Mrs Ross Church and Mrs Lean, was born at Brighton, and from 1865 published about eighty novels, besides a drama and many articles in periodicals. She edited *London Society* (1872–76).

Mars (archaic and poetic *Mavors*; in the song of the Arval Brothers, *Marmar*; the Oscan form is *Mamers*), an ancient Italian divinity of war and of husbandry, identified by the Græcising Romans with Ares (q.v.). As the father of Romulus he was specially the progenitor of the Roman race, and he shared with Jupiter the honour of being styled *Pater*, the forms *Marspiter* and *Maspiter* being common for *Mars Pater*. Other titles were *Mars Gradivus*, as the warlike god; *Silvanus*, as the rustic god; and *Quirinus*, from his relation to the state, and his especial care for Roman citizens in their civil capacity as *Quirites*. His priests, the *Salii*, danced in complete armour. The wolf and the woodpecker were sacred to him. He had many temples at Rome, the most celebrated of which were that outside the *Porta Capena*, on the Appian Road, and that of Mars Ultor built by Augustus in the Forum. The *Campus Martius*, where the Romans practised athletic and military exercises, was named in honour of Mars; so was the month of March (*Martius*), the first month of the Roman year. The *Ludi Martiales* were celebrated every year in the circus on 1st August. See PLANETS.

MARS, MADEMOISELLE (ANNE FRANÇOISE HIPOLYTE BOUTET), a great favourite at the Théâtre Français, was born in Paris on 5th February 1779, the illegitimate daughter of an actor Boutet (called Monvel) and an actress Mars Salvétat. She began to act before she was thirteen, joined the Théâtre Français in 1799, and died at Paris on 20th March 1847. She was equally mistress of naïve parts and of those of the coquette, and was especially successful in Molière's masterpieces. Her *Mémoires* were published in 2 vols. in 1849, and her *Confidences* in 3 vols. in 1855.

Marsala, a seaport on the westernmost point of Sicily, 55 miles S.W. of Palermo; pop. 72,500. It is defended by a citadel, has a cathedral and an academy of sciences, and carries on a large trade in wine, the well-known Marsala, which became popular from having been supplied to the British fleet in 1802. It resembles sherry, and is exported to Italy, England, and other countries. Marsala has also a trade in liqueurs, brandy, cheese, macaroni, and sea-salt. The town occupies the site of Lilybæum, the ancient capital of the Carthaginian settlements in Sicily. It obtained its present name from the Saracens, who occupied it in the 9th century, but were driven out by the Normans in the 11th. It was Garibaldi's landing-point for the Sicilian campaign of 1860. The harbour was filled up by the Emperor Charles V. to prevent a Turkish attack; it was reconstructed during the 19th century.

Marschner, HEINRICH (1795–1861), composer, born at Zittau in Saxony, abandoned the study of law at Leipzig for music. He was associated with Weber as opera director at Dresden, and was later kapellmeister at the Leipzig theatre and at the court of Hanover. He composed *Der Vampyr* (1828), *Hans Heiling* (1833), and other operas, &c.

Marseillaise, the stirring song or hymn of the French republicans, was composed, six-sevenths of it (stanza seven of different but uncertain authorship was added some months later), in 1792, by a young officer, Rouget de Lisle (q.v.), then stationed at Strasburg. He composed both words and music under one inspiration on a night in April after dining with the mayor of the city; *Chant de l'Armée du Rhin* was the name he gave it. The song was speedily carried by enthusiastic revolutionists to the chief cities of France. It was brought to Paris by the volunteers of Marseilles, who sang it as they entered the capital (30th July) and when they marched to the storming of the Tuileries. Hence the Parisians called it *La Marseillaise*. Rouget de Lisle's claim to have composed the music has been called in question; but his originality seems proved. Interdicted under the Restoration and the Second Empire, the *Marseillaise* became again the national song on the outbreak of the Franco-German war.

Marseilles (Fr. *Marseille*), in population the second city of France, is the chief town of Bouches-du-Rhône, and is situated on the south coast, about 27 miles E. of the mouth of the Rhone. It is the principal commercial port of France and of the entire Mediterranean. Wheat, oil-seeds, coal, wine, spirits, and beer, sugar, maize, oats, barley, coffee, olive, palm, and cotton oils, pepper, flour, and tallow are the principal imports; clay tiles, wheat, oil-cakes, flour, sugar, oil, wine and spirits, soap, and candles the chief exports. Marseilles is the home port of the Messageries Maritimes, and is served by the P. and O., Générale Transatlantique, and other great shipping companies. The harbour accommodation consists of the old harbour, a natural basin running into the heart of the city; a series of new docks, quays, and warehouses (La Joliette, &c.), giving altogether (including the extensions begun in 1919) about 21 miles of quays; and an outer roadstead between the dams to these docks and a breakwater constructed in deeper water; besides dry-docks, wet-docks, slips, &c. A shipping tunnel (1911–25) with huge bore of 50 feet connects it by way of the Étang de Berre and the Rhone Canal to the great inland waterways of Europe. The industry of the place is very considerable, the first place being taken by soap, vegetable oils, and oil-cake; candles, glycerine, soda, sugar, macaroni, biscuits, iron, lead, zinc, tiles, and leather are manufactured. Marseilles has extensive flour-mills and wine-vaults, and is a centre of the wool trade. There are shipbuilding and engineering yards and a prosperous fishing fleet.

The city of Marseilles is built on the slopes that overlook the old harbour, and at the foot, and has now extended to the south-east. Although greatly improved since 1853, the sanitary condition still leaves something to be desired. Its memorable buildings include the modern Byzantine basilica, which serves as a cathedral; the pilgrimage church, Notre Dame de la Garde, with an image of the Virgin greatly venerated by sailors and fishermen, and with innumerable ex-voto offerings, built in 1864 on the site of a chapel of 1214; the church of St Victor (1200), with subterranean chapel and catacombs of the 11th century; the health office of the port, with fine paintings by Vernet, David, Gérard, and Guérin; the museum of antiquities, in the Château Borély; the Longchamp palace, a very fine Renaissance building (1870), which shelters in one wing the picture-gallery, and in the other the natural history museum; the public library. The public institutions embrace a botanical and a zoological garden, a marine and an astronomical observatory, a faculty of sciences, and schools of medicine, fine arts, Oriental languages, music, commerce, hydrography. Pop. (1861) 260,910;

(1886) 376,143; (1911) 550,619; (1921) 586,341, including a large Italian colony. Marseilles was the birthplace of Pytheas, Petronius, Thiers, and Puget.

One of the oldest towns in France, Marseilles was founded by Phoceans from Asia Minor six hundred years before Christ. It was for many centuries, down to 300 A.D., a centre of Greek civilisation. The Greeks called it *Massalia*, the Romans *Massilia*. As the rival of Carthage it sided with Rome. It supported Pompey against Cæsar, but was taken by the latter in 49 B.C. after an obstinate defence. During subsequent ages it fell into the hands of the Saracens (9th century), Alphonso V. of Aragon (1423), and Henry III. of France (1575). In 1112 it had become a republic; but in 1660 it was deprived by Louis XIV. of the privileges it had enjoyed as a free port almost from its foundation. The years 1720 and 1721 are memorable for the devastations of the plague in the port, when nearly half the population of 100,000 perished, and for the splendid heroism of Bishop Belsunce and the Chevalier Rose. It was the scene of stirring events in 1792 and 1793, and sent large bands to Paris. In 1871 Marseilles, always noted for its extreme republicanism, proclaimed the commune. Its commerce has grown rapidly since the conquest of Algiers and the opening of the Suez Canal.

Marsh, OTHNIEL CHARLES, palæontologist, was born at Lockport, New York, 29th October 1831, graduated at Yale in 1860, and studied further at New Haven and in Germany. He became the first professor of Palæontology at Yale in 1866, and thenceforward devoted himself to the investigation of extinct American vertebrates, of which in various expeditions to the Rocky Mountains he discovered over a thousand new species, some representing wholly new orders. Professor Marsh described many of his discoveries in the *American Journal of Science*, and issued a series of valuable monographs (published by government) on *Odontornithes* (1880), *Dinocerata* (1884); *Sauropoda* (1888), &c. He died 18th March 1899.

Marshal (Fr. *maréchal*; Old High Ger. *marah*, 'a battle-horse,' and *schalh*, 'a servant'), a term meaning originally a groom or manager of the horse, though eventually the king's marshal became one of the principal officers of state. The royal farrier rose in dignity with the increasing importance of the *chevalerie*, till he became, conjointly with the Constable (q.v.), the judge in courts of chivalry. When the king headed his army in feudal times, the assembled troops were inspected by the constable and marshal, who fixed the spot for the encampment of each noble, and examined the number, arms, and condition of his retainers. With these duties was naturally combined the regulation of all matters connected with armorial bearings, standards, and ensigns. In England the earl-marshal is now head of the Herald's College (see HERALD), and the dignity is hereditary in the family of the Duke of Norfolk. In Scotland the office of marischal was hereditary in the family of Keith (q.v.). In 1716 George, tenth Earl Marischal, was attainted in consequence of his share in the rebellion of the previous year, and the office has since been in abeyance. In France the highest military officer is called a marshal, a dignity which originated early in the 13th century. There was at first only one *Maréchal de France*, and there were but two till the time of Francis I. Their number afterwards became unlimited. Napoleon's marshals are celebrated. From the title of this class of general officers the Germans have borrowed their Field-marschal, and the British (since 1736) their Field-marshal (q.v.).

Marshall, capital of Harrison county, Texas, at the junction of three railways, 40 miles W. of Shreveport, Louisiana. It has railway machine-shops, foundries, and a trade in cotton. Pop. 14,000.

Marshall, ALFRED, economist, born in London, 26th July 1842, and educated at Merchant Taylors', and St John's, Cambridge, became a fellow (1865), principal of University College, Bristol (1877), lecturer on political economy at Balliol (1883), and professor of Political Economy at Cambridge (1885-1908) in succession to Fawcett. Of his works, his standard *Principles of Economics* (1890) and its sequels *Industry and Trade* (1919) and *Money, Credit, and Commerce* (1923) are the best known. He died 13th July 1924. See Memoir by J. M. Keynes in *Economic Journal* (Sept. 1924).

Marshall, JOHN, chief-justice of the United States, was born in Fauquier county, Virginia, 24th September 1755, and was studying law when the Revolution began. He served as an officer—for a time under his father, Colonel Thomas Marshall (1730-1802)—from 1775 to 1779; in 1780 he received, while in Richmond, a license to practise law; and in 1781, after a final campaign, he settled down to his profession. He quickly gained distinction, and eventually rose to the head of the Virginia bar. From 1782 he sat in the Virginia legislature; in 1788 he was elected to the state convention, which ultimately—mainly owing to his and Madison's (q.v.) arguments—adopted the new United States constitution. In 1797 he was appointed joint envoy with Pinckney and Gerry (q.v.) to France, where he and Pinckney, as Federalists, were ordered to leave the republic after the envoys had indignantly declined Talleyrand's overtures for a personal and a public loan. His conduct in this matter only made Marshall more respected and popular at home, and in 1799 he was elected to congress; on 12th May 1800 he was appointed secretary of state, which office he held till March 1801. In January 1801 he was appointed chief-justice of the United States, and this position he occupied until his death, at Philadelphia, 6th July 1835. Chief-justice Marshall's long series of important decisions are recognised as standard authority on questions of constitutional law; he it was who secured for the supreme court the decision (in any controversy between the states and the central government) of what is or is not constitutional. It has been said of him that, 'living or dead, he is the supreme court.' He wrote a *Life of Washington*. See *Lives* by Magruder (1885) and Thayer (1901).

Marshall Islands, a group in the western Pacific, bisected by 10° N. lat., and having the Caroline group to the west, consists of two parallel chains of low coral-reefs—one, the Ratak group, consisting of fifteen islands, and measuring in all 48 sq. m.; the other, the Ralik group, eighteen islands, with a total area of 107 sq. m. The coconut and pandanus palms and the bread-fruit tree are the principal sources of food, besides fish. Phosphate and copra are the chief exports. The Micronesian inhabitants, some 12,000 in number, are an ugly but good-natured and hospitable race, fond of song and dance, and skilful weavers of bast mats. The matriarchal rule holds. One Marshall (and Gilbert) explored the islands in 1788. In 1885 they were annexed by Germany, and in 1919 assigned to Japan as mandatory of the League of Nations.

Marshalltown, capital of Marshall county, Iowa, near the Iowa River, 50 miles N.E. of Des Moines, at the crossing of two railways. It has a large trade in wheat, &c., manufactures furnaces, machinery, and much else. Pop. 16,000.

Marshalsea, the jail attached to the Marshalsea Court, originally established under the earl-

marshal of England for the trial of servants of the royal household. Later on it came to be used as a prison for debtors and defaulters, as well as persons convicted of piracy or other offences on the high seas. It stood near the church of St George, Southwark, and existed in the reign of Edward III. It was abolished as the Palace Court in 1849. Bishop Bonner was confined here for nearly ten years, till his death in 1569, and George Wither in 1613.

Marsh-gas. See CARBURETTED HYDROGEN, GAS, METHYL.

Marsh-mallow (*Althæa*), a genus of plants of the natural order Malvaceæ. The species, which are not numerous, are annual and perennial plants, with showy flowers, natives of Europe and Asia. Only one, the Common Marsh-mallow (*A. officinalis*), is an undoubted native of Britain, and is common only in the south, growing in meadows and marshes, especially near the sea. The whole plant is wholesome, abounding in fibre, mucilage, starch, and saccharine matter. It is in the roots chiefly that the mucilage abounds. The emollient and demulcent qualities of marsh-mallow are well known in medicine, and in seasons of scarcity the inhabitants of some eastern countries often have recourse to it as a principal article of food. Lozenges made from it (*Pâtes de Guimauve*) are in use. It is said to be palatable when boiled, and afterwards fried with onions and butter. The Hollyhock (q.v.) is commonly referred to this genus.

Marsh-marigold (*Caltha*), a genus of plants of the natural order Ranunculaceæ, having about five petal-like sepals, but no petals; the fruit



Common Marsh-mallow
(*Althæa officinalis*):
a, a flower; b, fruit.



Marsh-marigold (*Caltha palustris*).

consists of several spreading, compressed, many-seeded follicles. *C. palustris* is a very common

British plant, with kidney-shaped, shining leaves, and large yellow flowers, a principal ornament of wet meadows and the sides of streams in spring. It partakes of the acidity common in the order; but the flower-buds, preserved in vinegar and salt, are said to be a good substitute for capers. It is often called Cowslip in the United States.

Marsilea. See NARDOO, WATER-FERNS.

Marsilio. See FICINO.

Marsivan', a town of Asia Minor, 23 miles NW. of Amasia, with a silver-mine; pop. 15,000.

Marston, JOHN, dramatist and satirist, a son of John Marston, of Gayton (or Heyton), County Salop, by his wife Maria, daughter of Andrew Guarsi, an Italian surgeon, who had settled in London, was born about 1575, probably at Coventry. He matriculated at Brasenose College, Oxford, 4th February 1591-92, and was admitted B.A. 6th February 1593-94. From the elder Marston's will (dated 24th October 1599) it may be gathered that, after adopting the profession of the law, he abandoned it against his father's wish. He married (but the date of his marriage cannot be fixed) Mary, daughter of Rev. William Wilkes, chaplain to James I. and rector of St Martin's, County Wilts. Ben Jonson wittily observed to Drummond of Hawthornden that 'Marston wrote his father-in-law's preachings, and his father-in-law his comedies,' contrasting the asperity of Marston's comedies with the blandness of the chaplain's sermons. With the exception of *The Insatiate Countess* (which is of doubtful authorship), all Marston's plays were published between 1602 and 1607. He gave up play-writing about 1607, but the date at which he entered the church has not been ascertained. In 1616 he was presented to the living of Christ Church, Hampshire, which he resigned in 1631. He died 25th June 1634 in Aldermanbury parish, London, and was buried beside his father in the Temple Church, 'under the stone which hath written on it *Oblivioni Sacrum*.' His widow was buried by his side, 4th July 1657.

Marston's first work was *The Metamorphosis of Pygmalion's Image: and Certain Satires* (1598). Another series of satires, *The Scourge of Villany*, appeared later in the same year, a second edition (with an additional tenth satire) following in 1599. *Pygmalion*, a somewhat licentious poem, may have owed its inspiration to Shakespeare's *Venus and Adonis*. Marston pretends that it was written with the object of bringing discredit on amatory poetry; but the apology cannot be accepted. Archbishop Whitgift condemned it to the flames with other works of a similar tendency. The satires, which were published under the *nom de guerre* of 'William Kinsayder,' are uncouth and obscure. There was a feud between Marston and the satirist Joseph Hall (the future bishop of Norwich), and many hard knocks were dealt on either side. A Cambridge man, one 'W. J.', intervened with his *Whipping of the Satire*, in which he handled Marston roughly; and he was answered, not very effectively, by one of Marston's friends in the anonymous *Whipper of the Satire*. The controversy raged hotly and excited lively interest, but the allusions in these various satirical pieces are not very intelligible to-day.

In September 1599 Henslow records in his *Diary* that he advanced forty shillings to 'Mr Maxtone, the new poete (Mr Mastone),' in part payment for an unnamed play. This 'new poete' was Marston; but there is no other mention of him in the *Diary*. Two gloomy and ill-constructed tragedies, *Antonio and Mellida* and *Antonio's Revenge*, were entered in the Stationers' Register, 24th October 1601, and were published in the following year. They

contain passages of striking power, and a deal of intolerable fustian. In 1604 was published *The Malcontent*, a second edition, augmented by Webster, appearing in the same year. It is more skilfully constructed than the two parts of *Antonio and Mellida*. Marston's command of bold and vivid imagery is effectively displayed in the description of the hermit's cell, iv. 2. He dedicated *The Malcontent* in very cordial terms to Ben Jonson, and in 1605 prefixed some complimentary verses to *Sejanus*. There seem to have been many quarrels and reconciliations between Jonson and Marston. Jonson told Drummond that 'he had many quarrels with Marston, beat him and took his pistol from him, wrote his *Poetaster* on him; the beginning of them were that Marston represented him on the stage in his youth given to venery.' The original quarrel began in or about 1598.

The Dutch Courtesan (1605) is full of life and spirit, the character of the vengeful courtesan Franceschina being drawn with masterly ability. *Eastward Ho* (1605), from which Hogarth is said to have taken the plan of his prints 'The Industrious and Idle Prentices,' was written in conjunction with Chapman and Jonson. It is far more genial than any comedy which Marston wrote single-handed. Some satirical reflections on the Scots were introduced, for which offence the authors were committed to prison at the instance of Sir James Murray, and the report went that their ears were to be cut and their noses slit. *Parasitaster, or the Fawn* (1606), in spite of occasional tediousness, is an attractive comedy; but the tragedy of *Sophonisba* (1606) appals us with its horrors, the description of the witch Erichtho and her cave being gruesome to the last degree. *What You Will*, published in 1607, but probably written some years earlier, has many flings at Ben Jonson. *The Insatiate Countess* was published in 1613 with Marston's name on the title-page, but in a copy (belonging to the Duke of Devonshire) of the 1631 edition the author's name is given as William Barksteed, a poet of some ability and an actor. The rich and graceful poetry scattered through *The Insatiate Countess* is unlike anything that we find in Marston's undoubted works. Probably Marston left the play unfinished when he entered the church, and Barksteed took it in hand. An indifferent anonymous comedy, *Jack Drum's Entertainment*, written about 1600, may be safely assigned to Marston from internal evidence; and he appears to have had some share in another poor play, *Histrionastix*. In 1633 William Sheares, the publisher, issued 1 vol. sm. 8vo, *The Works of Mr John Marston*, comprising the two parts of *Antonio and Mellida*, *Sophonisba*, *What You Will*, *The Fawn*, and *The Dutch Courtesan*. The works were edited by Halliwell (-Phillips) in 1856, 3 vols., and by A. H. Bullen in 1887, 3 vols. The Malone Society in 1922 reprinted the *Antonio* plays from the 1602 quarto (ed. W. W. Greg). Mr G. B. Harrison edited *The Scourge of Villany* (1925).

Marston, JOHN WESTLAND (1820-90), born at Boston, Lincolnshire, early gave up law for literature; and in 1842 his *Patrician's Daughter*, a blank-verse tragedy of the day, was brought out at Drury Lane by Macready. It was the first, and also the most successful, of more than a dozen plays, all Sheridan-Knowlesian, and all forgotten. Besides these, he wrote a novel (1860), a good book on *Our Recent Actors* (1888), and a mass of poetic criticism.—His son, PHILIP BOURKE MARSTON, the blind poet, was born in London, 13th August 1850, and died there on 14th February 1887. His memory will survive through his friendships—with Rossetti, Watts-Dunton, Swinburne, Oliver Madox Brown—rather than through his sonnets and lyrics.

Marston Moor, in the West Riding of Yorkshire, 7 miles W. of York, the scene of a great parliamentary victory, 2d July 1644. The royalist army, about 22,000 strong, was led by Prince Rupert; the parliamentary troops numbered 15,000 foot and 9000 horse, consisting of a Scottish army under the Earl of Leven, a Yorkshire army under Fairfax, and one from the eastern counties under the Earl of Manchester, with Cromwell and Crawford. The battle began about seven o'clock in the evening. On the king's left flank the horse under Goring scattered the forces of Fairfax; on his right the troopers of the fiery Rupert were broken for the first time by Cromwell's 'Ironsides.' Hastily recalling his men from the chase, Cromwell saved the day by supporting Manchester and the Scottish infantry against the king's foot under Newcastle, and routing Goring's horse flushed with their victory. Before nightfall the success was complete, and the king's army fled in utter rout to York, leaving 4000 men dead on the field; among them all Newcastle's 'Whitecoats.' This victory gave the whole north to the Parliament, and first brought into prominence Cromwell's military genius. See S. R. Gardiner's *History of the Civil War* (1886), and Edward Lamplough's *Yorkshire Battles* (1891).

Marsupials, lit. 'pouched animals' (*Marsupialia*, *Didelphia*, or *Metatheria*), a sub-class of mammals, the members of which, except the American opossums and selvas, are now restricted to the Australian and Austro-Malayan regions. They are in many ways simpler than the higher mammals, notably in the structure of the brain and in the absence of a true (allantoic) placenta, except in the case of Perameles. The young are born very helpless, after a short gestation, and are usually stowed away in an external pouch or *marsupium*, where they are fed from the enclosed teats. From the wide occurrence of fragmentary marsupial remains in Triassic and Jurassic strata both in the Old and the New World, it seems that the pouch-bearers have been once widely distributed. Before the stronger mammals which rose up after them they have, however, succumbed, except in the case of the above-mentioned refugees in neotropical forests, and those saved by the insulation of the Australasian regions before any higher mammals gained a foothold. In the retreat thus afforded the marsupials have developed along numerous lines, as it were prophesying the carnivores, insectivores, rodents, and herbivores among the placental mammalia. Thus there are, besides the carnivorous and insectivorous opossums or Didelphyidae (from the United States to Patagonia) and the small selvas or Epanorthidae (South America), six Australasian families—the carnivorous and insectivorous Dasyuridae, the burrowing mole-like Notoryctidae (represented by one remarkable species), the burrowing bandicoots or Peramelidae, the wombats or Phascologyidae with rodent-like teeth, the arboreal Phalangeridae, and the herbivorous terrestrial kangaroos or Macropodidae.

See MAMMALS; also the well-known works of Owen, Huxley, and others on Vertebrates; the relevant parts of Cassell's and the *Standard Natural History*; Chisholm's trans. of Vogt and Specht's *Mammals* (1887); Waterhouse, *Natural History of Mammalia*, i. (1846); and Gould's *Mammals of Australia* (3 vols. 1845-63).

Marsus, DOMITIUS, Latin poet and prose writer of the second half of the 1st century B.C. Though not mentioned (at all events directly) by Horace, he seems to have been a member of Mæcenas's circle, and a friend of Virgil and Tibullus. He wrote *Cicuta*, a collection of epigrams; *De Urbanitate*, a treatise on wit; *Amazonis*, an epic poem; an epitaph on Tibullus; and elegiac poems. Only fragments of his works survive.

Marsyas, a Phrygian satyr, who, having found a flute that played of itself, which Athena had thrown away, was rash enough to challenge Apollo to a musical contest, subject to the condition that the victor should do what he liked to the vanquished. Apollo played upon the cithara, Marsyas upon the flute, and the Muses decided in favour of the god, who punished his rival's temerity by binding him to a tree and flaying him alive. From his blood sprang the river Marsyas; his statue stood in many ancient cities, a monument of the folly of presumption.

Martaban, an ancient town in Burma, on the right bank of the Salwin, opposite to Maulmain. It is reputed to have been built in 576 by the first king of Pegu, and was till 1323 the capital of the kingdom. It was taken by the king of Siam two centuries and a half later, and was twice captured by the British, in 1824 and in 1852. The Gulf of Martaban receives the rivers Irawadi and Salwin.

Martel, CHARLES. See CHARLES MARTEL.

Martello Towers are round towers for coast defence, about 40 feet high, built most solidly, and situated on the beach. They were so called, probably through corruption with Italian *martello*, 'a hammer,' because at Mortella Point in Corsica a small round tower stood admirably an immense cannonade from an English fleet under Lord Hood in 1794. Thereafter, especially in the 18th century, similar towers were erected along the southern and south-eastern coasts of England and of Ireland as a defence against French invasion. They have long been regarded as obsolete.

Marten (*Mustela*), a genus of digitigrade carnivorous quadrupeds of the family Mustelidae, differing from weasels in having an additional false molar on each side above and below, a small tubercle on the inner side of the lower carnivorous cheek-teeth, and the tongue not rough—characters which are regarded as indicating a somewhat less extreme carnivorous propensity. The body is elongated and supple, as in weasels, the legs short, and the toes separate, with sharp long claws; the palms and soles are generally, but not always, furry. The ears are larger than in weasels, and the tail is bushy. The martens exhibit great agility and gracefulness in their movements, and are very expert in climbing trees, among which they generally live. In this genus there are nine or ten species, distributed over Europe, Asia,

in colour with a yellowish throat; the body is about 17 inches long and the tail 8. Its partly arboreal habit is suggested by the common name. See FURS.

Martensen, HANS LASSEN, metropolitan bishop of Denmark and her most prominent theologian in the 19th century, was born at Flensburg on 19th August 1808, and studied at the university of Copenhagen. After shaking off the influence of Grundtvigianism, he became professor of Philosophy at Copenhagen, and in 1845 also court preacher. In 1840 he published a valuable monograph on *Meister Eckhart*, the German mystic, and nine years later his masterly conservative Lutheran *Christian Dogmatics* (Eng. trans. 1866), which gained him in 1854 the primacy of Denmark. This appointment was the cause of a powerful satirical attack upon him by Kierkegaard, and a controversy was aroused in which Martensen suffered severely. His great intellectual energy, however, and the force of his character soon enabled him to recover, and after the publication of another great work, in 3 vols., on *Christian Ethics* (1871-78; Eng. trans. 1873-92), his influence was more dominant than ever. With a mind wonderfully acute and powerful, he was deficient in intellectual sympathy. He stood for many years a bulwark of defence to conservative theology. He died on 3d February 1884. See his *Autobiography*, in Danish (1883), *London Quarterly* (1883), and *Brit. and Foreign Evang. Review*, vol. xxxv.

Martha's Vineyard, an island on the south coast of Massachusetts, 21 miles long, 6 miles in average width. It is noted as a summer resort.

Martial. Marcus Valerius Martialis, one of the finest among the few original Latin poets, and still the first of epigrammatists in verse, was born 1st March 38 or 41 A.D. at Bilbilis in Celtiberian Spain. Bilbilis, apart from its fame as a steel factory, was a centre also of Roman culture, and here Martial received a good education. Coming to Rome, he became in 64 a client of the influential Spanish house of the Senecas, through which he found other patrons, among them L. Calpurnius Piso, the leading man of his day. The tragic failure of the Pisonian plot lost Martial his warmest friends—Lucan, and still more Seneca—from whose heirs, however, he doubtless derived the small wine-growing estate at Nomentum, later prized mainly as a retreat from the bores (or the duns) of Rome. Of his life till Domitian became emperor we know little, except that he never maintained himself by steady professional work, but rather courted imperial and senatorial patronage by his rare social gifts and his genius for *vers de circonstance*. When (80 A.D.) Titus dedicated the Colosseum, Martial's epigrams on the occasion brought him the *jus trium liberorum* and the equestrian rank. Substantial independence, however, he did not obtain from Titus, nor, despite gross and venal flattery, from Domitian. In request as a diner-out, he divided his day between the baths, the theatres, the recitation-halls, and the composition of epigrams, and so far saw his ambition gratified as to count the most distinguished senators of the time among his friends, and all the *literati* in city or province among his readers. His life, however, was not a happy one, being continually shadowed by pecuniary embarrassment; we find him importuning a patron even for a toga or a mantle. By degrees the capital, its cares and its pleasures, became irksome to him; advancing years bereft him of Domitian and his friends of the palace; and the austere Nerva and Trajan had to be conciliated by other and less congenial arts than the adulatory epigram. In a fit of home-sickness he borrowed from his admirer, the



The Pine Marten (*Mustela martes*).

Malaya, and North America. The American 'Pekan' (*M. pennanti*) is the largest species, measuring as much as 46 inches from the snout to the tip of the tail. The most valuable species of marten is the European Sable (*M. zibellina*). It is now generally admitted that there is but one British species, the Pine Marten (*M. martes*), which is rapidly becoming very rare. It is dark brown

younger Pliny, the means of revisiting his ever fondly remembered Bilbilis of simple joys. Here again his good genius found him patrons—among them the highly-cultured Marcella, who presented him with an estate, on which he led an idyllic life. But the *vita municipalis* in the end palled, and we find him fretting for the *vita urbana*—for the Rome he was never again to see. Baulked of his wish to attain his seventy-fifth year, he died, at latest, in 104, aged sixty-three or sixty-six.

Martial possessed, for good and evil, the artistic temperament, its lack of steady purpose, its love of hand-to-mouth independence. This latter he enjoyed by humouring the contemporary vices he could not reform, though, conscience-stricken, he excuses himself on the ground that if his 'page were wanton, his life was honest.' Much of his best work, unfortunately, is his least pure. If, however, we excise 150 epigrams from the 1172 of the first twelve books, his collective writings are free from licentiousness. On the other hand, his genius and skill in verse it were hard to overestimate, his work here being distinguished by its readiness, its fastidious finish, its love of nature, its alternation of masterful eloquence and tremulous pathos. But it is as an epigrammatist, even in its modern and restricted sense, that he remains without a peer. Unequal he often is, but never vulgar. He lifts the veil from the Rome of Domitian, and exposes it mainly on its seamy side with a Hogarthian vividness not outdone by Juvenal himself.

The first noteworthy edition of Martial was that of Friedländer (2 vols. 1886); see also Professor W. M. Lindsay's standard edition of the complete text (in the Oxford Classical Texts, 1902), and his *Martialis Epigrammata Selecta* (1903)—on the latter of which A. E. Street based his admirable *Hundred Select Epigrams Metrically Rendered* (1907)—and Courthope's translations and imitations (1914).

Martial Law is the exercise of arbitrary power by the supreme authority in a district or country where the ordinary administration has ceased to be operative, either on account of civil disturbance or because of the presence therein of a hostile force, though, in the latter case, the 'Laws of War' would be a better term. Martial law is often confounded with military law, because in war or riot the supreme authority may have recourse to courts-martial and troops to maintain order. Military Law is summed up in the Army Act, 1881 (see **MUTINY ACT**), the Territorial and Reserve Forces Act of 1907, and rules, regulations, and royal warrants issued in accordance therewith. Accordingly it governs the soldier at all times, but affects civilians only when accompanying a force on active service; while martial law has been defined as 'no law,' but simply the will of the supreme authority. It is not recognised by British jurisprudence, and no rules are laid down for its application. It is assumed that, when the ordinary civil tribunals fail, the supreme authority will do his best to maintain order. He may therefore, if he thinks right, announce his intention of treating the civil population as though under military law, or in any other way that commends itself to him; but if they are British subjects he will have afterwards to justify his action by showing that it was absolutely necessary, and so obtain an indemnity from parliament for conduct which is in itself illegal. Military tribunals have several times been given power by Act of Parliament to try offenders against the public peace in Ireland, as in 1798, but here also Acts of Indemnity have always followed.

On the Continent the practice is different, and when necessary a 'state of siege' is proclaimed in the disturbed district or occupied territory, and the

inhabitants are thereby brought to a certain extent under military law.

Martigny, or **MARTINACH** (the *Octodurus* of the Romans), three united hamlets in the Swiss canton of Valais, is situated on the Simplon railway, 24 miles SE. of the Lake of Geneva. Two noted routes, one to the vale of Chamouni by the Tête Noire or the Col de Balme, the other over the Great St Bernard to Aosta, branch off here. Pop. 4000.

Martignes, a town in the French department of Bouches-du-Rhône, is situated on several islands, united by bridges, at the entrance to the Étang de Berre, 20 miles NW. of Marseilles. From its position it has been called the Provençal Venice. Pop. 6000, chiefly engaged in catching and curing fish, and in shipbuilding.

Martin. See **SWALLOW**.

Martin, the name of five popes, of whom the fourth and fifth are most noteworthy.—**MARTIN IV.**, a native of Brie in Touraine, was born about 1210, made cardinal in 1261, and elected pope in 1281. He was a mere tool of Charles of Anjou, and degraded himself even by employing the weapons of spiritual censure in his behalf. But all his efforts to buttress the French power in Sicily proved futile, and three years after the atrocity of the Sicilian Vespers he died, 1285.—**MARTIN V.** must be noticed as the pontiff in whose election was finally extinguished the great Western Schism (see **ANTIPOPE**, **CHURCH HISTORY**). He was originally named Otto di Colonna, of the great Roman family of that name. On the deposition of John XXIII., and the two rival popes Gregory XII. and Benedict XIII., in the Council of Constance, Cardinal Colonna was elected (1417). He presided in all the subsequent sessions of the council, and the fathers having separated without discussing the questions of reform, at that period earnestly called for in the church, Martin undertook to call a new council for the purpose. It was summoned to meet at Siena, and ultimately assembled at Basel in 1431, but the pope died suddenly just after its opening.

Martin, **St.** Bishop of Tours, was born at Sabaria in Pannonia about the year 316. He was educated at Pavia, and at the desire of his father, who was a military tribune, entered the army, first under Constantine, and afterwards under Julian the Apostate. The virtues of his life as a soldier are the theme of more than one interesting legend. On obtaining his discharge from military service, Martin became a disciple of Hilary of Poitiers. He returned to his native Pannonia, and converted his mother to Christianity, but he himself endured much persecution from the Arian party, who were at that time dominant; and in consequence of the firmness of his orthodoxy, he is the first confessor, rather than martyr, honoured in the Latin Church with an office and a feast. On his return to Gaul about 360 he founded a convent of monks near Poitiers, where he himself led a life of great austerity and seclusion; but in 371 he was drawn by force from his retreat, and made Bishop of Tours. The fame of his sanctity, and his reputation as a worker of miracles, attracted crowds of visitants from all parts of Gaul; and in order to avoid the distraction of their importunity, he established the monastery of Marmoutier near Tours, in which he himself resided. He died between 397 and 401, and St Ninian, who had visited him at Tours and ever preserved the greatest veneration for him, dedicated to his memory the church he was then building at Whithorn in Galloway. His life by his contemporary, Sulpicius Severus, is a very curious specimen of the Christian literature of the

age; it is practically the only source for his life, but is full of legendary matter and chronological errors. Martin left no writings, the short *Confession of Faith on the Holy Trinity* being more safely regarded as spurious. In the Roman Catholic Church the festival of his birth is celebrated on the 11th November. In Scotland this day still marks the winter-term, which is called *Martinmas*. Formerly people used to begin St Martin's Day with feasting and drinking; hence the French expressions *martiner* and *faire la St Martin*, 'to feast,' and the fact that St Martin is the patron of drinking and of reformed drunkards.

See the books by Reinkens (Gera, 3d ed. 1876), Charnard (Poitiers, 1873), Cazenove's *St Hilary and St Martin* (1883), and Scullard's *Martin of Tours* (1891).

Martin, BON LOUIS HENRI, a great French historian, was born at Saint-Quentin, 20th February 1810, and educated for a notary, but already at twenty had determined for a literary career. His first book was an historical romance, *Wolfthurn* (1830), followed by three others treating of the period of the Fronde. He next joined Paul Lacroix, the 'Bibliophile Jacob,' in his vast project for a history of France in 48 volumes, consisting of extracts from histories and chronicles from the earliest period to 1830. He published the first volume in 1833, and henceforward toiled alone at the vast undertaking, which was completed on a smaller scale in 1836. He now set himself to a still more gigantic task, his great *Histoire de France* (15 vols. 1833-36). A third and much improved edition (19 vols. 1837-54) earned the Gobert prize; the fourth edition (17 vols. 1855-60) was awarded by the Institute in 1869 the great prize of 20,000 francs. This magnificent work comes down only to 1789; its continuation to the author's own time formed the less admirable *Histoire de France Moderne* (2d ed. 5 vols. 1878-85). Martin was chosen deputy for Aisne in 1871, senator in 1876. He was elected a member of the French Academy in 1878. He wrote several minor histories, such as the *Histoire de Soissons* (1837), *Daniel Manin* (1859), *Jeanne d'Arc* (1872); and died at Paris, 14th December 1883. As a historian Martin was of the school of Thierry. As sensitive to the romantic as Michelet, he kept his imagination in check by the weight of his learning, the solidity of his sense, and by due respect to documents; an exception is his reconstruction of a history of Gaul; even so his work here gave a great stimulus to Celtic and anthropological studies. As a whole, his history is excellently arranged and admirably written, and, if prejudiced at points, is beyond doubt the best work dealing in detail with the history of France in its entirety.

See the *Life* by Hanotaux (1885), Mulot's *Souvenirs Intimes* (1885), and Jules Simon's *Mignet, Michelet, Henri Martin* (1889).

Martin, JOHN, painter, was born at Haydon Bridge, near Hexham, Northumberland, 19th July 1789. In 1806 he went up to London, in 1808 married, and, after a struggling youth as an heraldic and enamel painter, in 1812 exhibited 'Sadak in search of the Waters of Oblivion' at the Royal Academy, with which body he soon afterwards quarrelled. It was the first of his sixteen 'sublime' works, whose 'immeasurable spaces, innumerable multitudes, and gorgeous prodigies of architecture and landscape' divided the suffrage of the many between Martin and Turner; Bulwer-Lytton indeed pronounced him 'more original, more self-dependent' than Raphael and Michelangelo. Even yet the memory of the sixteen works is kept lurid by the coloured engravings of the 'Fall of Babylon' (1819), 'Belshazzar's Feast' (1821), 'The Deluge' (1826), &c. Martin also busied himself with projects for the improve-

ment of London. He died at Douglas, Isle of Man, 17th February 1854. See study by Mary Pendered (1923).

Martin, RICHARD, known as 'Humanity Martin' and 'Humanity Dick,' was born in Dublin of an old Irish landed family in February 1754, and educated at Harrow and at Trinity College, Cambridge. In 1776-83 and 1798-1800 he sat in the Irish parliament, and in 1801-26, after the Union, in the parliament of the United Kingdom; in 1781 he had been called to the Irish bar. In 1822 he carried the first legislation in any country for the protection of animals (3 Geo. IV. chap. 71), and in 1824 was one of the founders of the Royal Society for the Prevention of Cruelty to Animals. He laboured also, though unsuccessfully, to abolish the death penalty for forgery, and to secure counsel for prisoners charged with capital crimes. The number of his duels was notorious. He died at Boulogne, 6th January 1834.

Martin, SIR THEODORE, born in Edinburgh in 1816, was educated there at the High School and university, and, in 1846 settling in London, became a prosperous parliamentary solicitor. Among his earliest writings were the well-known 'Bon Gaultier' ballads, written in conjunction with Professor Aytoun. This was followed by translations of Goethe's *Poems and Ballads*, Henrik Hertz's *King René's Daughter*, and Oehlenschläger's *Corregio and Aladdin or the Wonderful Lamp*. Further metrical translations were of Horace's *Odes* (1860), of his whole works (1882), Catullus (1861), the *Vita Nuova* of Dante (1862), *Faust* (i. and ii. 1865-86), Heine (1878), the *Aeneid* (i.-vi. 1896), and Leopardi (1904). In 1863 he issued a volume of original and translated poems, and in 1870 an admirable little book on Horace. He wrote lives of Aytoun (1867), the Prince Consort (5 vols. 1874-80), Lord Lyndhurst (1883), and the Princess Alice (1885). He died 18th August 1909.

LADY MARTIN, well known as an actress by her maiden name, Helen Faucit, was born 11th October 1820, and made her début as Julia in the *Hunchback* at Covent Garden in January 1836. She was at once successful, took a leading part in Macready's Shakespearian revivals, in the first representation of Lytton's plays, and in Browning's *Blot in the 'Scutcheon* and *Strafford*. As an interpreter of Shakespeare's heroines she stood first among the actresses of her time. After her marriage to Theodore Martin in 1851 she left the stage, appearing only at rare intervals for public or charitable purposes, as in Beatrice at the opening of the Shakespeare Memorial Theatre at Stratford. In 1885 she published *On Some of Shakespeare's Female Characters*. She died 31st October 1898. See the *Life* (1900) by her husband.

Martina Franca, a conspicuous hill-town of Southern Italy, half-way between Taranto and Monopoli. It is a thriving place, with quarries and a trade in oil, and there is a large palace of the former dukes. Pop. 30,000.

Martineau, HARRIET (1802-76), born at Norwich, was the daughter of Thomas Martineau, a Norwich manufacturer. In 1830 she wrote *Traditions of Palestine*, and gained three prizes for three *Theological Essays* for the Unitarian Association. In 1831 she resolved to bring out a series of stories as *Illustrations of Political Economy*, convinced that the work was wanted. Notwithstanding repeated refusals and discouragements from publishers she persevered in her plan, and in 1832 the first number appeared. A fortnight after publication the demand for this number reached five thousand, and from that day the way was open to her for life, and she never had

any other anxiety about employment than what to choose, nor any real care about money. Her popularity was extraordinary during the appearance of *Illustrations of Political Economy*. She removed to London in 1832, the better to carry on her work. In 1834 she went to America for two years, and after her return published *Society in America* (1837) and a novel, *Deerbrook*, in 1839. She went abroad the same year, returned ill, and settled at Tynemouth, where she remained, a complete invalid, till 1844. During her illness she wrote *The Hour and the Man*, four volumes of children's tales, and *Life in the Sick-room*. She recovered through mesmerism, left Tynemouth, and fixed her abode in the Lake Country, where in 1845 she built herself a house near Ambleside. The same year she published *Forest and Game-law Tales*. In 1846 she visited Egypt and Palestine, and on her return issued *Eastern Life*. In 1849 she completed Knight's *History of the Thirty Years' Peace*; in 1851, with H. G. Atkinson, she published *Letters on the Laws of Man's Social Nature and Development*, showing that her unitarianism had been superseded by agnosticism; in 1853 she translated and condensed Comte's *Philosophie Positive*. Her *Autobiography*, printed many years before her death, was published with an editorial volume in 1877. See *Life* by Florence F. Miller (1884), Morley's *Critical Miscellanies* (iii. 1909), and Walford's *Twelve English Authoresses* (1892).

Martineau, JAMES, theologian, brother of the preceding, born at Norwich, 21st April 1805, was educated at the grammar-school there, and under Dr Lant Carpenter at Bristol; and having given up the idea of becoming a civil engineer, entered the Unitarian Manchester College (then at York) to qualify (1822-26) for the ministry. He had been thirteen years a distinguished Unitarian minister at Dublin and Liverpool when, in 1841, he was appointed professor of Mental and Moral Philosophy at Manchester New College. He removed to London in 1857 after that institution had been transferred thither, becoming also one of the pastors in Little Portland Street Chapel; and he was principal of the college from 1869 till his retirement in 1885. Martineau was recognised for fifty years as one of the profoundest thinkers and most effective writers of his day. Earnest and lofty in his aims, and catholic in his sympathies, he united strong grasp of thought and power of subtle analysis to a rare mastery of English style. Unlike the older Unitarian school, who professed to accept unquestioningly whatever was in the Bible, he insisted that the last appeal must be to the human mind, heart, and conscience. He was a powerful and persuasive preacher; and it was his *Endeavour after the Christian Life* that secured an attentive hearing for all his later work. In a 'second education' under Trendelenburg at Berlin in 1848, he broke finally with determinism and utilitarianism. Like Channing, he revolted from the school of Priestley, and became a spiritual teacher in the apostolical succession of Butler and Kant; over against Newman he was one of the most typical representatives of religious thought in his generation; and in philosophy, representing the 'intuitionist' school and strenuously vindicating a lofty sphere for conscience and the ethical will, he was a power to be named alongside of T. H. Green. From 1869 till 1880 he was one of the most prominent members of the famous Metaphysical Society, which included men so diverse as Stanley, Fronde, Huxley, Lubbock, Clifford, Gladstone, and Manning. He died 11th January 1900 revered by Christians of all denominations as a great apostle of Christian Theism.

His *Life and Letters* were published by Drummond and Upton (2 vols. 1902); a 'biography and study' by

A. W. Jackson (1900); *Recollections* by A. H. Craufurd (1903); and a compact 'study of his life thought' by J. E. Carpenter (1905).

Martínez Ruiz, JOSÉ, Spanish prose writer, better known by his pseudonym of AZORÍN, was born at Monovar in 1876. He established his reputation with three novels, *La Voluntad* (1902), *Antonio Azorín* (1903), *Las Confesiones de un pequeño filósofo* (1904), the last considered best, but later abandoned this form for work in literary criticism, as *Lecturas españolas* (1912), *Al margen de los Clásicos* (1915), *Los dos Luises y otros ensayos* (1921), and for imaginative essays of the past, as *Castilla* (1921). He is the chief representative of a reaction against the naturalism of Pardo Bazán and Ibáñez, and in Flaubert and the Spanish classics is to be found the main source of his inspiration. A charming delicacy is the most striking quality of his style, and in his use of Arabic terms and his revival of old words he has enlarged the Spanish vocabulary and given a new harmony to modern Spanish; in his device of short sentences, in his avoidance of diminutives, and in other peculiarities of style, some might claim to find, however, a departure from the genius of the language.

Martinique, one of the French West India Islands, 43 miles long, with an area of 380 sq. m., and 244,000 inhabitants, mostly of mixed race, was colonised by France in 1635. St Pierre (q.v.) was the principal commercial place, but now it is Fort-de-France (26,000), the capital. Sugar is the staple crop. The exports are mainly sugar, molasses, rum, and cocoa. Slavery was abolished in 1848; labour is largely performed by coolies. The island is volcanic, like St Vincent (q.v.) and other adjacent islands. There was a bad eruption in 1812, and in May 1902 Mont Pelée, a volcano quiescent for fifty years, burst into violent eruption; a whirlwind of incandescent gases charged with red-hot particles rushed down on the city, set the houses on fire, and burnt even the ships in the harbour, destroying St Pierre with all its inhabitants almost instantly, devastating over half the island, and strewing volcanic ashes over tens of thousands of square miles. Minor disturbances took place in the succeeding months, and a second destructive explosion followed in August.

Martímas, a Scottish term-day (11th Nov.). See MARTIN (ST.), TERM.

Martinsburg, capital of Berkeley county, West Virginia, in the Shenandoah Valley, 114 miles by rail W. of Baltimore. It is in the heart of a limestone and fruit-growing country, and there are lime and canning works; also hosiery, woollen, and clothing factories. Pop. 13,000.

Martin's Ferry, a city of Ohio, on the Ohio River, 50 miles SW. of Pittsburgh. The surrounding region is rich in coal, and there are glass, iron, tin, and engineering works. Pop. 12,000.

Martos, a town of Andalusia, Spain, 16 miles SW. of Jaén, on a steep hill crowned by an old castle. It has mineral baths, and trades in olive oil. Pop. 20,000.

Martyn, HENRY, missionary, was born at Truro, 18th February 1781, and educated at Truro grammar-school and St John's College, Cambridge. He was senior wrangler and first Smith's prizeman in 1801, and next year became fellow of his college. Charles Simeon's influence turned him from law to missions, and in 1805 he sailed for India as a chaplain under the Company. He was stationed successively near Serampore, at Dinapore, and at Cawnpore, and from the beginning, in spite of ill-health, gave himself eagerly to the study of the native languages. He translated the New Testament into Hindustani, Hindi, and Persian, the

Prayer-book into Hindustani, and the Psalms into Persian; he next travelled to Bushire, Shiraz, Tabriz, Erivan, Kars, Erzerum, and Tokat, where he sank exhausted by fever, 6th October 1812. See his *Journals and Letters* (ed. Wilberforce, 1837), and *Lives* by Sargent (1819, and many editions) and G. Smith (1892).

Martyr (Gr. *mártus*, *mártur*, 'a witness'), the name given in ecclesiastical history to those who, by their fearless profession of Christian truth, and especially by their fortitude in submitting to death itself rather than abandon their faith, bore the 'witness' of their blood to its superhuman origin. Of the same use of the word there are some examples also in the New Testament, as in Acts, xxii. 20; Rev. ii. 13; xvii. 6. But this meaning, as its technical and established signification, is derived mainly from ecclesiastical writers. During the persecutions of the Christians in the first three centuries (see CHURCH HISTORY), contemporary writers, as well pagan as Christian, record that many Christians, preferring death to apostasy, became martyrs or witnesses in blood to the faith, often in circumstances of the utmost heroism. The courage and constancy of the sufferers won the highest admiration from the brethren. It was held a special privilege to receive the martyr's benediction, to kiss his chains, to visit him in prison, or to converse with him; and a practice arose by which the martyrs gave to sinners who were undergoing a course of public penance letters of commendation to their bishop (see INDULGENCE). The day of martyrdom, moreover, as being held to be the day of the martyr's entering into eternal life, was called the *natal* or *birth* day, and as such was celebrated with peculiar honour, and with special religious services. Their bodies, clothes, books, and the other objects which they had possessed were honoured as Relics (q.v.), and their tombs were visited for the purpose of asking their intercession (see CANONISATION). Cyprian says of catechumens who died before baptism, that they had been baptised 'with the most glorious baptism of blood'; and the blood-baptism was held to remit sin and the temporal penalty of sin also. The number of martyrs who suffered death during the first ages of Christianity has been a subject of great controversy. The ecclesiastical writers, with the natural pride of partisanship, have, it can hardly be doubted, leaned to the side of exaggeration. Some of their statements are palpably excessive; and Gibbon, in his well-known 16th chapter, throws great doubt even on the most moderate of the computations of the church historians. But it is clearly though briefly shown by Guizot, in his notes on this celebrated chapter, that Gibbon's criticisms are founded on unfair and partial data, and that even the very authorities on which he relies demonstrate the fallaciousness of his conclusions. The first recorded martyr of Christianity, called the 'protomartyr,' was Stephen, whose death is recorded in Acts, vi. and vii. The protomartyr of Britain was Alban of Verulam, who suffered under Diocletian in 286 or 303.

MARTYROLOGY, a list of the commemoration days of Christian martyrs, generally with some account of their life and death, arranged in the order of months and days, and intended partly to be read in the public services of the church, partly for the guidance of the faithful in their devotions. The use of the martyrology is common to both the Latin and the Greek Church; in the latter it is called *menology*, or 'month-calendar.' Nearly all the later Western martyrologies are based upon one or other of three works, the Hieronymian, the Lesser Roman, and Bede's Martyrology. The first, which was stated to be compiled by St

Jerome from records of martyrdoms collected by Eusebius, is itself a compilation from numerous earlier calendars, and contains notices of many facts long subsequent to Jerome's time. A copy of the Lesser Roman Martyrology was discovered at Ravenna by Ado, Archbishop of Vienne, in 850, and seems to have been rather a private historical calendar than one intended for public use. The independent compilation by Bede has come down to us only in later editions, chiefly of the 9th century, as that of Florus of Lyons, Hrabanus Maurus, Ado of Vienne, and Usuard of Paris, as well as that of Notker of St Gall (912). The best-known *menology*, that compiled by order of the Emperor Basil, the Macedonian, in the 9th century, was edited in 1727 by Cardinal Urbini. In 1866 Professor W. Wright published a Syriac martyrology discovered by him, and written in or before 412. The official 'Roman Martyrology,' designed for the entire church, was published by authority of Gregory XIII., with a critical commentary, by Baronius in 1586; an enlarged edition of the same was issued by Rosweyd in 1613. See Achelis, *Die Martyrologien: ihre Geschichte und ihr Wert* (1900).

Martyr, PETER. See PETER.

Marut is, in Hindu Mythology, the god of wind. See INDIA (*The Vedas*).

Marvell, ANDREW, was born on the 31st March 1621 at Winestead, Holderness, of which his father, Andrew Marvell, was rector. The family removed to the outskirts of Hull in 1624 when the elder Marvell became lecturer at Holy Trinity and master of the Charterhouse. From the grammar-school Marvell went, probably in 1633, to Trinity College, Cambridge. To the *Musa Cantabrigiensis* in 1637 he contributed two poems addressed to Charles I., one in Greek and one in Latin. A scholar of his college in April 1638, and B.A. about a year later, he was, it is said, induced by Jesuits to leave the university, found by his father in a London bookseller's shop, and brought back. In 1640-41 his father, from whom he seems to have inherited his genius and nobility of character, was drowned in the Humber; and about this time Marvell left the university—for a clerkship in a Hull office, says tradition. In 1642-46 Marvell travelled in Holland, France, Italy, and Spain. In Rome he did not meet Milton, as is sometimes said, but he did meet the poetaster Richard Flecknoe, whose name was to be used as a stalking-horse by Dryden in his *MacFlecknoe*, and he bantered him in a satire somewhat after Donne's manner, but more good-humoured and humorous. The same qualities, with perhaps more brilliant wit, appear in the satirical 'Character of Holland,' which seems to date from 1652-3. In 1650 Marvell became tutor to Mary Fairfax, daughter of the Parliamentary general. To the time spent at Nun Appleton, Fairfax's Yorkshire seat, are assigned not only the poems 'Appleton House' and 'Upon the Hill and Grove at Billborow,' but the pastorals and 'Mower Songs'; and, above all, those garden poems on which his fame as a nature poet chiefly rests. Milton fixed upon Marvell as a man fit to assist him in his office of Latin secretary to Cromwell, and recommended him to Bradshaw in a letter of February 1652-3. The recommendation was not acted upon till 1657. In the meantime Marvell became tutor to Cromwell's ward, William Dutton, at Eton, where he had the society of John Hales and of a former Bermuda minister, who may have suggested the writing of 'Where the remote Bermudas ride'; and he corresponded with Milton and Cromwell. Among his poems of this period are the magnificent 'Horatian Ode upon Cromwell's Return from Ireland' and others glowing with admiration for Cromwell's character

and work. Unlike some who joined with him in deploring the Protector's death, and recanted when the Stewarts returned, Marvell praised him in his latest writings. He continued in office under Richard Cromwell. In January 1658-9 he was elected, perhaps by corrupt practices, member of parliament for Hull, which he represented uninterruptedly till his death. He received 6s. 8d. a day during session from his constituents. Except when unknown business, probably private, withdrew him to Holland, and when, in 1663-65, with permission of the House and consent of his constituents, he was secretary to the Earl of Carlisle on his embassy to Muscovy, Sweden, and Denmark, he gave assiduous attention to the work of parliament. About a year and a half before his death he apologised for the abruptness of his speech, as he was unaccustomed to speak there; but in hundreds of letters he kept his constituents informed of the course of events; and his moral weight seems to have been felt. There is good reason to believe that he exerted himself in parliament to secure Milton's safety after the Restoration. On the whole, however, a man of Marvell's character and views could do little in the Cavalier Parliament. He was better able to fight for liberty of conscience and against misgovernment by writing than by speaking; and he was more outspoken in anonymous verse-satires, which were handed about in manuscript, than in his printed prose, or in letters which, as he says himself, were apt to be tampered with. His prose works include *The Rehearsal Transposed* (1672-3), a triumphantly witty reply to Samuel Parker's writings on 'the mischiefs and inconveniences of Toleration'; *Mr Smirke, or the Divine in Mode* (1676), a work of like nature; and *An Account of the Growth of Popery and Arbitrary Government* (1677). For the discovery of the author of the last-named, which was anonymous, a reward was offered. Marvell's life was believed to be in danger, and there were suspicions of poisoning when, 'ex ignorantia medicis senis atque superciliosi,' he died on the 18th August 1678. His political position has been variously judged. Some, looking especially to his indignation against the historian of the Long Parliament in 'The Death of Tom May,' and the famous passage in praise of Charles I. in the 'Horatian Ode,' hold that at first, if not throughout his life, he was a Royalist. There are difficulties to be explained away on any theory; but bearing in mind that Marvell elsewhere shows himself capable of magnanimous appreciation of an enemy's good qualities, and scorn of self-seeking in partisans of his own side, one receives from a chronological reading of his works the impression that he was not a political theorist. At the Restoration he was willing to accept monarchy rather than suspend the function of government in the hope of improving the machine. He did what he could to secure a fair chance for Charles II. Gradually he became more and more republican, each turn of the screw being given by experience rather than by logic. At last he became convinced that the Stewarts must go, and his last satires are a call to arms against monarchy. 'Nevertheless,' he says in *The Growth of Popery*, 'because mankind must be governed some way and be held up to one law or other, either of Christ's or their own making, the vigour of such humane constitutions is to be preserved untill the same authority shall revoke them.' All his verse after the Restoration is satirical, partly in popular ballad forms of great vigour, partly in heroic couplets. His prose works are models of incisive irony. Their humour, magnanimity, and honesty were fatal to the quibbling polemics to which they were replies. But Marvell is best remembered as a poet

of nature, and perhaps the greatest master in English of the eight-syllable couplet. He came into a world of poetry dominated by Donne, to whom in imaginative insight he is allied. His poetry is by no means free from conceits, for notwithstanding his delicacy and grace his taste was fallible; but his conceits offend less than those of the other poets of the metaphysical school, and his intense sincerity often burns them out altogether. He was Milton's understudy in more than his official duties.

Little of Marvell's verse was printed in his lifetime. His widow, of whom nothing is known, published his *Miscellaneous Poems* in 1681; and his satires, with many spurious, were included in the *Poems on Affairs of State* (1689). His works were edited by Dr Grosart (4 vols. 1872-75), his poems and satires by G. A. Aitken (1892), with a valuable bibliography, &c., and by an anonymous editor (1923). Professor Margoliouth has undertaken a complete edition of Marvell, including his letters. See also Birrell, *Andrew Marvell* (1905); Poscher, *Andrew Marvells Poetische Werke* (1908); *Andrew Marvell: Tercentenary Tributes*, ed. W. H. Baggeley (1922); H. M. Margoliouth (1922) and Pierre Legouis (1923) in *Mod. Lang. Rev.*

Márwár. See JODHPUR.

Marx, KARL, the founder of international socialism, was born at Trèves, 5th May 1818. His father was a lawyer in that town, and the young Marx was sent to the universities of Bonn and Berlin to study with a view to the same profession; but he seems really to have devoted his time to history and philosophy. He was apparently a disciple of Hegel, and he had for a time the intention to settle at Bonn as a lecturer on philosophy. Marx, however, soon gave up the idea of following an academic career, and in 1842 undertook the editorship of the democratic organ, the *Rhenish Gazette*. His experience on the journal convinced him that his economic knowledge required enlarging; and after his marriage he proceeded in 1843 to Paris, the headquarters of revolutionary economics. In the *Deutsch-Französische Jahrbücher* he began that course of literary activity which, varied by agitation, constituted the work of his life. Expelled from France in 1845, he settled in Brussels, where amongst other productions he wrote his attack on Proudhon's *Philosophie de la Misère*, entitled *Misère de la Philosophie*.

But his chief work at Brussels was the reorganising, along with Fr. Engels, of the Communist League, for which he wrote the famous *Manifesto* (see SOCIALISM). In 1848 Marx took an active part in the revolutionary movement on the Rhine, and after its failure finally settled in London in 1849. Here at the British Museum he acquired his marvellous knowledge of economic literature and of the economic development of modern Europe. The early fruits of his labour appeared in a work, *Zur Kritik der politischen Oekonomie* (1859), the theories of which were, however, carried forward into the first volume of his *Kapital* (1867). Before that year Marx had, in 1864, resumed his work as agitator. He had the foremost part in founding and directing the International, and after the death of Lassalle he won practical control of the social-democratic movement in Germany. He died in London, 14th March 1883.

Marx's works leave us in no doubt that he was a man of extraordinary knowledge, which he handled with masterly skill. To one who has taken the pains to understand his terminology his style is lucid and powerful, though also sometimes tedious owing to the minuteness of his exposition; and the march of thought is varied by humour, unsparing invective, and flashes of light from the most unexpected quarters. Since the beginning of literature few books have been written like the

first volume of Marx's *Kapital*. It is premature to offer any definitive judgment on his work as revolutionary thinker and agitator, because that is still very far from completion. There need, however, be no hesitation in saying that he, incomparably more than any other man, has influenced the labour movement all over the civilised world; his theories have in a thousand ways already penetrated the different strata of society, even the highest, but most of all the working-classes. It may also be safely said that his views can have any hope of realisation only after very extensive modification. In many respects his analysis of the economic development of modern society has been justified by subsequent events, but in many also it has been falsified; and it could be shown that he has left out of account some of the decisive factors in social development.

As he tells us in the preface to the *Kapital*, the final aim of his great work is to reveal the economic law that moves modern society. The social development of modern times depends on capital; the cardinal fact in modern history is the rise, culmination, and final catastrophe of capitalism. But the full development of capital and of the class representing it involves the rise of socialism and of the proletariat. The great work of Marx, therefore, gives us an historical analysis of capital and by implication a forecast of socialism.

The development of capitalism depends on the appropriation and accumulation of surplus value; we cannot understand the nature of capitalism without understanding surplus value. With the analysis of value, therefore, the great work of Marx begins. The wealth of modern society, in which the capitalistic method of production prevails, appears as an enormous collection of commodities, which are exchanged one against another in the utmost variety of ways. But they have one common characteristic: they are products of human labour. The value of all the commodities that circulate in the world-market is constituted by human labour, and measured in human labour-time; not this or that individual labour, but the average labour of the community, under the normal social conditions of production, with the average degree of skill and intensity of labour.

But labour cannot be carried on without the means of labour, which are land and capital. Taking England as the classic example of the fully-developed capitalism, Marx shows that since medieval times the course of historic evolution has tended to render the instruments of labour the monopoly of a special class. It is clear that the rise of such a class has had as complement the rise of another class who are destitute of the means of production, but who being free may sell their labour at the wage it can obtain in the market. They accordingly sell their labour for a wage, which represents the average subsistence necessary for themselves and the children required to continue the supply of labour. Their labour, however, when utilised by the capitalist produces a value greater than their wage. This is the *surplus value* of Karl Marx. The growth of capitalism depends on the appropriation and accumulation of this surplus value; and the history of modern society is a history of the antagonism of the two classes concerned—of the capitalist class, who absorb surplus value, and of the proletariat, who produce it.

The progress of the conflict leads to many remarkable results. On the one hand the great capitalist goes on destroying the smaller, until the wealth of the world is concentrated in the hands of a few colossal capitalists. On the other hand the development of the capitalistic system causes degradation, demoralisation, misery, and pauper-

ism among the labouring classes, but it at the same time organises them in industrial armies; above all it raises them to a clear consciousness of their class position. In this way the process goes on in obedience to its own inherent laws, wealth accumulating at one pole of society and wretchedness at the other. Capitalism is at last ruined by an excess of the sustenance on which it grew—viz. surplus value. When things have become intolerable, the organised proletariat take the initiative, and seizing possession of the means of production carry on the economic process for the good of all. Government—which has always hitherto been an arrangement for keeping the producing classes in subjection—will simply become a control of productive processes.

As understood by Marx, socialism does not propound utopian schemes, nor even does it seek particularly to offer programmes of social reform. The great aim of his teaching is to understand a process of historical transformation which proceeds before our eyes; scientific socialism is simply a conscious participation in this process. Agitation and revolutionary action can be effective only in so far as they comprehend and co-operate with the inevitable tendencies of social evolution. The change contemplated by socialism is an economic revolution brought about in accordance with the natural laws of historic evolution. We must also remember that Marx regards the economic factor as cardinal and decisive in history. Law and politics, religion and philosophy, are all moulded and controlled by the prevailing economic conditions. With this view of Marx is naturally associated his materialistic conception of history. 'According to Hegel, the thought-process, which he transforms into an independent subject under the name idea, is the creator of the real, which forms only its external manifestation. With me, on the contrary, the ideal is nothing else than the material transformed and translated in the human brain.' In short, the system of Marx is an evolutionary and revolutionary socialism, based on a materialistic conception of the world and of human history. He seeks to change the economic basis of society, and thereby to change the whole structure, but only by a conscious participation in, and willing co-operation with, historic tendencies, which in themselves are inevitable.

In his later and mature productions so far as published Marx has not given any definite forecast of the form likely to be assumed by the new society. As already indicated, his great aim is not to provide a recipe for social betterment but to elucidate an historical process which is inevitable, to make it clear to the consciousness of the class most profoundly interested—the proletariat—and as far as possible to shorten and alleviate the pangs of travail of the new era, which in any case will come to the birth when its time is fulfilled. Thus regarded, the life and work of Marx have a notable unity and reach and fixity of purpose. All that he did and wrote as scientific economist on the one hand and as agitator on the other, though at first sight inconsistent, is really formed and animated by the one idea.

Marx's leading works are mentioned above; a 3d edition of his *Kapital*, vol. i., appeared in 1883; vols. ii.-iii. were published under the editorship of Fr. Engels in 1885-95. Most economic works have something to say about Marx; see also studies by Gross (1885), Adler (1887), Spargo (1911), Beer (1921), an essay by Laski (1922), and Aveling's *Student's Marx* (1892), besides COMMUNISM, SOCIALISM, and works there named.

Marxstadt, formerly KATHERINENSTADT, a town of Russia, capital (1924) of the German Volga Republic. It was capital of the earlier German Volga Labour Commune (1918) from its institu-

tion till 1923, when it was superseded by Pokrovsk. Pop. 15,000.

Mary (Heb. *Miriam*, Gr. *Maria* or *Mariam*), 'the Mother of Jesus' (Matt. ii. 11; Acts, i. 14), called the Blessed Virgin, is held in high honour by Christians; and her intercession is invoked with a higher religious worship and a firmer confidence than that of all the other saints, not only in the Roman Church, but in all the Christian churches of the East. Of her personal history but few particulars are recorded in Scripture. Some details are filled up from the works of the early Fathers, especially their commentaries or deductions from the scriptural narrative, some from the apocryphal writings of the first centuries, and some from medieval or modern legends. The genealogy of our Lord in St Matthew is traced through Joseph (q.v.); and, as it is plainly assumed that Mary was of the same family with her husband Joseph, the evidence of the descent of the latter from David is equivalently an evidence of the origin of Mary from the same royal house. But the genealogy of Christ as traced in St Luke is commonly held to be the proper genealogy of his mother in the flesh, Mary. The incidents in her personal history recorded in Scripture are few in number, and almost entirely refer to her relations with our Lord. They will be found in Matt. i. ii., xii.; Luke i., ii.; John ii., xix.; and Acts, i., where the last notice of her is of her 'persevering in prayer' with the disciples and the holy women at Jerusalem after our Lord's ascension (Acts, i. 14). The apocryphal gospels entitled 'The Gospel of the Nativity of Mary,' and the 'Protevangelion of the Birth of Christ,' contain some additional, but, of course, unauthentic particulars as to the lineage, birth, and early years of Mary, among which is the miraculous story of her betrothal with Joseph, immortalised by the pencil of Raphael. As to her history after the ascension of her Son the traditions differ widely. A letter ascribed to the Council of Ephesus speaks of her as having lived with John at that city, where she died, and was buried. Another epistle, nearly contemporaneous, tells that she died and was buried at Jerusalem at the foot of the Mount of Olives. Connected with this tradition is the incident which has so often formed a subject of sacred art, of the apostles coming to her tomb on the third day after her interment, and finding the tomb empty, but exhaling an 'exceeding sweet fragrance.' On this tradition is founded the belief of her having been assumed into heaven, which is celebrated in the festival of the Assumption (q.v.). The date of her death is commonly fixed at the year of our Lord 63, or, according to another account, the year 48. Another tradition makes her survive the crucifixion only 11 years.

Of theological questions regarding the B.V.M. (*Beata Virgo Maria*), one is treated at IMMACULATE CONCEPTION. The perpetual virginity of Mary is not explicitly attested in Scripture, and there are even certain ambiguous phrases which at first sight seem to imply that children were born of her after the birth of Jesus, as that of his being called (Matt. i. 25; Luke, ii. 7) her 'first-born son,' and that of James and others being more than once called 'brothers of the Lord;' for which see JOSEPH. The perpetual virginity of Mary is held as a firm article of belief in the Roman and Eastern churches.

MARIOLATRY (Gr. *Maria*, and *latreia*, 'adoration') is the name given by polemical writers to the worship paid by Roman Catholics to the Virgin Mary. This name is intended to imply that the Catholic worship of the Virgin is the supreme worship of *latreia* or adoration, which Catholics earnestly disclaim, although, from her relation to our Lord, they hold her worship, which they style

hyperdulia, to be higher than that of all other saints. Many examples of prayers addressed to Mary (such as the 'Litany of the Sacred Heart of Mary'), of acts of worship done in her honour, and of expressions employed regarding her, are alleged by controversialists, for the purpose of showing that the worship of Mary in the Roman Church is in effect 'adoration.' To these and similar allegations Roman Catholics reply that many of the objected prayers and devotional practices are entirely unauthorised by the church, and that some of them are undoubtedly liable to misinterpretation; but they further insist that all such prayers, however worded, are to be understood, and are, in fact, understood by all Roman Catholics, even ordinarily acquainted with the principles of their faith, solely as petitions for the intercession of Mary, and as expressions of reliance, not on her own power, but on the efficacy of her prayers to her Son.

Although no trace is found in the New Testament of any actual worship of the Virgin Mary, yet Roman Catholic interpreters regard the language of the angel Gabriel, who saluted her as 'full of grace,' or 'highly favoured,' and as 'blessed among women,' and her own prediction in the canticle of the Magnificat, that 'all nations should call her blessed' (Luke, i. 48), as a foreshadowing of the practice of their church; and they rely equally on the language employed by the early Fathers, as, for instance, Irenæus, regarding the Virgin, although Protestants consider it as having reference to the Incarnation. But it seems quite certain that during the first ages the invocation of the Virgin and the other saints must have held a subordinate place in Christian worship; the reason for which, according to Roman Catholics, was probably the fear which was entertained of reintroducing among the recent converts from paganism the polytheistic notions of their former creed. But from the time of the triumph of Christianity in the 4th century, the traces of it become more apparent. St Gregory Nazianzen, in his panegyric of the virgin martyr Justina, tells that in her hour of peril she 'implored Mary the Virgin to come to the aid of a virgin in her danger.' But it was only after the heresy of Nestorius that the worship of Mary seems to have obtained its full development. His denial to her of the character of mother of God, and the solemn affirmation of that character by the ecumenical council of Ephesus (430 A.D.), had the effect at once of quickening the devotion of the people and of drawing forth a more marked manifestation on the part of the church of the belief which had been called into question. The 5th and 6th centuries, both in the East and in the West, exhibit clear evidence of the practice; and the writers of each succeeding age till the Reformation speak with gradually increasing enthusiasm of the privileges of the Virgin Mary, and of the efficacy of her functions as a mediator with her Son. St Bernard, and, still more, St Bonaventura, carried this devotional enthusiasm to its greatest height. The institution of the 'Rosary of the Virgin Mary,' the appointment of a special office in her honour, and, more than all, the fame of many of the sanctuaries which were held to be especially sacred to her worship gave a prominence to the devotion which Protestants find it difficult to reconcile with the honour which they hold due to God alone. The chief festivals of the Virgin, common to the Western and Eastern churches, are the Conception, the Nativity, the Purification, the Annunciation, the Visitation, and the Assumption. The Roman Church has several other special festivals, with appropriate offices—all, however, of minor solemnity. For accounts of representations of Mary in Art, see MADONNA, PIETÀ.

Mary I., queen of England, daughter of Henry VIII. by his first wife, Catharine of Aragon, was born at Greenwich on 18th February 1516. She was in her youth a great favourite with her father, and at the age of seven was betrothed to the Emperor Charles V. In her tenth year she was sent with certain commissioners and a species of viceregal court to the marches of Wales to carry out measures for the better government of that country. She was well educated, a good linguist, and fond of music. She was virtuous and pious, devoted to her mother, and devoted to her church. With the divorce of her mother her troubles began. Henry treated her with great harshness, and even forced her to sign a declaration that he was supreme head of the church, and that her mother's marriage had been 'by God's laws and man's law incestuous and unlawful.' During the reign of her half-brother Edward she lived in retirement, and no threats could induce her to conform to the new religion. On the death of Edward (6th July 1553), she became entitled to the crown by her father's testament and the parliamentary settlement. The Duke of Northumberland had, however, induced Edward and his council to set Henry's will aside in favour of Lady Jane Grey, to whom the duke had married his son Guildford Dudley. Lady Jane was proclaimed on 10th July, but the whole country suspected Northumberland and favoured Mary, who, supported by her friends, was able without bloodshed to enter London on 3d August in triumph. The queen now showed remarkable leniency towards her opponents. Northumberland and two others were executed as traitors, but Lady Jane and her husband were, for the present, spared. She had promised the mayor of London that she would not strain consciences, and she proceeded very gradually and cautiously to bring back the old religion. She reinstated the Catholic bishops and imprisoned some of the leading Reformers, but dared not restore the pope's supremacy, and she herself retained, under the advice of Gardiner, the title of supreme head of the church. Cardinal Pole was immediately on her accession designated papal legate, but prudence and the counsel of the emperor prevented his entering England. The question of the hour upon which all turned was the queen's marriage. Some thought of Courtenay, Earl of Devon; others of Cardinal Pole, then only in deacon's orders; but the queen, in the face of the fears and protests of the nation, obstinately and morbidly set her heart on Philip of Spain. The unpopularity of the proposal brought about the rebellion of Wyatt and an attack upon London. The rebellion was quelled mainly through the courage and coolness of the queen, but the consequences of her easy triumph were fatal to her. The hapless Lady Jane, who had seemingly been detained as a hostage for the good-behaviour of her friends, was with her husband and father brought to the block. The Princess Elizabeth was suspected, but without proof, of complicity in the treason, and was committed to the Tower. Injunctions were sent to the bishops to restore ecclesiastical laws to their state under Henry VIII. In July 1554, twelve months after Mary's accession, Philip landed and was married to her at Winchester. In the November following Pole entered England, and parliament, having made it sure that restitution would not be exacted from the owners of the confiscated church property, consented to petition for reconciliation to the holy see, and the realm was solemnly absolved from the papal censures. Soon after, the savage persecution which gave to the queen the name of 'Bloody Mary' began. In 1555 Ridley, Latimer, and other martyrs were brought to the stake. Cranmer was burned in March 1556, and Pole was consecrated Archbishop of Canterbury in his place. In August

1555 Philip had left England, to return only once more for a few weeks, and Gardiner died in November of the same year. Pole was now left supreme in the councils of the queen, and still the persecution raged; during the last three years of her reign some 300 victims perished in the flames. How far Mary herself was responsible for the cruelties practised is doubtful. During this period she was rendered almost helpless with ill-health. She was constantly deluded with the belief that she was about to become a mother. Broken down with sickness, with grief at her husband's heartlessness, and with disappointment at her childlessness, she became a prey to the deepest melancholy. Finally the evils which the nation predicted from the Spanish alliance came about. The queen was induced by Philip to enter upon war with France. The consequence was the loss of Calais to England. Mary died 17th November 1558.

See the histories of Lingard and Froude; P. F. Tytler, *England under the reigns of Edward VI. and Mary*; *Privy Purse Expenses of the Princess Mary*, with a memoir by Sir F. Madden; A. Strickland, *Lives of the Queens of England*; and other books cited at HENRY VIII., ELIZABETH, GREY (LADY JANE).

Mary II. (1662-94), wife of William III. (q.v.). **Mary, Queen of Scots**, was the daughter of James V. of Scotland by his second wife, Mary of Lorraine, daughter of Claude, Duke of Guise (q.v.), and widow of Louis of Orleans, Duke of Longueville. She was born at Linlithgow on the 7th or 8th of December 1542. Her misfortunes may be said to have begun with her birth. The tidings reached her father on his death-bed at Falkland, but brought him no consolation. 'The deil go with it!' he muttered, as his thoughts wandered back to the marriage with Bruce's daughter, which brought the crown of Scotland to the Stewarts—'it cam with ane lass, and it will pass with ane lass!' Mary became a queen before she was a week old. Within a year the Regent Arran had promised her in marriage to Prince Edward of England, and the Scottish parliament had declared the promise null. War with England followed, and at Pinkie Cleuch the Scots met a defeat only less disastrous than Flodden. But their aversion to an English match was unconquerable; they hastened to place the young queen beyond the reach of English arms, on the island of Inchmahome, in the Lake of Menteith, and to offer her in marriage to the eldest son of Henry II. of France and Catharine de' Medici. The offer was accepted; and in July 1548 a French fleet carried Mary from Dumbarton, on the Clyde, to Roscoff, in Brittany, whence she was at once conveyed to St Germain-en-Laye, and there affianced to the Dauphin.

Her next ten years were passed at the French court, where she was carefully educated along with the king's family, receiving instruction in the art of making verses from the famous Ronsard. On the 24th of April 1558 she was married to the Dauphin, who was six weeks younger than herself. It was agreed, on the part of Scotland, that her husband should have the title of King of Scots; but Mary was further betrayed into the signature of a secret deed, by which, if she died childless, both her Scottish realm and her right of succession to the English crown (she was the great-granddaughter of Henry VII.) were conveyed to France. On the 10th of July 1559 the death of the French king called her husband to the throne by the title of Francis II. The government passed into the hands of the queen's kinsfolks, the Duke of Guise and the Cardinal of Lorraine; but their rule was short-lived. The feeble and sickly king died on the 5th of December 1560, when the reins of power were grasped by the queen-mother, Catharine de' Medici, as regent for her next son,

Charles IX. Mary must have been prepared, under almost any circumstances, to quit a court which was now swayed by one whom, during her brief reign, she had taunted with being 'a merchant's daughter.' But there were other reasons for her departure from France. Her presence was urgently needed in Scotland, which the death of her mother, a few months before, had left without a government, at a moment when it was convulsed by the throes of the Reformation. Her kinsmen of Guise had ambitious projects for her marriage; great schemes were based on her nearness of succession to the English crown; and both these, it was thought, might be more successfully followed out when she was seated on her native throne.

She sailed from Calais on the 15th, and arrived at Leith on the 19th August 1561, having escaped the English ships of war which Elizabeth despatched to intercept her. Her government began auspiciously. The Reformation claimed to have received the sanction of the Scottish parliament, and if Mary did not formally acknowledge the claim, she was at least content to leave affairs as she found them, stipulating only for liberty to use her own religion—a liberty which Knox and a few of the more extreme Reformers denounced as a sin against the law of God. She is said to have rejected the violent counsels of the Roman Catholics; it is certain that she surrounded herself with Protestant advisers, her chief minister being her illegitimate brother, James Stuart, whom she soon afterwards created Earl of Moray. Under his guidance, in the autumn of 1562, she made a progress to the north, which, whatever was Moray's design, ended in the defeat and death of the Earl of Huntly, the powerful chief of the Roman Catholic party in Scotland. For the Chastelard episode, see CHASTELARD.

Meanwhile the courts of Europe were busy with schemes for Mary's marriage. The king of Sweden, the king of Denmark, the king of France, the Archduke Charles of Austria, Don Carlos of Spain, the Duke of Ferrara, the Duke of Nemours, the Duke of Anjou, the Scottish Earl of Arran, and the English Earl of Leicester were proposed as candidates for her hand. Her own preference was for Don Carlos, the heir of what was then the greatest monarchy in Christendom; and it was not until all hopes of obtaining him were quenched that she thought seriously of any other. Her choice fell, somewhat suddenly, on her cousin, Henry Stewart, Lord Darnley, son of the Earl of Lennox, by his marriage with a granddaughter of King Henry VII. of England. He was thus among the nearest heirs to the English crown, and his claims to the succession were believed to have the support of the great body of English Roman Catholics. But except this and his good looks he had no other recommendation. He was weak, needy, insolent, and vicious; his religion, such as it was, was Roman Catholic; his house had few friends and many enemies in Scotland; and he was three years younger than Mary. Her best friends, both Roman Catholic and Protestant, warned her against him, but in vain. The marriage was celebrated at Holyrood on the 29th July 1565. It was the signal for an insurrection by Moray and the Hamiltons, who hoped to be joined by the whole Protestant party. But their hope was disappointed; and the queen, taking the field in person, at once quelled the revolt, and chased the rebels beyond the Tweed.

Her triumph was scarcely over when misunderstandings began to arise between her and her husband. Darnley's worthlessness and folly became only too apparent; she was disgusted by his debauchery, and alarmed by his arrogance and

ambition. She had given him the title of king, but he now demanded that the crown should be secured to him for life, and that, if the queen died without issue, it should descend to his heirs. Mary hesitated to comply with a demand which would have set aside the settled order of succession; and what she refused to grant by favour the king prepared to extort by force.

Mary's chief minister prior to Moray's rebellion had been David Rizzio, a mean-looking Italian, of great astuteness and many accomplishments, but generally hated beyond the palace walls as a base-born foreigner, a court favourite, and a Roman Catholic. The king and Rizzio had been sworn friends, sharing the same table, and even sleeping in the same bed; but the king was now persuaded that it was Rizzio who was the real obstacle to his designs upon the crown. In this belief, he entered into a formal compact with Moray, Ruthven, Morton, and other chiefs of the Protestant party, undertaking, on his part, to prevent their attainer, or procure their pardon, and to support and advance the Protestant religion; while they, on the other part, bound themselves to procure the settlement of the crown upon him and his heirs, and to take and slay, if need were, even in the queen's palace and presence, every one who opposed it. The result of this conspiracy was the murder of Rizzio on the 9th of March 1566, the king leading the way into the queen's cabinet, and holding her in his grasp, while the murderers dragged the poor Italian into an ante-chamber, and, mangling his body with more than fifty wounds, completed what they deemed a justifiable act. When Mary learned what had been done she broke out in reproaches against the king as being the chief cause of the deed. 'I shall be your wife no longer,' she told him, 'and shall never like well till I cause you have as sorrowful a heart as I have at this present.' As had been agreed beforehand among the conspirators, Mary was kept prisoner in Holyrood; while the king, of his own authority, dismissed the parliament which was about to forfeit Moray and his associates in the late insurrection. The plot was thus far successful; but Mary no sooner perceived its objects than she set herself at work to defeat them. Dissembling her indignation at her husband's treachery and the savage outrage of which he had been the ringleader, she succeeded by her blandishments in detaching him from the conspirators, and in persuading him not only to escape with her from their power by a midnight flight to Dunbar, but to issue a proclamation in which he denied all complicity in their designs. The conspiracy was now at an end; Ruthven and Morton fled to England, while Moray was received by the queen; and the king, hated by both sides, because he had betrayed both sides, became an object of mingled abhorrence and contempt.

It was an aggravation of the murder of Rizzio that it was committed, if not in the queen's presence, at least within a few yards of her person, only three months before she gave birth (on the 19th June 1566) to the prince who became James VI. As that event drew near, the queen's affection for her husband seemed to revive; but the change was only momentary; and before the boy's baptism, in December, her estrangement from the king was greater than ever. Divorce was openly discussed in her presence, and darker designs were not obscurely hinted at among her friends. The king, on his part, spoke of leaving the country; but before his preparations were completed he fell ill of the smallpox at Glasgow. This was about the 9th of January 1567. On the 25th Mary went to see him, and, travelling by easy stages, brought him to Edinburgh on the 31st. He was lodged in a small mansion beside the Kirk of the Field, nearly

on the spot where the south-east corner of the Old College now stands. There Mary visited him daily, and slept for two nights in a room below his bedchamber. She passed the evening of Sunday the 9th of February by his bedside, talking cheerfully and affectionately with him, although she is said to have dropped one remark which gave him uneasy forebodings—that it was much about that time twelvemonth that Rizzio was murdered. She left him between ten and eleven o'clock to take part in a masque at Holyrood, at the marriage of a favourite valet. About two hours after midnight the house in which the king slept was blown up by gunpowder, and his lifeless body was found in the neighbouring garden.

The chief actor in this tragedy was undoubtedly James Hepburn, Earl of Bothwell (q.v.). What part Mary herself had in the crime continues matter of historical controversy, centring mainly in the question of the authenticity of the Casket Letters. These so-called letters were declared by the Earl of Morton (q.v.) to have been found by him (20th June 1567) in a silver casket taken from a servant of Bothwell. They consist of eight letters and some verses, all said to have been written by Mary to Bothwell between January and April 1567. None of the originals are known to exist. The letters, if genuine, undoubtedly establish Mary's complicity. That they are genuine is now most generally admitted, for while their authenticity still lacks final proof, any argument so far adduced for their invalidation has failed to satisfy the canons of historical criticism. In any case, it is certain that the course of subsequent events is far from being consistent with Mary's ignorance of the plot for the removal of Darnley. On the 12th of April Bothwell was brought to a mock-trial, and acquitted; on the 24th he intercepted the queen on her way from Linlithgow to Edinburgh, and carried her, with scarcely a show of resistance, to Dunbar; on the 7th of May he was divorced from his comely and new-wedded wife; on the 12th Mary publicly pardoned his seizure of her person, and created him Duke of Orkney; and on the 15th—only three months after her husband's murder—she married the man whom every one regarded as his murderer.

This fatal step at once arrayed her nobles in arms against her. She was able to lead an army against them, but it melted away without striking a blow on the field of Carberry (15th June), when nothing was left to her but to abandon Bothwell and surrender herself to the confederate lords. They led her to Edinburgh, where she knew fits of frenzied despair.

From Edinburgh she was hurried to Lochleven, where, on the 24th of July, she was prevailed upon to sign an act of abdication in favour of her son, who, five days afterwards, was crowned at Stirling. Escaping from her island-prison (where she was confined of still-born twins) on the 2d of May 1568, she found herself in a few days at the head of an army of 6000 men. On the 12th it was met and defeated by the Regent Moray at Langside, near Glasgow. Four days afterwards, in spite of the entreaties of her best friends, Mary crossed the Solway, and threw herself on the protection of Queen Elizabeth, only to find herself a prisoner for life. From Carlisle, her first place of captivity, she was taken, in July, to Bolton; from Bolton she was carried, in February 1569, to Tutbury; from Tutbury she passed in succession to Wingfield, Coventry, Chatsworth, Sheffield, Buxton, Chartley, and last of all to Fotheringhay. The presence of Mary in England was a constant source of uneasiness to Elizabeth and her advisers. A large minority in the country were still Catholic, and naturally looked to Mary as the likely restorer

of the old faith. Plot followed plot, therefore, to effect her deliverance, and to place her on the throne of Elizabeth. Of these plots the most famous is that of Antony Babington, which had for its object the assassination of Elizabeth and the deliverance of Mary. The conspiracy was discovered; certain letters of Mary approving the death of Elizabeth fell into the hands of Walsingham; and, mainly on the evidence of copies of these letters, Mary was brought to trial in September 1586. Sentence of death was pronounced against her on the 25th of October; but it was not until the 1st of February 1587 that Elizabeth took courage to sign the warrant of execution. It was carried into effect on the 8th, when Mary laid her head upon the block with the dignity of a queen and the constancy and resignation of a martyr, evincing to the last her devotion to the church of her fathers. Five months afterwards her body was buried with great pomp at Peterborough, whence, in 1612, it was removed to King Henry VII.'s Chapel at Westminster, where it still lies in a sumptuous tomb erected by James VI.

Mary's character, according as views differ of her complicity in the death of Darnley, continues matter of debate. Her beauty and accomplishments have never been disputed. She was confessed by every one to be the most charming princess of her time. Her large sharp features might perhaps have been thought handsome rather than beautiful, but for the winning vivacity and high joyous spirit which animated them. It has been questioned whether her eyes were hazel or dark gray, but there is no question as to their star-like brightness. Her complexion, although fresh and clear, would seem to have been without the brilliance so common among our island beauties. Her hair appears to have changed with her years from a ruddy yellow to auburn, and from auburn to dark brown or black, turning gray long before its time. Her bust was full and finely shaped, and she carried her large stately figure with majesty and grace. She showed to advantage on horseback, and still more in the dance. The charm of her soft, sweet voice is described as irresistible; and she sang well, accompanying herself on the harp, the virginal, and still oftener on the lute, which set off the beauty of her long, delicate, white hand. The consciousness how that hand was admired may have made it more diligent in knitting and in embroidery, in both of which she excelled. Her manner was sprightly, affable, kindly, frank perhaps to excess, if judged by the somewhat austere rule already beginning to prevail among her Scottish subjects. She spoke three or four languages, was well and variously informed, talked admirably, and wrote both in prose and in verse, always with ease, and sometimes with grace or vigour. In the ring of which she was the centre were statesmen like Moray and Lethington, soldiers like Kirkcaldy of Grange, men of letters like Buchanan, Leslie, Sir Richard Maitland, and Sir James Melville. The first poet of France published verses deploring his absence from her brilliant court; Damville, the flower of French chivalry, repined at the fate which called him away from it so soon; Brantôme and the younger Scaliger delighted to speak, in old age, of the days which they passed beneath its roof.

Mary's prose-writings have been collected by the enthusiastic devotion of Prince Alexander Labanoff, in his *Recueil des Lettres de Marie Stuart* (7 vols. 1844). Setting aside the twelve so-called 'sonnets' which she is said to have written to Bothwell, and which survive only in a French version of an English translation, no more than six pieces of her poetry, containing in all less than 300 lines, are now known. They have no remarkable merit. The best is the

poem of eleven stanzas on the death of her first husband Francis II., printed by Brantôme. The longest is a *Meditation* of a hundred lines, written in 1572, and published two years afterwards by her ever faithful follower, Bishop Leslie of Ross. All are in French, except one sonnet, which is in Italian. The lines beginning 'Adieu, plaisant pays de France,' ascribed to her, are, according to Barbé (*In Byways of Scottish History*, 1912), by Brantôme; or, as some think, by a journalist, Meusnier de Querlon (died 1780). A volume of French verse on the *Institution of a Prince*, which she wrote for the use of her son, has been lost since 1627, along with a Latin speech in vindication of learned women, which, when no more than thirteen, she delivered in the Louvre to the French court.

The literature is extensive. Among the chief works, apart from the *Histories of Scotland* by Keith, W. Robertson, Laing, P. F. Tytler, Burton, Hume Brown, &c., and of England by Hume, Froude, &c., are Jebb's *De Vita et Rebus Gestis Mariæ Scotorum Reginæ* (1725); J. Anderson's *Collections Relating to the History of Mary, Queen of Scotland* (1727-28); Goodall's *Examination of the Letters said to be written by Mary, Queen of Scots, to James, Earl of Bothwell* (treats the letters as forgeries; 1754); W. Tytler's *Inquiry into the Evidence against Mary, Queen of Scots* (vindictory; 1759, 1790); G. Chalmers's *Life of Mary, Queen of Scots* (vindictory; 1818, 1822); David Laing's edition of *John Knox's History of the Reformation* (1846-64); the *Life* by Agnes Strickland in her *Lives of the Queens of Scotland* (1850-59; new ed. 1873); A. de Montaignon's *Latin Themes of Mary Stuart* (1855); Prince Labanoff's *Notice sur la Collection des Portraits de Marie Stuart* (1856); Mignet's still valuable *Histoire de Marie Stuart* (condemnatory; 1852); Teulet's *Lettres de Marie Stuart* (1859); Chéruef's *Marie Stuart et Catherine de Médicis* (1858); Joseph Robertson's *Catalogues of the Jewels, Dresses, Furniture, Books, and Paintings of Mary, Queen of Scots* (1863); Hosack's *Mary, Queen of Scots, and her Accusers* (a defence; 1870-74; a popular ed. 1888); books by Petit and De Flandre (1874), Chantelauze (1876), and the interesting document by Claude Nau, Mary's secretary (ed. by Father Stevenson, 1883); Leader's *Mary Stuart in Captivity* (1881); Baron Alphonse de Ruble's *La Première Jeunesse de Marie Stuart* (1891); Jane T. Stoddard's *The Girlhood of Mary, Queen of Scots* (1908); Baron Kervyn de Lettenhove's *Marie Stuart* (2 vols. 1889), dealing with only the two last years of her life; T. F. Henderson's *Casket Letters* (1890), supporting the authenticity of the letters, and giving for the first time Morton's declaration regarding the manner in which the casket is said to have fallen into his hands; Philippon's *Histoire du Règne de Marie Stuart* (3 vols. 1891-92); Skelton's *Impeachment of Mary Stuart* (a defence; 1876) and his sumptuous *Mary Stuart* (1893); Dr Hay Fleming's *Mary Queen of Scots* (1897); S. Cowan's exculpatory monograph (1901); Andrew Lang's *Mystery of Mary Stuart* (sums up against the queen on the main charge; 1901); the *Papal Negotiations and Letter to Guise*, edited by Father Pollen, S.J. (1901-4); Mumby's *Elizabeth and Mary Stuart* (1914), and *The Fall of Mary Stuart* (1921); Steuart (ed.), *Trial of Mary Queen of Scots* (1923); Mahon's *The Indictment of Mary Queen of Scots* (1923), and *Mary Queen of Scots* (1924); Lives by Florence A. MacCunn (1905) and T. F. Henderson (1905); and for portraits, Cust's *Authentic Portraits of Mary Queen of Scots* (1903).

Maryborough, a port of Queensland, on the Mary River (here spanned by a wooden bridge), 25 miles from its mouth and 180 N. of Brisbane, with which there is communication by steamer and rail. Gold from Gympie and copper from Mount Parry and other mines, with sugar and timber, are shipped to Brisbane for export. There are great engineering works and timber mills. Pop. 11,000.

Maryland, one of the original states of the American Union, lies between the parallels of 37° 53' and 39° 44' N. lat., and the meridians of 75° 4' and 79° 33' W. long. It contains 12,320 sq. m.—very nearly the size of Holland—of which

about one-fifth is water. The length from east to west is 196 miles, and the breadth varies from 128 to 3 or 4 miles. It is separated from Pennsylvania and Delaware by 'Mason and Dixon's Line' (q.v.); the south-western border follows the course of the Potomac River, the whole of which, with the exception of about 12 miles in the District of Columbia (q.v.), is under the jurisdiction of Maryland, down to the low-water mark on the Virginia side.

The elevation varies greatly, from sea-level to 3500 feet. In the west it is mountainous, being crossed by the Alleghanies; in the middle, hilly and rolling; in the east and south-east, low and undulating. A line drawn from the mouth of the Susquehanna to the city of Washington will cut the state into two nearly equal parts, and divide the mountain and hill country from the low lands on both sides of the Chesapeake Bay. The productions and occupations are largely determined by the physical features—in the west coal and lumber; in the middle corn and wheat; in the east fish, fruit, and vegetables. The climate is generally regarded as unusually healthful. The mean summer temperature is 75° F., the mean winter temperature 34° F. The annual rainfall varies from 38 inches in the mountains to 46 inches near the Atlantic coast. The mountain air is regarded as a specific for hay-fever.

The geological formations vary with the surface elevations. The southern section of both the shores of the Chesapeake Bay is alluvial; north of the alluvial deposit is a Tertiary formation; north-west of this come metamorphic rocks; west of them a wide belt of Silurian and Devonian formation; and still farther west Carboniferous strata beginning at Cumberland. In the Tertiary we find marl in abundance. In the metamorphic rocks gneiss, granite, limestone, and iron. In the Carboniferous extensive veins of bituminous coal of the best quality; one remarkable vein in the George's Creek district is 14 feet thick. Over 200 kinds of marble have been found in the state, some of them equal to the Italian marbles. Near Baltimore are large beds of clay, from which bricks of peculiar excellence and beauty are manufactured. Gold, silver, and copper are produced in small quantities. Kaolin and magnesite are found, and among numerous other minerals, some present in large quantities, are soapstone, glass sand, chrome, cements. Coal is far the most important mineral product, and in value is followed by building stones.

The soil is well adapted to cultivation, with the exception of the mountain tops in the west, and a small proportion of marsh land in the east. The forest-trees are principally pine, chestnut, and oak; hickory and walnut are becoming scarce. The staple fruit-trees are the apple, the peach, and the pear. Tobacco is the principal crop in the peninsula between the Chesapeake and the Potomac, as it was the main reliance of the early settlers, constituting even their ordinary medium of exchange. Tomatoes in large quantities for canning, small fruits (especially strawberries), and all kinds of vegetables are cultivated on the eastern shore and sent to the markets of Baltimore, Philadelphia, and elsewhere. The mountains still contain some deer; and wild geese, swans, and turkeys are found in considerable numbers at the proper season, as well as woodcock, grouse, and quail (locally called partridge). Immense flocks of wild ducks of various species throng the estuaries of the Chesapeake on the approach of cold weather: the 'canvas-back' is found nowhere else in perfection.

The Chesapeake Bay (q.v.) divides Maryland into two unequal portions, the Eastern and the Western Shore. With its estuaries it gives the state a coastline of more than 500 miles, and an abundance of

steamboat landings: on the Eastern Shore there is scarcely a farm more than 5 miles distant from a river accessible to steamboats of light draught. Shad and herring are caught in large numbers, and the oyster fisheries are second in importance only to those of Virginia. For the leading manufactures see BALTIMORE, where most are located. Baltimore is also the principal port and great commercial centre of the state. Maryland has over 2000 miles of railway (steam and electric), and two canals (from Cumberland, in the west, to Washington, 184½ miles, and between the Chesapeake and Delaware Bays, 12½ miles).

In Maryland education is compulsory for children in a system of free public schools. Coloured children are educated in separate schools, but under the same management. The percentage of illiteracy is low. There is in every county a high school or academy which gives secondary instruction and fits pupils for college. The colleges supported in whole or in part by the state are St John's College, Annapolis (originally King William's School); Washington College, Chestertown, Kent county, to the foundation of which George Washington contributed £100 sterling; the Agricultural College, near Bladensburg; and the Western Maryland College, Westminster. There are also several denominational colleges. The foremost of the educational institutions of Maryland is the Johns Hopkins University, in Baltimore, where also are Maryland University, Goucher College (for women), and the Peabody Institute (for education in music). There is a school for the feeble-minded at Pikesville; a school for the deaf and dumb at Frederick; and in Baltimore a school for the blind, and a school for coloured blind children and deaf-mutes, all supported by the state. At Catonsville there is an asylum for the insane. The United States Naval Academy is at Annapolis.

Maryland returns two senators and six representatives to congress. The legislature is styled the General Assembly, and consists of two houses—the Senate and the House of Delegates. The Senate, elected by the people, is composed of one member from each of the twenty-three counties and four from the city of Baltimore. The House of Delegates has one hundred and two members, from Baltimore city and the several counties in proportion to their respective populations. The seat of government is at Annapolis. Baltimore had in 1920 a pop. of 733,826. Other principal towns are Cumberland, Hagerstown, Frederick, Frostburg, Catonsville, on the Western Shore; Salisbury, Cambridge, Crisfield, on the Eastern. Pop. of state (1830) 447,030; (1860) 687,049; (1880) 934,943; (1900) 1,188,044; (1920) 1,449,661.

History.—In 1632 Charles I. of England issued a patent to Cecil Calvert, Lord Baltimore, granting him all the land 'from Watkins Point on the Bay, northward to the 40th degree of latitude, and from the Atlantic Ocean and Delaware Bay on the east to the Potomac River on the west.' This grant included not only the present Maryland, but also parts of Pennsylvania and Delaware, and many vexatious disputes resulted, some of which were settled only in 1890. The district was named in honour of Henrietta Maria, Charles's queen. In March 1634 a party of English gentlemen and their servants and retainers, under the command of Leonard Calvert, a brother of Lord Baltimore, landed on the shore of a river now called St Mary's, a branch of the Potomac, and bought from the Indians a tract of land. The friendly relations thus commenced with the Indians and but rarely interrupted, together with the announcement of toleration and protection to all Christians of whatever shade of religious belief, led to the rapid and

peaceful growth of the new colony. Maryland was among the first of the colonies to take an active part in the War of Independence. In the Civil War (1861-65) the people of Maryland were divided in sentiment, but the state remained within the Union. See *Histories* by Scharf (1879) and McSherry (1855; revised by B. B. James, 1905).

Maryland. See LIBERIA.

Marylebone, or ST MARYLEBONE, a metropolitan and parliamentary borough (returning, since 1918, one member, till then two) in the north-west of London, contains Regent's Park with the Zoological Gardens, Lord's cricket ground, the Queen's Hall, Hertford House (Wallace Collection), Harley Street, and Marylebone railway station (London and North Eastern Railway); pop. 104,000. See LONDON.

Maryport, a seaport of Cumberland, at the mouth of the Ellen, 28 miles SW. of Carlisle, gets its name from the fact that Mary, Queen of Scots, landed here in her flight from Scotland (1568), though it was called Ellenfoot down to 1750, when its harbour was constructed. A new dock was opened in 1884. Shipbuilding and its kindred employments are carried on, and there are iron-foundries and iron-furnaces, sawmills, flour-mills, tanneries, breweries, &c. The exports are chiefly coal and iron. Near by is a Roman fort where many antiquities have been found; pop. 11,000.

Marysville, capital of Yuba county, California, at the junction of the Yuba and the Feather rivers, at the head of navigation, 52 miles by rail N. of Sacramento. It has an extensive trade, and flour, iron-founding, woollen, and other industries. Dredge gold-mining is carried on. Pop. 5000.

Masaccio ('Slovenly Tommy'), the nickname of TOMMASO GUIDI, a Florentine painter, born in 1401 or 1402 in the Arno valley, probably at Castel San Giovanni. A reputed pupil of Masolino, he was enrolled in the Florentine guild of painters in 1424. Whilst still a young man he may have executed in the church of St Clement, Rome, a fresco of the Crucifixion and scenes illustrating the lives of some of the later saints; modern criticism, however, tends generally to disallow the claim. His greatest achievements, in any case, were wrought on the walls of the Carmine church, Florence, especially in the Brancacci chapel. It has been matter of controversy which pictures precisely were from the brush of Masaccio; Masolino worked at the same walls before him and Filippino Lippi after him. Those which are assigned to him beyond doubt or question are 'Expulsion from Paradise' (greatly admired by Raphael, who repeated the design in the loggia of the Vatican), 'Peter and the Tribute-money,' 'Temptation of Adam and Eve,' 'Peter Preaching,' and the same saint 'Baptising,' 'Healing the Sick,' 'Giving Alms,' and (in part) 'Restoring the Young Man to Life.' Apart from his frescoes Masaccio's major effort was his Pisan altarpiece, the various scattered and unidentified portions of which have only been rediscovered as a result of modern research, and are now to be found in five distinct collections. Masaccio's work marks an advance in Italian painting, in that it exhibits a more vigorous and correct representation of nature, with improved perspective and harmony of arrangement between figures and background. His influence on the Italian Renaissance was far-reaching, and he acted as a constant stimulus to the greatest masters of the 15th century. Towards the end of 1428 Masaccio suddenly left Florence, and is reported to have gone to Rome and to have died there before the year 1429 ran out. See a work by Enrico Somaré (Milan, 1924).

Masai, a people of East Equatorial Africa, dwelling in a district that stretches from 1° N. to 5° S. lat., and from 34° to 38° E. long., and includes Kilima-Njaro, Kenya, and Lake Baringo. The southern half of the district is low and barren, with no rivers and little rain, whilst in the north it rises into a plateau-region (5000 to 9000 feet), rich in running streams, forests, and grass-land. The Masai are not a Negro or Bantu race; they resemble the Gallas, being men of magnificent stature and Apollo-like forms, though their faces are ugly and ferocious in expression. This is due to the warlike habits of their youth, when, for nearly a score of years, they live in military kraals, spending their time alternately in idleness and on the war-path, eating nothing but beef, drinking nothing but milk, and having indiscriminate intercourse with the unmarried girls of the tribe. After marriage, which takes place when they lay aside the habits of the warrior, they settle down as cattle-breeders. The arms of the warriors consist of an ox-hide shield, a spear with a blade 2 to 2½ feet long and 3 inches broad affixed to a shaft of 15 inches, a sword, and a knobkerry. They are an aristocratic race, and clever public speakers; menial work is done by the women and boys. They speak a Hamitic language. See Hollis, *The Masai* (1905), and Merker, *Die Masai* (1910 ed.).

Masaniello (properly TOMMASO ANIELLO), a fisherman of Amalfi, born in 1623, was the leader of the revolt which took place in Naples in July 1647 against the Spanish viceroy, the Duke of Arcos. The people had been exasperated by oppression, and great excitement had been produced by a new tax upon fruit. Masaniello himself was aggrieved by the harsh treatment which his wife had received after being detected in an attempt to smuggle a little flour. Taking advantage of a quarrel between the fruit-sellers and the tax-collectors on 7th July 1647, Masaniello stirred up the multitude to a revolt. Their triumph was complete; palaces and public buildings were plundered, mostly for arms, a bloody popular justice was executed, and the viceroy was forced into a regular treaty with Masaniello in the church of the Carmelites on 13th July. But success and weight of responsibilities—some say poison—turned his head; he gave himself up to excess and capricious despotism, and, temporarily deserted by his friends, was assassinated by agents of the viceroy, or perhaps executed, on 16th July. Masaniello is the subject of an opera by Auber (q.v.).

Masaryk, THOMAS GARRIGUE, Czech writer and politician, was born at Göding, in Moravia, 7th March 1850. After working as a blacksmith, he studied at Vienna and Leipzig, became a dozent in philosophy at Vienna, and professor (1882) in the Czech university of Prague. In 1891-93 he sat in the Austrian Reichsrat as leader of the Young Czech 'realist' movement. Thereafter he wrought to set nationalism on a new footing, giving it a broader outlook. Again elected to the Reichsrat in 1907, he was a champion of general self-determination, an exposé of political fictions, and had a share in forwarding South Slav unity. On the outbreak of the Great War he escaped to Italy, became a lecturer in King's College, London, and organised the movement for Czechoslovak independence. He was first president of the new republic (1918), and was re-elected in 1920. Among many books on philosophical and political subjects he wrote *Grundlagen des Marxismus* (1898), and *The Spirit of Russia* (i. and ii. 1916). Hermann Bahr described him as a mixture of Tolstoi and Walt Whitman.

Mascagni, PIETRO, composer, born 7th December 1863 at Leghorn, produced in 1890, after a some-

what irregular musical education, and in competition for a prize, the brilliantly successful one-act opera *Cavalleria Rusticana*, the plot being taken from a story by Verga (q.v.). Later works were *L'Amico Fritz* (1891, based on Erckmann-Chatrian), *I Rantzau* (1892), *Verone*, *Ratcliffe*, *Iris*, *Parisina*, *Lodoletta*, *Il piccolo Marat*, besides songs and ballads.

Mascara, a fortified town of Algeria, 50 miles S.E. of Oran, on a slope of Atlas. It is an important trading-centre. Abd-el-Kader was born in the neighbourhood, and the place was the seat of his power. Pop. 29,000.

Mascarenes. See MAURITIUS.

Masefield, JOHN, poet, dramatist, and novelist, was born in Shropshire in 1875. Running away from school he lived a vagabond life on sea and land, but returned in the end to England, where a brother of the poet Yeats procured him a start in literature. For a time he was on the staff of the *Manchester Guardian*. His first poems, *Saltwater Ballads* (1902) and *Ballads* (1903) were of the sea, as were also his first prose works—two collections of short stories, *A Mainsail Haul* (1905) and *A Tarpsailin Muster* (1907), and a novel, *Captain Margaret* (1908). These earliest works caused no stir, but a measure of recognition came with *The Tragedy of Nan* (1909), a play, and fame with *The Everlasting Mercy* (1911), a narrative poem much criticised for its ruthless realism. Among later works were the narrative poems, *The Widow in the Bye Street* (1912), *Dauber* (1913), *The Daffodil Fields* (1913), *Reynard the Fox* (1920), *Right Royal* (1920), *King Cole* (1923); collections of shorter poems in *Philip the King* (1914), *Lollington Downs* (1917), *Enslaved* (1920); the plays, *The Tragedy of Pompey the Great* (1910), *The Faithful* (1915), *Good Friday* (1916), *Melloney Holtspur* (1922); the novels, *Multitude and Solitude* (1909), *The Street of To-day* (1911), *Sard Harker* (1924). Masefield has also produced works in literary criticism, as *Shakespeare* (1911), and in history, as *Sea-Life in Nelson's Time* (1905), *On the Spanish Main* (sketches of buccaneers, 1906), and an edition (1907) of Dampier's *Voyages*. *Gallipoli* (1916) and *The Old Front Line* (1918) were prose sketches of the Great War. Masefield is to be ranked among the foremost English writers of his time. He reveals the influence of Chaucer, Whitman, Kipling, Conrad, Hardy, and Yeats, and the spirit of the country and of the sea is in his work, as well as a realism sombre at times. He finds in the poor and the hard-pressed a subject, and speaks pity and justice for all broken things. If the narrative poem is his characteristic and probably most significant form, he is distinguished no less by the charm of his lyrics. With a tendency to over-production, there is mixed with the best of his work much that is careless and inferior. See *Studies* by W. H. Hamilton (1922) and C. Biggame (1924).

Masham, MRS. See MARLBOROUGH.

Mashonaland, or MASHUNALAND, a region of Rhodesia (q.v.) north-east of Matabeleland, embraces the plateau (4000-4600 feet) whose backbone is formed by the Umvukwe Mountains, and in which some of the chief feeders of the Zambezi, Limpopo, Sabi, and Mazoe have their origins. It is healthy, with rich soil, grass all the year round, and an abundance of running streams. On the Matabele invasion, those Mashona who escaped massacre took refuge in the mountainous districts, building their villages on almost inaccessible crags. They are the best husbandmen in South Africa, and grow rice, Kaffir corn, maize, ground-nuts, sweet potatoes, tobacco, and cotton; this last they weave into blankets. They are also good iron-workers. Iron, copper, and gold exist in immense quantities.

Mauch in 1871 discovered many old mines that had been worked with some scientific skill, especially at Zimbabwe (q.v.). Mashonaland was put under British protection in 1888.

Masinissa, king of the Massylii or Eastern Numidians, was born about 238 B.C., and brought up at Carthage. Having helped the Carthaginians to subdue Syphax, king of the Massaesylii or Western Numidians, he accompanied his allies to Spain and fought valiantly and successfully against the Romans. But about 210 the Carthaginians gave his promised bride to Syphax; and for this and other reasons he became henceforward an ally of Rome. He received as his reward the kingdom of Syphax, together with large portions of the territory of Carthage. But before he died, in 149 B.C., he slackened his zeal for Rome.

Mask (through the medium of Fr. and Span. from the Arabic *maskharat*, 'a jester') is an artificial covering for the face, worn by many different peoples for different purposes. Masks are common amongst the inhabitants of New Britain, New Ireland, New Guinea, and the adjoining islands, amongst the North American Indians and the Eskimo, the Chinese, the aborigines of Australia, and some Negro tribes. The masks these peoples use are generally very hideous and repellent in aspect, being designed expressly to inspire terror in the mind of the beholder. The primary object is to scare away the demons and spirits who bring misfortunes, diseases, national calamities, or other evils upon the tribe; the exorcism is usually practised by processions of masked men, who dance and utter loud cries calculated to frighten the enemy away. Where totemistic beliefs prevail, it is customary for the people to celebrate dances clad in the skins of wild animals, and on such occasions masks are worn shaped to resemble the animals represented in the dance. It is highly probable that practices of a similar nature were current amongst the primitive Greeks, Egyptians, and other peoples. The myth of the snake-haired Gorgon is traced back to this origin; so too is the practice of covering the faces of the dead with a mask, intended to keep the demons away from them whilst they were on their journey to the abode of shades, a practice common to the ancient Greeks and Egyptians, and the ancient Peruvians and Mexicans. Death-masks of gold have been found in tombs of Mycenæ and Kertch; those of the Peruvians were made of silver and wood; some found at Carthage were of clay, painted in divers colours; and copper and wood were used in Mexico. Masks, besides being worn by living men, were sometimes attributed to their gods, as in ancient Egypt and Greece, and in India, or were put on over the faces of the gods' images, as in ancient Mexico. The Greeks, moreover, in their theatrical performances, employed masks shaped to represent the expression of a particular emotion or passion, as rage, grief, sly cunning, &c. These, made of linen, tree-bark, leather, or even wood, had large funnel-shaped mouth-openings, for the purpose of giving the voice of the actor a penetrating sound (whence Lat. *per-sona* = 'a mask'), so that it might be heard all over the vast theatres in which he had to act. Passing on to the Romans, the custom of putting masked actors on the stage was transmitted by them to the Italian theatres of the middle ages; nearly all the actors in the *Commedia dell'Arte* wore masks. The custom was also practised in the English Masque (q.v.) of Elizabethan and subsequent times. The Masquerade (q.v.) or masked ball is a survival of the same observance; but in it the purpose is disguise of identity, as in the case of the Man with the Iron Mask (see IRON MASK).

Maskat. See MUSCAT, OMAN.

Maskelyne, NEVIL, D.D., astronomer and physicist, was born in London, 6th October 1732, and educated at Westminster School and at Cambridge. In 1758 he was admitted to the Royal Society, and having devoted himself to astronomy, was appointed astronomer-royal in 1765. During his forty-six years' tenure of that office he improved methods and instruments of observation, invented, though in part anticipated by the Abbé Rochon, the prismatic micrometer, and made many important and accurate observations. In 1774 he measured the earth's density from the deflection of the plumb-line at Schiehallion, Perthshire (see EARTH). The first of his very numerous publications was the *British Mariner's Guide* (1763). With the issue for 1767 he founded the *Nautical Almanac*. His *Tables for Computing the Places of the Fixed Stars, &c.*, were published by the Royal Society in 1774. In 1776 he produced the first volume of the *Astronomical Observations made at the Royal Observatory, Greenwich, from 1665*—an invaluable work still continued. He was rector from 1775 of Shrewsbury, Salop, and from 1782 of North Runcton, Norfolk, and died 9th February 1811.

Mason, ALFRED EDWARD WOODLEY, novelist and dramatist, was born in London, 7th May 1865, and educated at Dulwich College and at Trinity College, Oxford. For a time he toured with a theatrical company, but later abandoned the stage for literature, and in 1895 produced his first novel, *A Romance of Wastdale*. Of numerous later novels, *The Courtship of Morrice Buckler* (1896; dramatised 1897), *The Four Feathers* (1902), *The Broken Road* (1907), *Running Water* (1907; dramatised 1922), the detective story *At the Villa Rose* (1910; dramatised 1920), *The Turnstile* (1912), *The Summons* (1920, embodying experiences during the Great War), and *The House of the Arrow* (1924) may be mentioned. Apart from the dramatisation, where that has been done, of his novels, he wrote also the plays, *Colonel Smith* (1909), *The Witness for the Defence* (1911), and *Open Windows* (1913). In 1906–10 he was a Liberal member of parliament.

Mason, GEORGE HEMMING, A.R.A. (1818–72), was born in Staffordshire. He first studied medicine, but in 1845 established a studio at Rome, and did not return to England till 1858. His best works were 'The Evening Hymn' (1868), 'Girls Dancing by the Sea' (1869), and 'The Harvest Moon' (1872). His pictures show great pathos and rich effects of colour.

Mason, SIR JOSIAH, manufacturer and philanthropist, was born at Kidderminster, 23d February 1795. From street-hawker he became the largest pen-maker in the world; for long he was maker to Perry. As a partner he later financed the Elkingtons in their introduction of electro-plating. The great fortune acquired in these ways he distributed largely in public charity. Thus he erected and endowed almshouses, and an orphanage at Erdington, and was the founder of the Josiah Mason College, expanded in 1900 into the university of Birmingham. He died at Erdington, 16th June 1881. See the *Memoir* by Bunce (1890).

Mason, WILLIAM (1724–97), minor poet, more famous as the friend of Gray, was born probably at Kingston-upon-Hull, and educated at Cambridge. By his *Musæus* (1747), a poetic lament for the death (1744) of Pope written in imitation of *Lycidas*, he attracted Gray. Later he published two absurd but ambitious tragedies, *Elfrida* and *Caractacus*; the *English Garden* (1772–82), a long and tedious poem in blank verse; and the *Memoirs of Gray* in 1775, a work with serious defects. Mason became in 1754 vicar of Aston, in Yorkshire, and

later also precentor and canon of York. See a book by J. W. Draper (1925).

Mason and Dixon's Line, the boundary line between Maryland and Pennsylvania. The line runs due east and west, and takes its name from two English engineers, Charles Mason and Jeremiah Dixon, who, between 1763 and 1767, surveyed it to a point some 244 miles west of the Delaware River; further advance was then checked by Indians, but the boundary was later completed by others. The running of the line marked the close of an eighty years' boundary dispute between the Baltimores and the Penns, proprietors respectively of Maryland and of Pennsylvania. The eastern part of the line was originally marked with milestones brought from England, every fifth of which bore on one side the arms of Baltimore, and on the other those of Penn. Owing to the removal of the stone marking the north-east corner of Maryland this point was again determined by survey in 1849-50; while, local disputes arising owing to the absence of stones on the western section of the boundary, a re-survey was undertaken in 1901-3. Previous to the Civil War the line was popularly accepted as marking the boundary dividing the free from the slave states. At the same time as they ran the boundary between Maryland and Pennsylvania, Mason and Dixon also surveyed and marked the boundary between Maryland and Delaware.

Mason and Slidell. See TRENT AFFAIR.

Masonry, the art of construction in stone. The earliest existing examples are among the most magnificent specimens of the art. No nation has excelled the ancient Egyptians, who did not use mortar in their important structures, such as the pyramids, the joints being all carefully polished and fitted. Cyclopean masonry, of which remains exist in many parts of Greece and Italy, also exhibits stones of great size and with carefully-adjusted joints. The walls of Mycenæ are among the earliest examples. These are built with huge irregular blocks, the spaces between being filled up with smaller stones. The Etruscan specimens are more carefully executed; the stones are not squared, but they are all carefully fitted together. The masonry of the Greeks and Romans very closely resembled that of the present day: *Rubble-work* (*opus incertum*), in which the stones are not regularly coursed; *Coursed-work*, where the joints are all level, and the stones of equal height; *Ashlar*, resembling the latter, but built with larger stones carefully dressed on the joints.

The early medieval masonry was of very bad construction, being, in fact, little better than common rubble, with an occasional use of Herring-bone Work. The Normans improved upon this kind of work, but their masonry was also so bad that many of the towers built by them either fell or had to be taken down. The art gradually improved with the advance of Gothic architecture, and ashlar was re-introduced for all important works. The ashlar-work so constantly used in Renaissance buildings has given place to the hammer-dressed and squared masonry. Special materials sometimes produce special kinds of work; thus, in Norfolk and Suffolk, walls are often faced with large flints, split so as to form a clean face and good joints, in bands or panels between stonework or brickwork.

Masons' Marks, or BANKER MARKS, in mediæval buildings were cut upon each stone by the craftsman who worked it. Each man had his own device, whereby every stone for which he was responsible could be identified.

Masorah, or MASORETH (tradition), a collection of critical notes on the text of the Old Testament, its divisions, accents, vowels, grammatical forms, and letters (see HEBREW LANGUAGE). The

Masorah, like the Halacha and Haggada, was the work of many ages and centuries, as, indeed, we find in ancient authorities mention made of different systems of accentuation used in Tiberias (Palestine), and Babylon (Assyria). It was in Tiberias also that the Masorah was first committed to writing between the 6th and 9th century A.D. Monographs, memorial verses, and glosses on the margins of the text seem to have been the earliest forms of the written Masorah, which gradually expanded into one of the most elaborate and minute systems, laid down in the 'Great Masorah' (about the 9th century), whence an extract was made known under the name of the 'Small Masorah.' The final arrangement of the Masorah, which was first printed in Bomberg's second Rabbinical Bible (Venice, 1525), is due to Jacob ben Chayim of Tunis and to Felix Pratensis (in the Bomberg edition of 1518). The language of the Masoretic writers is Aramaic, and the abbreviations, contractions, symbolical signs, &c., require careful study. Many have been translated and explained by Prof. A. S. Geden (*Massoretic and other Notes*, published by the Brit. and For. Bible Soc., 1906). See Dr Ginsburg's great work on the Masorah (4 vols. folio, 1880-86); L. Blau, in *Jew. Quart. Rev.*, xii. 1900, pp. 217 foll.; S. Baer, *Zeitschr. d. D. Morgenländ. Ges.*, xl. pp. 743 foll.; E. N. Adler, *About Hebrew Manuscripts*, pp. 49 foll.; the art. 'Masorah' in the *Jew. Ency.* The different forms of the term *Masoreth*, *Masorah*, &c., are discussed by W. Bacher, *Jew. Quart. Rev.*, iii. 1891, pp. 785 foll.; and by C. Levias, *Heb. Union Coll. Annual*, 1904.

Masovia. See MASURIANS, POLAND.

Maspero, SIR GASTON CAMILLE CHARLES, K.C.M.G. (1846-1916), Egyptologist, born at Paris of Italian parents, began to lecture on Egyptology at the École des Hautes Études in 1869, and in 1873 was appointed professor of Egyptology at the Collège de France. In 1881 he founded a school of Egyptian archaeology at Cairo, and in 1881-86, and in 1899-1914, was director of explorations and custodian of the Cairo Museum. In 1886 he became professor at the Institute of Paris, in 1914 secretary of the Académie des Inscriptions. As an explorer he excavated or opened the pyramids of the 5th and 6th dynasties, and the burial-places of Sakkara and Dahshûr, and discovered new sepulchral sites of great value at Deir el-Bahari near the entrance to the Valley of the Tombs of the Kings, at Elkhûm 130 miles S. of Thebes, and at other places. He wrote many valuable works on Egyptian archaeology, history, and folklore.

Masque, a species of dramatic performance, much in vogue in England towards the close of the 16th and the beginning of the 17th century. It was in fact the favourite form of private theatricals at the time. The masque appears to have originated in the practice of introducing, in any solemn or festive processions, men wearing masks, who represented imaginary or allegorical personages. At first it was simply an 'acted pageant,' as in the well-known progresses of Queen Elizabeth; but gradually it expanded into a regular dramatic entertainment, and in the hands of men like Fletcher and Ben Jonson attained a high degree of literary beauty. Jonson's masques were represented at court, and were greatly relished. The taste for masques died out under Charles I., to whose reign belongs the noble *Comus* of Milton (1634).

See Brotanek, *Die englische Maskenspiele* (1902); Greg, *List of Masques* (1902); Reyher, *Les Masques anglais* (1909); *The Cambridge English Literature*, vol. vi. (1910); and *Shakespeare's England*, vol. ii. (1916).

Masquerade, or MASKED BALL, a festive meeting in which the host and guests are more or less disguised, the name being derived from the

use of the mask. The public *nummeries* of former times, Easter plays, Festivals of Fools, &c., which were frequent in most parts of Europe, but somewhat various in different countries, probably suggested the idea of the masquerade, which, however, was not open to all, according to the well understood rules of these ancient amusements, but was limited to some select class, or to those who paid a certain sum for admission. Catharine de' Medici introduced the regular masquerade at the French court. It found its way to England in the reign of Henry VIII., but did not reach any of the courts of Germany till the end of the 17th century.

Mass is defined as 'the quantity of matter in a body'; and weight is proportional to mass. See GRAVITATION, MATTER.

Mass. See LITURGY.

Mass, MUSIC OF. Each part of the service of High Mass has its unisonal plain-song melody, varying according to the season or festival; the first collections of these melodies were made by St Ambrose, and afterwards more completely by St Gregory. But since the invention of counterpoint certain portions have been selected for more elaborate treatment—viz. the *Kyrie, Gloria, Credo, Sanctus, Benedictus*, and *Agnus Dei*; each of which, but especially the *Credo*, is by common traditional practice divided into separate movements, also designated by the initiatory words. In the early contrapuntal music, a plain-song melody, or even a secular tune, formed the basis on which the whole was constructed, and the mass was named in accordance—e.g. the numerous *Missa L'Homme Armé*, founded on an old French love-song. This appropriation of secular tunes, which could never wholly lose their association with the often objectionable words, anticipates Shakespeare's Puritan 'who sings Psalms to hornpipes,' and the similar practices of recent revivalists. These compositions soon became more remarkable for their learning and ingenuity than appropriateness or reverential feeling; and to such an extent was this abuse carried that the Council of Trent condemned them in no measured terms, and a commission, appointed in 1564 to carry out certain of its decrees, was on the point of entirely forbidding the use in future of polyphonic music in the church, when the production by Palestrina of his world-famous *Missa Papæ Marcelli* convinced the cardinals that such music could be profoundly devotional as well as technically skilful; and its use was allowed to be continued. The succeeding epoch of church music, however, was one of decline; but in the later part of the 17th and commencement of the 18th century arose a new school, comprising Alessandro Scarlatti, Leo, and Durante, in whose compositions the introduction of instrumental accompaniment was the most important new feature—one which gave to all subsequent masses the style of the cantata, more individual and dramatic than devotional. In this style also are the stupendous masses of Bach in B minor, Beethoven in D, and Cherubini in D and A. Those of Haydn, Mozart, Weber, Schubert, and Gounod are full of beautiful music. Pius X. ordered a return to the Gregorian chant in 1903.

The music of the Requiem, or *Missa pro defunctis*, differs of course considerably in its details from that of the ordinary High Mass. The most famous compositions for it are those of Mozart and Cherubini. Brahms's masterpiece, the German Requiem, is not a mass, but a sacred cantata on scriptural words.

Massa, distinguished as MASSA DI CARRARA, a city of northern Italy, 20 miles by rail S.E. of Spezia. It is a bishop's see, has a public library, an academy of arts and sciences, a cathedral, and a ducal palace. The inhabitants rear silkworms, grow tobacco, press oil, make paper, saw timber,

and trade in the white marble that all sculptors use. Pop. 34,000.—The province of Massa and Carrara has an area of 687 sq. m., and a pop. of 226,000. In 1568 the ruling family in Massa were created princes, and in 1664 dukes. The dukedom passed by marriage to the house of Modena-Este in 1741.

Massa, a port of Morocco, at the mouth of the Wadi Massa, 60 miles S. of Agadir, is popularly reputed to be Jonah's landing-place.

Massa, NICCOLÒ (1499–1569), Italian medical writer, born at Venice.

Massachuset, a tribe or confederacy of Algonquins (q.v.) who inhabited the shores of Massachusetts Bay, and had their chief village on the site of Quincy, Mass. John Eliot (q.v.) undertook their conversion to Christianity, and it was into their tongue that he translated the Bible (1661–63) and other books. They were already dwindling away; and by his policy of associating them in villages with other 'praying Indians' their separate existence was brought to an end.

Massachusetts, one of the New England states of the American Union, lies between 41° 14' and 42° 53' N. lat., and between 69° 53' and 73° 32' W. long., and, 160 miles long by 47 to 90 broad, has an area of about 8300 sq. m.—larger than Wales. It is bounded on the north, west, and south by New Hampshire, Vermont, New York, Connecticut, Rhode Island, and the Atlantic; on the east by Massachusetts Bay, a part of the Atlantic Ocean, from which the state derives its familiar name of the Bay State. The surface is uneven, varying from low plains, near the sea-coast, containing numerous small lakes, to a rolling country in the interior, becoming mountainous as the western boundary is approached. This mountainous portion is composed of two distinct ranges, being part of the Green Mountains, which here extend southward from the adjacent state of Vermont. The highest of the peaks is Greylock (3505 feet), but most of them are wooded to the summit, and the scenery, while not grand, is of great beauty. The soil is in many portions, particularly in the east, rocky and sterile, and the state contains several quarries of importance yielding granite and syenite, red sandstone, and valuable marble. In granite production Massachusetts is one of the most important states in the Union. Other products of value are clay and lime. There is not much mining. The soil of the river-valleys and of some other sections is fertile, the leading products being corn, potatoes, and tobacco. The fisheries are the most important in the Union, a large capital being invested and the annual product large.

The rivers, while not important for navigation, are the source of valuable water-power which has been utilised in industry, and in annual manufacturing output the state leads all others except New York and Pennsylvania. The chief manufactures are textiles, iron and other metallic goods, boots and shoes, food preparations, building materials, clothing, paper and wood-pulp, leather, wooden wares, &c. The leading textile industries are cotton, woollen, and worsted goods. There are 5000 miles of electric and steam railway in the state.

Massachusetts contains fourteen counties, and returns two senators and sixteen representatives to the federal congress. The state legislature is called the General Court of Massachusetts. Its sessions are biennial. The Senate consists of 40, the House of Representatives of 240, members. The executive branch of the government is vested in the governor, who is officially styled the governor of the commonwealth of Massachusetts, and whose title is His Excellency; lieutenant-governor, whose title is His Honour; and an advisory council consisting of eight members chosen by districts. The

governor, lieutenant-governor, and heads of the executive departments are elected annually. The cities of the commonwealth must have a population of at least 12,000. The towns (corporate bodies having less than 12,000 inhabitants) are governed by a board of selectmen elected by popular suffrage in an annual town meeting of all the voters in the town, which meeting also makes appropriations for the maintenance of the different departments of the town government. All judges in the commonwealth are appointed by the governor with the advice and consent of the council, and hold their office during good behaviour. The active military force of the state, the national guard, or organised militia, consists of some 10,000 officers and men. Besides this active militia all able-bodied male citizens between the ages of eighteen and forty-five, except exempt persons, are enrolled, and subject to military duty in time of exigency.

Popular education in Massachusetts, through the system of free public schools, is carried to a very high point. Public primary, grammar, and high schools are supported by taxation—tuition and textbooks being free; and there is a system of university extension teaching under the Advisory Board of Education. Massachusetts maintains ten normal schools, and there are in the state two technical institutes, and fifteen colleges and universities, the latter including Harvard, Williams College, Amherst College, and Boston University and College.

The leading cities of Massachusetts are Boston (pop. in 1920, 748,060), the capital and chief seaport; Worcester (179,754), with manufactures in metals and machinery; Springfield (129,614), with numerous manufactures; Holyoke (60,203), the centre of the paper manufacture; Fall River (120,485), Lowell (112,759), and Lawrence (94,270), devoted to cotton manufacturing; Lynn (99,148), Haverhill (53,884), and Brockton (66,254), boot and shoe centres; Salem (42,529) and New Bedford (121,217), both noted seaports of former days, and now possessing extensive cotton-mills; Taunton (37,137), with varied manufactures; Gloucester (22,947), noted for its fisheries; and Cambridge (109,694), near Boston, the seat of Harvard University; Somerville (93,091), Malden (49,103), Quincy (47,876), Newton (46,054), Pittsfield (41,763), Fitchburg (41,029), and Medford (39,038). Pop. of state (1800) 422,845; (1850) 994,514; (1890) 2,238,943; (1900) 2,805,346; (1910) 3,666,416; (1920) 3,852,356.

History.—The coast is supposed to have been visited by Northmen about the year 1000, but the first permanent settlement was made at Plymouth, near Cape Cod, 22d December 1620, by the company of the Pilgrim Fathers (q.v.), who were separatists from the English Church, and who sailed from Plymouth, England, in the ship *Mayflower*. This settlement became the nucleus of the Plymouth Colony. In 1628 a company of Puritans under Endicott settled at Salem upon the coast farther north, and, with later settlements at Boston, Lynn, and elsewhere, became the Massachusetts Bay Colony. The union of these two colonies was accomplished under a new charter granted in 1692. Under this last charter the governor, lieutenant-governor, and secretary were appointed by the king. Prior to this none but the Puritan forms of religion had been permitted in the colony of Massachusetts, and its history had been marked by bitter intolerance and cruel persecutions. Now a system was adopted under which the majority of each town or parish chose the minister, who was maintained by the taxes paid by all alike. No consideration was shown to the minorities, and the old Puritan establishment was virtually continued nearly everywhere. The last vestiges of this union between church and state were not swept away until 1833.

During the early years the colonists suffered great privations from the rigours of the climate, and they were also subjected to troubles with the Indians. They were, however, a hardy and industrious race, and gradually grew in numbers and prosperity. They were involved in the difficulties between England and France in the New World, and in the expeditions against the French in Canada, especially at the first siege of Louisburg (q.v.), the citizen soldiers of Massachusetts performed effective service. After the war of the revolution, begun in Massachusetts in 1776 with the battles at Lexington and Bunker Hill, the colony became one of the original thirteen states of the Union, under the name of the commonwealth of Massachusetts. The second half of the 19th century witnessed the change of Massachusetts from a largely agricultural to a manufacturing state, and now a majority of the population is urban; not because less land is cultivated, but because manufactures have increased much faster than agriculture.

See Hale, *Story of Massachusetts* (1892); Adams, *Massachusetts, its Historians and History* (1893).

Massacre. See ARMENIA, BARTHOLOMEW, BRICE, GLENCOE, &c.

Massa e Carrara, an Italian province. See MASSA.

Massafra, a town of the Italian province of Lecce, 11 miles NW. of Taranto. The 11,000 inhabitants grow olives, wine, and fruits.

Massage (Fr., 'kneading') is the term used in medicine to denote a system of treatment in which the manipulation and exercise of parts ('passive movement') are employed for the relief of morbid conditions. The term is used in an elastic sense, and comprises a variety of forms of treatment extending in the one direction towards the composite gymnastic exercises of Swedish origin (see SLOYD), so useful in favouring a sound physical development in children, and in the other towards the jerking and wrenching movements, empirically employed, and familiar in Great Britain under the name of 'bonesetting.' For the most part, however, massage corresponds to the application of kneading, stroking, and rubbing, separately or combined with each other.

Massage is as old as, if not older than, any other form of medical treatment. Hippocrates (600 B.C.), the 'Father of Medicine,' has left in his writings a description of its application and uses; observing that 'it loosens stiff joints and gives tone and strength to those which are relaxed; further, that 'it must be applied with soft hands and in all cases delicately.' In the Greek world, and also in the Roman (cf. Lytton's *Last Days of Pompeii*), massage formed a necessary complement to the toilet of the bath; but, apart from the slaves who were specially trained for such duties, there appears to have been a regular profession of 'rubbers' competing with, and often superseding the physicians of the period. The Chinese and the early races of India seem to have known the value of massage from a remote period, for it is frequently referred to in the ancient writings of both peoples. During the dark ages this method of treatment seems to have fallen into disrepute in Europe; and it was only within the later half of the 19th century that its practice was thoroughly re-established, and that on a scientific basis. It is largely due to Dr Mezger, a physician of Amsterdam, that massage has become once more a systematised mode of medical treatment. He began to treat sprains by this method in 1853, and from that time to the present his system has attracted much attention, and has spread widely over the European and American continents.

Two chief methods of application are employed: (1) Stroking, or rubbing with a gliding movement, affecting chiefly the superficial parts (*effleurage*). (2) Pressing, tapping, or kneading, affecting chiefly the deeper tissues, and in one locality at a time (*tapotement*). To these may be added an important combination of the two, viz.: (3) Friction with kneading (*pétrissage*), in which the tissues are at the same time rubbed longitudinally and squeezed laterally, both superficial and deeper tissues being thereby equally affected. In applying these methods the hand and fingers of the manipulator alone are used. As a rule, if the hands are soft and moist no emollient substance is required, and the best effects are produced without such aid. In all cases the movements follow a direction towards the trunk. In stroking (*effleurage*) the finger-tips pass first lightly over the affected surface, followed by the outspread palm of the hand, which exerts a slightly firmer pressure. In tapping (*tapotement*) the finger-tips, the knuckles, or the edges of the palm are firmly thrust against the affected areas, so as to act chiefly on the deeper tissues, by compressing them firmly against the bony framework of the part. In friction (*pétrissage*) the tissues are grasped and raised between the fingers and thumbs, and slightly compressed laterally as well as longitudinally as the manipulator's hands pass upwards over the part. The total time taken up in the application of one of these methods, or in a combination of any of them, should not exceed twenty minutes, and as a rule one such *séance* is sufficient in the twenty-four hours. An hour's rest should be taken after each *séance*.

The chief vital effects produced by massage are soothing of pain by reduction of the sensibility of the nerves of the skin; an acceleration in the circulation both of blood and lymph in the parts operated on; and, as a result, increased nutrition of healthy tissues and accelerated removal of morbid products. General and local applications of massage are practised in medicine—the former when some general effect is aimed at, as in nervous emaciation, and in the treatment of the apparently drowned; the latter in local injuries, as sprains and bruises, and in local manifestations of constitutional conditions, as rheumatic joint affections, neuralgia, tic, and sciatica. In purely local joint and bone diseases, while an active process of disease is present, it is, however, likely to do harm.

Massa'getæ, a wild and warlike people, who inhabited the broad steppes on the north-east of the Caspian Sea, to the northward of the river Araxes or Jaxartes. Herodotus says that they had a community of wives; that they sacrificed and devoured their aged people; that they worshipped the sun, and offered horses to him; that they lived on the milk and flesh of their herds, and on fish; that they fought on horseback and on foot with lance, bow, and double-edged axe. Cyrus is said to have lost his life in fighting against them, 530 B.C.

Massalia. See MARSEILLES.

Masséna, ANDRÉ, Duke of Rivoli, Prince of Essling, and the greatest of all Napoleon's marshals, was born at Nice, it is said of Jewish origin, 6th May 1758. He began life as a cabin-boy, and served fourteen years in the Sardinian army, but left it because his plebeian birth precluded him from promotion. Early in the French Revolution he joined a battalion of volunteers, and rose rapidly in rank, becoming in December 1793 a general of division. He distinguished himself greatly in the campaigns in Upper Italy, especially at Saorgio (1794), Loano (1795), and Rivoli (1797), and earned from his chief his famous surname of

enfant chéri de la victoire. After Jourdan's defeat at Stockach (25th March 1799) the chief command of the army in Switzerland devolved upon him in circumstances of great difficulty, but he kept his ground against the Archduke Charles, and finally by his crushing victory over Suvaroff at Zürich (1799) freed France from the danger of invasion. He defended Genoa in 1800. In 1804 Napoleon made him a marshal of the empire, and next gave him the command of the army of Italy. He kept the Archduke Charles in check, crushed him at Caldiero, and overran Naples. In 1807, after the battle of Eylau, he commanded the right wing of the French army, and at the end of the campaign was created Duke of Rivoli. During the peace he lost his left eye by accident at a hunting-party. In the campaign of 1809 against Austria he commanded on the right bank of the Danube, and covered himself with glory at Landslut, Eckmühl, and Ebersberg-on-Traun. On the second day of the battle at Aspern or Essling (22d May), with the most conspicuous bravery he covered the army in its crossing the Danube, and alone saved it from destruction, earning for himself the title of Prince of Essling. In 1810 he was sent to Spain to drive the English into the sea, and he compelled Wellington to fall back upon his impregnable lines at Torres Vedras. Finding it impossible to obtain any advantage, and harassed by lack of supplies, he made a masterly retreat, to find himself recalled with ignominy by his imperious master. His failure he himself ascribed to the disobedience of his subordinates, Ney and Junot. He offered his services, however, again, when Napoleon was preparing for the Russian campaign, but was entrusted only with the command in Provence, and in this position he remained till the Restoration, when he gave in his adhesion to the Bourbons, and was made a peer. On Napoleon's return from Elba he invited Masséna to follow him, but received no response. He refused to sit on Ney's court-martial, and denounced the competence of the court. He died 4th April 1817, and was buried in Pere-la-Chaise with the one word *Masséna* on his tombstone. In tactics Masséna resembled his master in quickness and fertility in resource. He was brave and indefatigable in the field, but as extortionate as a Roman prætor. His *Mémoires* were edited by General Kock (7 vols. 1849-50), and there is a *Life* by Toselli (1869). See Gachot, *Histoire militaire de Masséna* (1901 et seq.).

Massenet, JULES (1842-1912), composer, born at Montaud, near St Etienne, studied under Ambroise Thomas, and was professor of Composition at the Paris Conservatoire in 1878-96. He won the *Prix de Rome* in 1863, was favourably received as the composer of meritorious orchestral works and a comic opera, *La Grande Tante* (1867), and in 1873 took his place amongst the foremost of the younger composers of France, his fame being established by the comic opera *Don César de Bazan* (1872), the classical opera *Les Érinnyes* (1873), and the oratorio *Marie Madeleine* (1873). These were followed by the oratorios *Eve* (1875) and *La Vierge* (1879), the operas *Roi de Lahore* (1877), *Hérodiade* (1881), *Manon Lescaut* (1884), *Esclarmonde* (1889), *Thais* (1894), *Le Jongleur de Notre Dame* (1902), *Roma* (1912), *Cléopâtre* (1914), and others, and numerous instrumental pieces.

Massey, WILLIAM FERGUSON (1856-1925), New Zealand statesman, was born of Ulster stock at Limavady, near Londonderry. In 1870, when fourteen years of age, he went to New Zealand to rejoin his parents, who in 1862 had emigrated, and, having worked for a time on the land with his father, eventually settled at Mangere, near Auckland,

and became a prosperous farmer. Following varied experience in local government, he was in 1894 elected to parliament as Conservative member for Waitemata. In 1903 he became leader of his party, and in 1912, after eighteen years of opposition, prime minister in a Reform—this name had now been adopted by the Conservative party—government; this office he held till his death, from 1915 to 1919 in a Reform-Liberal coalition. Massey's chief work lay in his restoration of the fortunes of his party, in his procuring for Britain the complete support of New Zealand during the Great War, and in his efforts after the war to bring a return to normal conditions.

Massillon, JEAN BAPTISTE, one of the most distinguished of modern orators, was born at Hyères in Provence, 24th June 1663. His father was a notary and had designed him for his own profession, but at length in 1681 the boy obtained permission to follow his vocation and enter the congregation of the Oratory. Later, he subjected himself to a more rigorous discipline in the abbey of Sept-Fonts. His preaching power was soon discovered, and his funeral oration on M. Villars, the Archbishop of Vienne, established his fame, and led to his being summoned by Cardinal de Noailles to Paris, where he first had the opportunity of hearing Bourdaloue, whose style and manner powerfully influenced the young orator. It is said that the older preacher said when first he heard him, 'He must increase, but I must decrease.' Like Bourdaloue, he avoided the declamatory manner and theatrical action then popular in the French pulpit; and the earnest impressiveness of his face and voice more than counterbalanced the lack of such adventitious aids to effect. He gave a remarkable series of lectures in the seminary of St Magloire, and first preached before Louis XIV. in Advent 1699. It was to him that the king said, 'I have heard great orators in my chapel and have felt satisfied with them, but every time I have heard you I have felt dissatisfied with myself'—a saying which well expresses the characteristics of the fearless eloquence of this great orator, who, more than any of his contemporaries, was able to lay bare the secret springs of human action, and to use the feelings and the passions of his audience as arms against themselves. He was again appointed to preach the Lent at Versailles in 1704; but although the king was again equally warm in his admiration, Massillon was never afterwards invited to preach in his presence. In 1717 Massillon was named Bishop of Clermont, and next year preached before the young king, Louis XV., his celebrated *Petit Carême*—a series of ten short Lenten sermons. It was not till 1719 that he was consecrated Bishop of Clermont, in which year also he was elected a member of the Academy; and in 1723 he preached the funeral oration of the Duchess of Orleans, his last public discourse in Paris. From this time he lived almost entirely for his diocese, where his charity and gentleness gained him the love of all. He died of apoplexy, 28th September 1742. Bossuet and Bourdaloue contest with Massillon the palm of oratory, yet it is not too much to say that he was a greater preacher than either. By French critics he has been termed the Racine of the pulpit, and the name may pass as regards the purity and elegance of Massillon's language, though it takes no count of his characteristic directness and vigour. For impassioned denunciation of vice marks his preaching, no less than gentle persuasiveness to virtue, although it remains true that he is greatest in the latter. His sermons on the Prodigal Son, on the Deaths of the Just and the Unjust, for Christmas, and for the Fourth Sunday in Advent may be named among his masterpieces.

His sermons were collected by his nephew (15 vols. 1745-48); later editions are those of Renouard (1810), the Abbé Guillon (16 vols. 1828), and Blampignon (4 vols. 1886). See Sainte-Beuve's *Causeries du Lundi*, vol. ix.

Massinger, PHILIP, dramatist, baptised at St Thomas's, Salisbury, 24th November 1583, was a son of Arthur Massinger, a retainer of the Earl of Pembroke. In a dedicatory epistle to Philip Herbert, Earl of Montgomery, prefixed to *The Bondman* (1624), he mentions that his father spent many years in the service of the Herbert family, 'and died a servant to it.' On 14th May 1602 Massinger entered St Alban's Hall, Oxford, and he left the university without a degree in 1606. Gifford supposed that during his residence at Oxford he became a convert to the Roman Catholic faith; and the plays afford some evidence in support of this view.

Massinger was writing for the theatre during the lifetime of the stage-manager Philip Henslowe, who died in January 1615-16. At Dulwich College is preserved an undated letter (*circa* 1613-14) to Henslowe from Nathaniel Field, Daborn, and Massinger. The three playwrights were in financial distress and begged for an advance of five pounds ('without which we cannot be bailed') on a play which they were preparing. Their petition was granted. On 4th July 1615 Daborn and Massinger borrowed from Henslowe the sum of three pounds. In later years Massinger wrote many plays single-handed; but much of his work is mixed up with the work of other men, particularly Fletcher. His friend Sir Aston Cokayne, in an 'Epitaph on Mr John Fletcher and Mr Philip Massinger,' expressly states, 'Plays they did write together, were great friends.' Beaumont had a share in only a few of the plays ascribed to 'Beaumont and Fletcher;' but Massinger and Fletcher continued to work together long after Beaumont's death. Fletcher was buried in St Saviour's Church, Southwark, 29th August 1625; and Massinger was laid in the same grave, 18th March 1640.

Probably the earliest of Massinger's extant plays is *The Unnatural Combat*, a repulsive tragedy, printed in 1639. The first in order of publication is *The Virgin Martyr* (1622), partly written by Dekker, who doubtless contributed the beautiful colloquy between Dorothea and Angelo (II. i.). In 1623 was published *The Duke of Milan*, a fine tragedy, but too rhetorical. *The Bondman*, *The Renegado*, and *The Parliament of Love* were licensed for the stage between 3d December 1623 and 3d November 1624. In many of his plays Massinger introduces political allusions, and more than once his temerity was rebuked by Sir Henry Herbert, Master of the Revels. *The Bondman* contains some outspoken criticism on the feeble condition of the navy. There is considerable resemblance between *The Parliament of Love*, which was first printed by Gifford from a mutilated MS., and *A Cure for a Cuckold*, ascribed to Webster and Rowley (but not improbably the work of Massinger and Rowley). Of *The Roman Actor*, produced in 1626 and printed in 1629, Massinger declares 'I ever held it the most perfect birth of my Minerva.' It abounds in eloquent declamation, but is somewhat stiff. *The Great Duke of Florence*, produced on 5th July 1627, has a delightful love-story. Massinger's female characters are usually unattractive and sometimes odious; but in this comedy he has drawn a charming heroine—a modest, frank, warm-hearted girl. *The Maid of Honour*, published in 1632 and probably produced in 1628, is—like *The Bondman*—full of political allusions (as S. R. Gardiner showed). Massinger is always opposed to the court faction. *The Picture*, licensed for the stage 8th June 1629, and printed in 1630, has an improbable plot, but

is well written. *The Emperor of the East*, produced in 1631 and printed in 1632, bears some resemblance to *The Duke of Milan*. In both plays a man of passionate, ungovernable temper unjustly suspects his wife of infidelity; but *The Emperor of the East* ends happily. Nathaniel Field joined Massinger in writing the fine tragedy *The Fatal Dowry*, printed in 1632, but produced some years earlier. From this play Rowe's once-famous *Fair Penitent* was largely drawn, without acknowledgment. *The City Madam*, licensed for the stage in 1632, and *A New Way to pay Old Debts*, printed in 1633, are Massinger's most masterly comedies. There is no warmth or geniality about them; but, as satirical studies, they have Ben Jonson's strength without his ponderousness. *A New Way* has held the stage down to recent times. Sir Giles Mompesson, the infamous extortioner, is supposed to have been the original of Sir Giles Overreach, a character which has been personated by many famous actors. *The Guardian* (1633), *A Very Woman* (1634), and *The Bashful Lover* (1636) were printed together, 1 vol., in 1655. The most interesting is *A Very Woman*, which is Fletcher's play *The Woman's Plot* revised by Massinger. *Believe as You List*, produced on 7th May 1631, and first printed from MS. in 1844, relates to the adventurer who at the beginning of the 17th century claimed to be the Don Sebastian killed in 1578 at the battle of Alcazar. Massinger represents the claimant as a model of kingly dignity, worthy to rank with Ford's Perkin Warbeck. Though *Believe as You List* has survived, several other MS. plays of Massinger were destroyed by Warburton's cook towards the close of the 18th century. The powerful and stately *Tragedy of Sir John Van Olden Barnavelt*, produced in August 1619, written by Massinger and Fletcher, was printed for the first time from MS. in vol. ii. of Bullen's *Old Plays* (First Series), and was reprinted in Holland. In spite of the Lord Mayor's prohibition it was acted with applause by the king's men.

Massinger showed great care and skill in the construction of his plays. Other playwrights affect us more powerfully, but few can compare with Massinger for general excellence. He was not only a sincere, high-minded artist, but a keen observer of state affairs. Hence his writings have a historical as well as a literary interest. Some of his plays are (as Coleridge said) as interesting as a novel; others are as solid as a treatise on political philosophy. His versification is peculiar. He seems to have taken the metrical style of Shakespeare's latest plays as his model; but his verse, though it is fluent and flexible, lacks the music and magic of Shakespeare's. No writer repeats himself more frequently than Massinger; he had a set of favourite phrases that he constantly introduces. This trick of repetition, joined to his metrical mannerisms, helps us materially to distinguish his work from Fletcher's. Robert Boyle (in *Englische Studien*) and F. G. Fleay have discussed the difficult question how far Massinger was concerned in the authorship of plays that pass under the name of 'Beaumont and Fletcher.'

Massinger's plays were edited by William Gifford in 1805, 4 vols.; 2d ed. 1813. There are also editions by Hartley Coleridge (1840) and (from the text of Gifford) by Cunningham (1867). See also Koeppl in *The Cambridge English Literature* (vol. vi. 1910), essays by Swinburne and Leslie Stephen, and Cruickshank's study (1920).

Massinissa. See MASINISSA.

Masson, DAVID, an eminent Scottish author, born at Aberdeen, 2d December 1822, educated at Marischal College in that city, and at the university of Edinburgh. At nineteen he became editor of a Scottish provincial paper, and later joined the

literary staff of W. & R. Chambers. In 1847 he settled in London, writing for the reviews, the *Encyclopædia Britannica*, and the *English Encyclopædia*. In 1852 he succeeded Clough in the chair of English Literature in University College; in 1865 he became professor of English Literature in the university of Edinburgh, a post he resigned in 1895. Masson edited *Macmillan's Magazine* from 1859 to 1868. His first published work was his *Essays Biographical and Critical* (1856), reprinted with later essays in 3 vols. (1874-76) entitled respectively *Wordsworth, Shelley, and Keats*; *The Three Devils—Luther's, Milton's, and Goethe's*; and *Chatterton, a Story of the Year 1770*. His great work is his ponderous *Life of John Milton, narrated in connection with the Political, Ecclesiastical, and Literary History of his Time* (6 vols. 1859-80), the most complete biography of any Englishman, and of great value for contemporary history. Other works are *British Novelists and their Styles* (1859); *Recent British Philosophy* (1865); *Drummond of Hawthornden: the Story of his Life and Writings* (1873); the 'Cambridge' edition of *Milton*, with introductions, notes, and an essay on Milton's English (3 vols. 1874; new ed. 1890), the 'Golden Treasury' edition (2 vols. 1874), and the 'Globe' edition (1877). Later works are *De Quincey* (1878) in the 'Men of Letters' series, and his edition of De Quincey's works (14 vols. 1889-91), some volumes of *Sketches and Essays* (1892 and 1894), *Memories of Two Cities* (1911), and *Shakespeare Personally* (1911). In 1879-98 he edited the *Register* of the Privy Council of Scotland, and from 1893 till his death, 6th October 1907, he was Historiographer Royal for Scotland.

Massorah. See MASORAH.

Massowah, or MASSAUWA, a town built on a coral island off the west coast of the Red Sea, in 15° 36' N. lat., 39° 28' E. long. It was seized by Turkey in 1557, but in 1866 given by her to Egypt; and in 1885 it was occupied by Italy. The island is only about 1½ mile in circumference, and is connected with the mainland by a causeway, 1610 yards in length, resting on an intervening island. The population number about 7000 (exclusive of the garrison), of whom 200 are European, mainly Italian. Fishing for pearls and mother-of-pearl is the principal industry, but there is also a little fishing, and weaving of palm-fibres. Massowah is one of the most important harbours and trading-ports on the African coast of the Red Sea, and its trade is mainly with Arabian ports, Bombay, Suez, and Abyssinia. It is the terminus of a military railway into the interior. The chief exports are pearls and mother-of-pearl, ivory, ostrich feathers, coffee, tobacco, wax, precious stones, gold, and skins. Massowah is very hot (mean of the year 85° 8' F.) and very unhealthy; nevertheless the advantages of its site led the Italians to make it the capital of Eritrea. It was superseded by Asmara in 1900.

Massys. See MATSYS.

Master. See COURTESY TITLES.

Master, in the royal navy, was an officer ranking with, but junior to, lieutenants, and charged with the details of sailing the vessel, under the general orders of the captain. Now the title has been changed to 'navigating lieutenant.' In the merchant navy the master of a vessel, usually, by courtesy, denominated the captain, is the officer commanding her.

Master and Servant. The relation of master and servant arises out of a contract of hiring and service. Under such a contract one person agrees for a wage or other valuable consideration to work subject to the orders of another. The contract may be express or inferred from

conduct. Under a contract of service the employer has a right not only to direct what work the servant is to do but also the manner in which the work is to be done. The relation of master and servant exists only between persons of whom the one has the order and control of the work done by the other. This is the main test to be applied in determining whether a contract, involving the performance of work or the rendering of services, does or does not constitute the relation of master and servant.

A contract of hiring and service, either as master or servant, may be entered into by any person of ordinary contractual capacity. The contract of an infant to serve or do work for another is presumed to be for the infant's benefit, and is therefore *prima facie* binding on him. The fact that the contract includes some stipulations which, taken by themselves, are not beneficial from the infant's point of view will not render it unenforceable against him if the conditions agreed on, taken as a whole, are not unfair or detrimental to him.

The consideration for a contract of service is, as a rule, an agreed sum to be paid in wages. (As to preferential claims for wages on the bankruptcy of the employer, see BANKRUPTCY.) Wages or other remuneration for services can only be recovered when it can be shown that there was a contract, express or implied, that payment should be made. The mere fact that services are performed or work done for another does not infer that remuneration is payable therefor. A contract of service normally contains terms dealing with the services to be rendered and the wages to be paid. But in many such contracts there are no express stipulations as to either the services or the wages, the parties being content to rely on certain trade customs or usages as imported into the contract. The wages of workmen in industrial employments may be calculated upon the time worked, 'time rates,' or the work done, 'piece rates.' In some trades wages are regulated by sliding-scale agreements. When remuneration is due for work done, but there is no special agreement as to its amount, the person employed is entitled to receive a reasonable reward for his services. In such cases, where a certain rate of remuneration is customary for the particular kind of work done, that rate is taken to be reasonable. The remuneration of a servant may consist, in whole or in part, of a share in the profits of a business. The Partnership Act, 1890, sect. 2, expressly provides that a contract for the remuneration of the servant or agent of a person engaged in a business by a share in the profits of the business does not of itself make the servant or agent a partner in the business or liable as such.

Under the Truck Acts, 1831 to 1896, the wages of workmen—that is, broadly speaking, persons engaged in manual labour other than menial or domestic servants—must be paid in lawful current coin, and not in goods or otherwise. Stipulations that the workmen shall spend his wages in any particular manner or at any particular shop are prohibited. The Acts also contain provisions designed to prevent unreasonable deductions being made from the wages of workmen in respect of fines or damaged tools and materials. (See TRUCK SYSTEM.) By statute (46 and 47 Vict. chap. 31) the payment of wages to any workman, within the meaning of that term in the Truck Acts, at or within any public-house or place for the sale of spirituous liquors is prohibited, unless paid by the resident owner or occupier himself to persons *bona fide* employed by him.

The servant must enter upon his service and continue it for the time agreed. He must serve his master faithfully, obey lawful orders, and

exercise reasonable care and skill. The master on his part must receive the servant into his service and retain him as his servant for the time agreed. He must pay the servant his wages and perform any other obligations undertaken to the servant under the contract. The master is bound to indemnify the servant for all expense, loss, or liability incurred by the servant in obeying the master's lawful orders or in doing, by the master's authority or in the reasonable performance of the duties of the employment, any act which is not plainly unlawful. On the other hand, a servant is not entitled to be indemnified against the consequences of his own unlawful act. Where, however, the act done by the servant was one which was not obviously unlawful and which the servant was induced by his master's conduct to believe to be lawful, the servant will not be deprived of his right to indemnity by reason of the act turning out to have been unlawful. A master is not bound to give his servant or former servant a testimonial or 'character' on leaving his employment, or to answer inquiries by persons who are thinking of taking him into their service. But if, in doing so, he uses words which are *prima facie* a slander or a libel upon the servant, the occasion is one of qualified privilege, and the servant can only recover damages for the slander or libel on proving that the statement was made maliciously (see CHARACTER TO SERVANT).

The duration of a contract of service is fixed by the agreement of the parties or by usage. Where the contract is for a period of a year or less it may be made orally. Where it is for a longer period than a year, or for a year which is to commence on a date subsequent to the date of the making of the contract, it is not enforceable by action unless it is in writing. If a contract of service is entered into without any definite time being expressed or implied for its duration the hiring is considered a general hiring, and is presumed in law to be a hiring for a year; but this presumption may be rebutted by stipulations or other circumstances showing a contrary intention. Where the only circumstance from which the intended duration can be inferred is the reservation of wages at so much a week or so much a month, it is presumed to be a weekly or monthly hiring; but the mere fact of wages being payable weekly or monthly is not conclusive as to the duration of the hiring or inconsistent with a yearly hiring.

A contract of employment may be terminated by either party giving due notice to the other. The length of notice may be provided for in the contract or may be implied from custom or trade usage. In the case of domestic and menial servants, their engagement is determinable by a month's notice on either side; and the master may determine it at any time on paying or tendering a month's wages in lieu of notice. The courts have also taken judicial notice of a custom in domestic service that the service may be terminated at the end of the first month by notice given at or before the end of the first fortnight. The custom of one month's notice does not in general apply to industrial workmen. Where there is no stipulation as to notice and no custom as to notice exists in the trade or employment, the contract is terminable by reasonable notice—the question of what is reasonable notice in particular cases being one of fact, dependent on the nature of the service and the circumstances of the case. The master is justified in terminating a contract of service by dismissing the servant without notice or compensation if the servant wilfully disobeys any lawful order of the master, or is grossly insolent, or is guilty of misconduct inconsistent with the fulfilment of the express or implied conditions of his service, or

habitually neglects his duties or proves to be incompetent for the duties which he undertook. Similarly, the servant is justified in terminating his engagement if the master fails to carry out his part of the contract. A contract of service is conditional upon the servant's health continuing to be such that he can perform his duties. A temporary illness of the servant does not put an end to the contract; but if the servant's incapacity through illness is likely to be permanent, or to last so long that, having regard to the nature of the employment and the length of the term for which the agreement was made, it would be unreasonable to expect the master to keep the servant, the master is entitled to terminate the contract and dismiss the servant. Until the contract is brought to an end the master must continue to pay the servant the full remuneration due to him under the contract.

If either the master or the servant commits a breach of the contract, the other party to the contract is entitled to recover damages. Where a servant is wrongfully dismissed he can recover from his master such damages as will compensate him for the loss which he has actually sustained, including the amount of wages earned but not paid at the date of his dismissal, and the pecuniary loss resulting from his being prevented, by the master's breach of contract, from earning prospective wages under the contract. A domestic servant, on being wrongfully dismissed, can recover a month's wages in addition to wages already due, if any. He, as a rule, is not entitled to recover 'board wages'—i.e. compensation for loss of board and lodging; but where he has been wrongfully dismissed during the currency of a month's notice given by him to terminate the service he is entitled to receive, in addition to ordinary wages, 'board wages' during the period between the date of the wrongful dismissal and the date when the service would have terminated under the notice. Where it is clearly within the contemplation of the parties to the contract that the servant should be at liberty to receive 'tips,' the servant is entitled to claim, as part of the loss sustained by him, an amount in respect of the loss of the tips which he would have received but for the wrongful dismissal. A servant wrongfully dismissed must make reasonable efforts to obtain other suitable employment so that the loss resulting to him from the wrongful dismissal may be diminished. An unreasonable refusal on his part to accept other employment will have the effect of reducing the damages he can recover. It is now settled that the damages recoverable by a servant for wrongful dismissal cannot include compensation for the manner of dismissal or for his injured feelings or for the loss he may sustain from the fact that his having been dismissed of itself makes it more difficult for him to obtain fresh employment. In an action for wrongful dismissal it is a sufficient defence if the master can show that a good ground for dismissal did in fact exist at the time of the dismissal, even though the master may have alleged another ground of dismissal or may have been unaware that such ground of dismissal existed.

A person who knowingly and designedly interrupts the relation subsisting between master and servant by procuring the servant to depart from the master's service or by harbouring and keeping him as servant after he has quitted his place and during the stipulated period of service, whereby his master is injured, commits a wrongful act, for which he is responsible in damages. But the Trade Disputes Act, 1906, sect. 3, enacts that an act done by a person in contemplation or furtherance of a trade dispute shall not be actionable on the ground only that it induces some other person to break a contract

of employment or that it is an interference with the trade, business, or employment of some other person.

A master is liable to third persons upon a contract entered into by his servant where he has expressly authorised the servant to make the contract. He is not, as a general rule, liable upon contracts made by his servant without express authority; but the servant's authority to bind his master may be implied from the circumstances of the case. Thus, a servant may bind his employer by contract if the duties of his employment are such that it is necessary and customary to make contracts of the kind in question in order to enable him to perform these duties, or if the master has previously held him out to third persons as having authority to bind him.

A master is civilly responsible to third persons for the negligence or wrongful act of his servant committed in the course of his employment. This responsibility is founded on the principle that every man in the management of his own affairs, whether by himself or by his agents or servants, is bound so to conduct them as not to injure another. The master, having the right to choose his servants and to control the manner in which they do their work, is responsible not merely for what he authorises his servant to do but also for the way which the servant does it. Hence a wrongful act or omission of a servant is deemed to be done in the course of his employment and renders his master liable to third parties, not only if it has been authorised by the master but also if it be a wrongful, negligent, or unauthorised way of carrying on the work in which the servant is employed or of doing what he was authorised to do. The fact that the wrongful act of the servant had been forbidden by the master does not afford a defence to the master if the act was a mode of doing what the servant was employed to do. The liability of a master extends even to a wilful wrong, such as fraud or assault, committed without the master's knowledge, by the servant in the course of his service. It was formerly thought that where the fraud or other wilful wrongdoing of the servant was committed for his own benefit and not in the master's behalf the master was not responsible. But it is now settled that, if the servant was acting within the scope of his employment, his employer is liable for fraud or other wilful wrong committed by the servant even if the servant's sole intention was to benefit himself. On the other hand, the master is not liable for the acts of his servant outwith the scope of the servant's employment unless he has expressly authorised them or has subsequently adopted them for his own use and benefit. A master is not, generally speaking, criminally responsible for the acts of his servant unless he has himself authorised them. But under certain statutes the master is made criminally liable for acts done by the servant in the course of his employment, although he was unaware of what the servant had done. Thus, under the Licensing Act, 1910, a publican is liable for the conduct of his servants if they supply refreshments to a constable on duty or if they permit gaming to be carried on upon the licensed premises.

A master—as the law stood prior to the Employers' Liability Act, 1880, and the Workmen's Compensation Act, 1897—was not liable for the wrongful act or omission of his servant if the person injured was himself a fellow-servant of that servant. For the rule of common law was and, independently of the statutory law on the subject, is that, in such a case, the employer can set up the defence of 'common employment'—a defence based on the doctrine that a servant, when he engages to serve a master, undertakes, as between himself and his master, to accept all the ordinary risks of the service, including

the risk of negligence upon the part of a fellow-servant. All persons engaged under the same employer for the purposes of the same business are fellow-servants in a common employment within the meaning of this common-law rule. It makes no difference if the servant by whose negligence another servant is injured is a foreman or manager in the same employment, whose orders the injured servant was bound to obey. A workman who has been injured in the course of his employment can at common law recover compensation from his employer only where it is shown that the employer has been guilty of personal negligence or has not provided competent fellow-servants, or has failed to supply safe and proper machinery.

The rule of common law that a master is liable to any person not in his employment for the negligence of his servant but is not liable for such negligence where the person injured is in his employment frequently bore harshly on workmen who had sustained personal injuries in the course of their service. The Employers' Liability Act, 1880 (43 and 44 Vict. chap. 42), was passed for the purpose of mitigating this harshness. The statute, while it does not abrogate the doctrine of common employment, has greatly modified its application, and has gone far to do away with the distinction, as regards a master's liability for the negligence of his servant, between the position of a workman injured in the course of his employment and that of a person who, not being in the master's employment, has been injured. For the general effect of the statute, in cases to which it applies, is to extend to a workman injured in the course of his employment the same rights and remedies against the employer as if the workman had not been in the service of that employer. The workmen entitled to the benefit of the Act are railway servants and persons engaged in manual labour under a contract with an employer (as defined in the Employers and Workmen Act, 1875, *vide infra*, p. 82) other than domestic or menial servants and seamen. An employer is made liable in damages for personal injury to a workman caused by: (1) any defect in the condition of the ways, works, machinery or plant, provided that the defect arises from, or has not been discovered or remedied owing to, the negligence of the employer or of some person in his service entrusted by him with the duty of seeing that these things are in proper condition; (2) negligent superintendence on the part of any servant whose sole or principal duty is that of superintendence and who is not ordinarily engaged in manual labour; (3) the negligence of any servant to whose orders the workman injured was, at the time of the injury, bound to conform, where the injury resulted from his having so conformed; (4) the act or omission of any servant done or made in obedience to the rules or bye-laws of the employer, or in obedience to particular instructions given by any person delegated with the authority of the employer in that behalf, where the injury results from some impropriety or defect in the rules, bye-laws, or instructions; (5) the negligence of a servant having the charge or control of any signal, points, locomotive-engine, or train upon a railway. The workman injured cannot recover if he knew of the defect or negligence which caused his injury and did not, within a reasonable time, inform the employer or some one superior to himself in the service, unless he was aware that the employer or such superior already knew of the defect or negligence. The amount of damages recoverable under the Act is limited to a sum equal to the estimated earnings of a person in the grade, employment, and district of the workman injured during the three years preceding the injury. Notice of the injury must be given to the employer

within six weeks. The action must be commenced within six weeks from the time of the injury, or, in case of death, within twelve months from the time of death. In case of death the want of notice is no bar to the maintenance of the action if the judge thinks there was reasonable ground for such want of notice.

The Workmen's Compensation Act, 1897, now superseded by the Act of 1906 as amended by the Act of 1923, introduced a wholly new principle under which employers, in cases covered by the Acts, are in effect made the insurers of their workmen against accidental injury arising out of and in the course of the workman's employment. The obligation of compensation under these statutes is independent of any negligence on the part of the employer or the fellow-servants of the workman, and is made part of every contract of employment to which the statutes apply. The definition of 'workman' under the Acts is very comprehensive. Under sect. 13 of the Act of 1906 it includes any person who has entered into or works under a contract of service or apprenticeship with an employer, whether by way of manual labour, clerical work, or otherwise, and whether the contract is expressed or implied, is oral or in writing. Section 7 of the Act of 1906 expressly provides that the Act shall, subject to certain modifications, apply to persons employed as members of the crew of any British ship. Under sect. 9 of the Act of 1923 the definition of 'workman' is further extended to include persons engaged in plying for hire with vehicles or vessels the use of which is obtained from the owner under a contract of bailment or, in Scotland, a contract of letting to hire; professional players engaged or paid through a club; and persons, not being members of the crew, engaged for certain purposes on board ship. The cardinal test is that the relation of master and servant must exist between the person against whom the claim is made and the person who makes the claim. Certain classes of persons, however, are expressly excluded: (1) Persons employed otherwise than by way of manual labour whose remuneration exceeds £350 a year; (2) persons whose employment is of a casual nature and who are employed otherwise than for the purposes of the employer's trade or business; (3) members of the police force; (4) outworkers to whom articles are given out to be made up, cleaned, washed, or repaired in their own homes or on other premises not under the control of the person giving out the articles; (5) members of the employer's family dwelling in his house.

An injury, to give rise to a claim under the Acts, must be 'personal injury by accident.' The word 'accident' is to be taken in its popular and ordinary sense, as denoting an unlooked-for mishap or untoward event which is not expected or designed. Certain industrial diseases—specified in Schedule III. of the Act of 1906 and in Orders subsequently issued by the Secretary for State—are, for the purposes of compensation, deemed personal injury by accident. The accident must arise out of the workman's employment and also in the course of that employment. Both these conditions must be fulfilled. It is now settled by decisions of the House of Lords that an accident only arises out of and in the course of the employment when a causal connection exists between the employment and the accident. Section 7 of the Act of 1923 provides that an accident resulting in the death or serious and permanent disablement of a workman shall be deemed to arise out of and in the course of his employment, notwithstanding that the workman was at the time when the accident happened acting in contravention of any statutory or other regulation applicable to his employment,

or of any orders given by or on behalf of his employer, or that he was acting without instructions from his employer, if such act was done by the workman for the purposes of, and in connection with, his employer's trade or business. Compensation is not payable when it is proved that the injury was attributable to the workman's 'serious and wilful misconduct'; but the employer cannot escape liability on this ground in cases where the injury to the workman results in death or in serious and permanent disablement.

Where death results from the injury the compensation is a lump sum payable to the dependants of the workman. 'Dependants' are such of the members of the workman's family (wife or husband, parent or grandparent, step-father, step-mother, son, daughter, grandchild, step-son, step-daughter, brother, sister, half-brother, half-sister) as were wholly or in part dependent upon the earnings of the workman at the time of his death or would, but for the incapacity due to the accident, have been so dependent. Where the workman, being the parent or grandparent of an illegitimate child, leaves such child so dependent on his earnings or, being an illegitimate child, leaves a parent or grandparent so dependent upon his earnings, the word 'dependant' includes such illegitimate child and such parent or grandparent respectively. If the deceased workman leaves dependants who were wholly dependent upon him, the lump sum payable is an amount equalling 156 times his average weekly wages; but in no case more than £300 or less than £200. If he leaves dependants who were partially dependent the compensation is assessed according to the extent to which they were dependent upon him. Where the injury does not result in death, but in total or partial incapacity for work, the compensation is a weekly payment during the incapacity. The maximum weekly payment in case of disablement was, by the Act of 1923, increased to thirty shillings. In cases of total incapacity the weekly payment is an amount not exceeding 50 per cent. of the workman's average weekly earnings; but if that amount is less than twenty-five shillings a week the workman is entitled to a weekly addition, on a scale prescribed by the Act, which is treated as if it were part of the weekly payment. In cases of partial incapacity the Act of 1923 abolished the former discretionary power of the arbitrator to award such part of the difference between pre-accident and post-accident earnings as he might think proper, and has reduced the assessment of compensation to an arithmetical calculation. The main factors on which this calculation is based are the amount of the average weekly earnings of the workman before the accident and the average weekly amount which he is earning or is able to earn in some suitable employment or business after the accident. In ascertaining the compensation regard must be had to any payment, allowance, or benefit which the workman may receive from his employer during the period of his incapacity. Any weekly payment can be reviewed at the request either of the employer or workman, and, on such review, may, where a change of circumstances has occurred, be ended, diminished, or, subject to the maximum, increased.

Notice of the accident must—except in certain circumstances when the giving of notice is excused—be given to the employer as soon as practicable after the accident has happened and before the workman voluntarily leaves the employment in which he was injured. Under the Act of 1923 the notice may be given either in writing or orally. The notice must contain the name and address of the injured person, the cause of the injury, and the date of the accident. A claim for compensation has to be made within six months from the occur-

rence of the accident, or, in case of death, within six months from the time of death. The claim need not be made in any formal manner, but must be made in some definite form. A mere notice of accident is not a claim. A workman who has given notice of an accident must, if so required by the employer, submit himself for examination by a duly qualified medical man provided and paid for by the employer. So also where a workman is in receipt of a weekly payment the employer is entitled to require him from time to time to submit himself for medical examination. Where a weekly payment has been continued for not less than six months it may, on application by the employer, be redeemed by payment of a lump sum. The Act of 1923, sect. 24 (7), contains special provisions applicable to the case where the injured workman is under twenty-one years of age at the date when the application for redemption is made.

Any question arising as to liability to pay compensation or as to the amount or duration of compensation may be settled either by agreement or by arbitration under the Acts. An agreement may be made orally or in writing, or may be implied from the actions of the parties. A memorandum of the agreement should be sent to the registrar of the county court, or, in Scotland, to the sheriff clerk, who on being satisfied as to its genuineness must record it, whereupon it is for all purposes enforceable as a county court judgment or, in Scotland, as a sheriff court decree. In England arbitrations under the Acts usually take place before the county court judge or some person appointed by him. Under the Act of 1923, sect. 11 (3), the judge may in any case, if he thinks fit, and must, if either party so requires and gives security for the prescribed fee, summon a medical referee to sit with him as assessor. An appeal lies to the Court of Appeal and thence to the House of Lords from the decision of a county court judge on any question of law. In Scotland an appeal lies from the arbitrator—the sheriff—by stated case on a question of law to the Court of Session and thence to the House of Lords.

Where the injury is so caused as to give the workman a right to damages against the employer at common law or under the Employers' Liability Act, 1880, he may, at his option, either claim compensation under the Workmen's Compensation Acts or bring an action for damages. The workman is put to his election to take the one course or the other. Under the Act of 1923, sect. 18, however, the workman, provided he brings the action for damages within six months from the occurrence of the accident causing the injury, is entitled, if it be held in such action that the injury is one for which the employer is not liable in damages, to ask the court which determines that action to award him compensation under the Workmen's Compensation Acts, subject to the deduction of costs caused by his bringing the action for damages instead of taking arbitration proceedings. Where the injury is so caused as to give the workman a right to damages against a third person, he can both bring an action for damages against that third person and claim compensation from the employer, but he cannot recover damages from the third party and also compensation from his employer in respect of the same injury.

Disputes arising out of contracts of service have long been the subject of statutory regulation. For many centuries the justices of the peace exercised, under various statutes, important functions in the determination of such disputes. The Conspiracy and Protection of Property Act, 1875 (38 and 39 Vict. chap. 86), repealed the Master and Servant Act, 1867, and other statutes under which the justices were empowered to inflict fine and imprisonment in

case of breach of contract or other misconduct. That statute makes the wilful and malicious breach of a contract of service an offence punishable with fine or imprisonment in only two cases: (1) where the person in breach knows or has reasonable cause to believe that the probable consequences of his breach of contract will be to endanger human life or cause serious bodily injury, or to expose valuable property to destruction or serious injury; and (2) where the person in breach is employed in the supply of gas or water. (For the law as to combinations of workmen or of masters, see COMBINATION, CONSPIRACY, TRADE UNIONS.) In disputes between an employer and a workman a county court, or, in Scotland, the sheriff court, possesses, under the Employers and Workmen Act, 1875 (38 and 39 Vict. chap. 90), a special statutory jurisdiction to adjust and set off the one against the other all claims on the part either of the employer or of the workman arising out of the employment, and, in cases of breach of contract, to take security for the performance of the contract in lieu of awarding damages. The powers thus conferred by the Act on a county court may, in cases where the amount claimed does not exceed £10, be exercised by a court of summary jurisdiction—the justices, in relation to any such dispute, being deemed to be a court of civil jurisdiction. The expression ‘workman,’ as defined in this Act, does not include a domestic or menial servant but, subject to that exclusion, extends to ‘any person who, being a labourer, servant in husbandry, journeyman, artificer, handicraftsman, miner, or otherwise engaged in manual labour,’ has entered into or works under a contract with an employer, whether the contract be a contract of service or a contract personally to execute any work or labour. The Conciliation Act, 1896 (59 and 60 Vict. chap. 30), was passed with the view of preventing disputes through the establishment of conciliation boards representing both employers and workmen. Provision is made under this Act and a subsequent Act passed in 1916 for the registration of such boards at the Ministry of Labour, and for the intervention of the Ministry of Labour itself in order to bring about the amicable settlement of trade disputes. The Industrial Courts Act, 1919, established a permanent industrial court, consisting of persons appointed by the Minister of Labour, to which trade disputes may be referred for settlement, and also made provision for the setting up of courts of inquiry into the causes and circumstances of any actual or apprehended trade dispute. The Act does not bring into operation any principle of compulsory arbitration, as the consent of both parties to an industrial dispute must precede any reference to the industrial court. But such consent is not required for the purpose of setting up a court of inquiry into the causes and circumstances of a dispute.

In recent years parliament has intervened to secure payment of minimum rates of wages in certain industrial employments. Under the Coal Mines (Minimum Wage) Act, 1912, it is an implied term of every contract for the employment of a workman underground in a coal mine that the employer shall pay to that workman wages at not less than the minimum rate settled by the joint district boards appointed for that purpose in the various districts concerned and applicable to that workman. The district boards are also entrusted with the duty of making district rules regarding the exclusion from the right to wages at the minimum rate of aged and infirm workmen and of workmen who fail to comply with conditions as to regularity and efficiency of work. Again, under the Trade Boards Acts, 1909 and 1918, trade boards, on which both employers and

workers are represented, have been established for the purpose of fixing minimum rates of wages for both time-work and piece-work in certain trades. Trade boards were first instituted in 1909 pursuant to the Act of that year, which was passed as a result of the inquiries into the conditions existing in a number of industries. In 1916 the Ministry of Labour was made the central authority. Trade boards are established not only in the trades specified in the Acts but also in other trades to which the Acts have been applied from time to time, as provided in the Act of 1918, by special order of the Minister of Labour on his being satisfied that no adequate machinery exists for regulating wages throughout the trade. After rates have been fixed by a trade board and made obligatory by order of the Ministry of Labour an employer is punishable for employing any persons at wages lower than the rates so fixed. The rates fixed by a trade board may be fixed so as to apply universally to the trade, or so as to apply to any special process in the work of the trade, or to any special class of workers in the trade, or to any special area. (As to statutory provisions regulating working conditions, see FACTORY AND WORKSHOPS ACTS, MINING.) The statutory regulations with respect to contracts of sea service are contained in the Merchant Shipping Acts.

In Scotland the relation of master and servant is constituted by a contract, *locatio conductio operarum*, in which the one party hires the services of the other in a particular capacity. A contract *locatio conductio operis*, in which a person undertakes for a consideration to do a particular job or perform a specific service for another, does not subject the person undertaking the work to the order and control of the other as to the manner in which he shall do his work and does not create the relation of master and servant. The rules of Scots law regulating the control of service are, generally speaking, substantially similar to those of English law, and the modern statutes affecting the incidents of such a contract apply to both countries. A contract of service for not more than a year may be constituted by verbal agreement and proved by parole evidence. A contract of service for more than a year is not binding unless it is constituted by a writing probative of both parties. If the period of service is not expressed in the contract, certain presumptions, applicable to ordinary classes of service, arise in regard to the duration of the engagement. Thus domestic servants are presumed to be hired by the half-year, beginning at Martinmas or Whitsunday, and farm servants and gamekeepers by the year; but these presumptions yield to proof of a contrary intention, regard being had to the circumstances of the case and the custom of the district in respect of the particular kind of service. Under the Removal Terms (Scotland) Act, 1886 (53 and 54 Vict. chap. 36), where a servant is hired by the year or half-year commencing or expiring at one or other of the terms of Whitsunday or Martinmas, he, in the absence of express stipulation to the contrary, is bound to enter upon or quit the service on 28th May or 28th November at noon, or on the following day at noon when the term falls on a Sunday. In the case of those classes of servants—agricultural, domestic, and the like—who are customarily hired by the year or half-year, the engagement, if at the expiry of the period no other arrangement is made by the parties, is held to be renewed by tacit relocation for another period of the same duration. In order to prevent the operation of tacit relocation it is necessary that notice or warning be given by the master to the servant or by the servant to the master forty days before the term. The notice or warning may be express or may be implied from words or acts

plainly indicating that the contract is to come to an end. In the case of other servants, where there exists no stipulation or custom in the employment as to the length of notice, reasonable notice must be given. The wages of labourers, farm servants, manufacturers, artificers, and work-people were, by statute (33 and 34 Vict. chap. 63), declared free from any arrestment unless in so far as they exceed twenty shillings a week, or unless the arrestment is in virtue of a decree for aliment or for rates and taxes, and sets forth the nature of the debt; and by the Small Debt (Scotland) Act, 1924 (14 and 15 Geo. 5, chap. 16, sect. 2), the limit was raised to thirty-five shillings a week. Servants' wages fall within the triennial prescription (see DEBT) unless in cases where the debt or action for wages is founded on a written obligation. The prescription applies to the wages of any kind of servant. The three years are reckoned from the date when the wages fell due, each term's wages running a separate prescription. The effect of the triennial prescription is not to extinguish the debt but to alter the *onus* of proof and limit the mode of proof. When the prescription has run the creditor must prove not only that the debt was incurred but that, three years afterwards, it was still resting owing, and he is limited to proof by the writing or the oath of the debtor.

The system of National Health Insurance and Unemployment Insurance, established by recent statutes, is dealt with *sub voce* INSURANCE.

On English Law of Master and Servant, see C. Manley Smith (London, 7th ed. 1922); J. Macdonell (2d ed. 1908); on Scots Law of Master and Servant, Fraser (3d ed. 1882); Umpherston (1904); on Workmen's Compensation Acts, W. A. Willis (23d ed. 1925); Elliott (8th ed. 1925, by Berryman); on Employers' Liability to their Servants, Dawbarn (4th ed. 1911); Slessor and Henderson, *Industrial Law* (ed. 1924).

Reference is made to the following articles:—

Apprentice.	Conspiracy.	Trade Unions.
Character to Servant.	Debt.	Truck System.
Combination.	Factory Acts.	

Master of Arts (abbreviated M.A., and sometimes, particularly in America, A.M.) is a degree conferred by universities and some colleges. In the universities of England this title follows that of Bachelor (q.v.). The dignity of Master (*Magister artium liberalium*) was held in high esteem in the middle ages. In Germany it is now obsolete, having been superseded by that of doctor. A Master has the right to vote in congregation or convocation at Oxford, and in the senate at Cambridge, and consequently enjoys the university franchise; in the Scottish universities Masters (there are no Bachelors of Arts) are members of the General Council, and as such elect the parliamentary representatives for the university. See DEGREES.

Master of Ceremonies, of the Rolls, &c. See CEREMONIES, ROLLS, &c.

Masters, EDGAR LEE, American author, was born at Garnett, Kansas, in 1869, and admitted to the bar in 1891. In 1893 he published *A Book of Verses*. 1905 saw the issue of *Blood of the Prophets*, and 1907 and 1908 two plays, *Althea* and *The Trifler*. *Spoon River Anthology* (1915), by which he is chiefly known, is a collection of clever satirical verse epitaphs on (and professedly by) the 'dear departed' of a small middle western town. Later work, as *Starved Rock* (1919), *Domesday Book* (1921), and *Children of the Market Place* (1923), has not gained the same popular appreciation.

Masterwort (*Peucedanum Ostruthium*), a perennial herb of the natural order Umbelliferae. It is a native of Europe, and is found in moist pastures in some parts of Britain, but apparently naturalised rather than indigenous, its root having formerly been much cultivated as a pot-herb, and held in great repute as a stomachic, sudorific,

diuretic, &c. The root has a pungent taste, causes a flow of saliva and a sensation of warmth in the mouth, and often affords relief in toothache. *Astrantia major*, a herb belonging to the same natural order and having similar properties, is also named Masterwort.

Mastic, a species of gum-resin yielded by the Mastic or Lentisk tree (*Pistacia Lentiscus*, natural order Anacardiaceae). It oozes from cuts made in the bark, and hardens on the stem in small round tear-like lumps of a light straw colour, or, if not collected in time, it falls on the ground, where it acquires some impurities. Its chief use is in making the almost colourless varnish for prints, maps, drawings, &c. It is also used by dentists for stopping hollow teeth, and was formerly employed in medicine. The chief source is the island of Chios, where a particular variety of the tree has been cultivated for about 1000 years.—The name of mastic is also given to oleaginous cements, composed of about 7 parts of litharge and 93 of burned clay, reduced to fine powder, made into a paste with linseed-oil.

Mastiff. The characteristics of the mastiff group of dogs are very marked and constant. One variety of the breed has been known from ancient times as the English, another as the Bordeaux or mastiff of Gaul. These may be classed as the European, while another kind is the Asiatic, of which the Tibetan is perhaps the most typical. No group of domestic dogs has more appearance of being an original and distinct species, although the English mastiff has been crossed and recrossed from time to time, principally with the object of increasing the size; and, while the blood of the Asiatic variety was very probably introduced at an early date, subsequently crosses with the Alpine mastiff, the St Bernard, the boarhound, and the bulldog have undoubtedly been introduced, and the modern English mastiff must be regarded as a composite breed.

The English mastiff is thick-set and powerful, with a large head and broad, short, truncated muzzle, large, thick, pendulous lips, ears formerly often semi-erect, now hanging and of moderate size, smooth-coated, with frequently a full but not bushy tail. This variety formerly averaged from 25 to 28 inches at the shoulder, but since the middle of the 19th century, owing to repeated crossing and selection, an average of from 30 to 32 inches has been obtained, perhaps somewhat to the loss of muscular power and activity. The colours are all shades of fawn, tan, and black, with and without mixture of white. Formerly red and brindle were the commonest colours, but owing to selection fawn in all shades is now the most prevalent, with the muzzle, ears, and other extremities shaded with darker (often black) markings.

The mastiff was formerly very courageous, and would readily attack the lion or bear; now it is chiefly valued for exhibition purposes. As a companion or watch-dog no other variety equals it, for, while faithfully protecting the property entrusted to it (at times with marvellous sagacity and discrimination), it has the additional merit of generally refraining from the infliction of personal injury on the invader. It becomes ardently attached to its master, although not demonstratively affectionate. It has an excellent nose, but is of little or no use for sporting purposes, and dull at learning any kind of tricks.

The mastiff of Tibet was larger than the old English, but is smaller than the modern English mastiff, averaging from 27 to 30 inches at shoulder. The head is longer, narrower, and more elevated at the back or cone, the skin much looser, and forming a fold from the eyebrows which descends

to the lips, these being more pendulous than in the English variety, and partaking more of the character of the bloodhound. The hair is rough and dense, the tail bushy and curled generally over the back, colour mostly black, with tan or fawn shadings over the eyes, on the paws, and under the belly; but fawn-coloured specimens are not uncommon. Dogs of this kind are found in Nepal, Bhutan, Tibet, Mongolia, and probably northward through Russia and Siberia, in a state of more or less purity; and dogs presenting the characteristics of the Asiatic mastiff and of vast size appear to have existed since the days of the Assyrian empire, 650 B.C. See the Rev. M. B. Wynn's *History of the Mastiff* (1886).

Mastodon, a genus of extinct elephants, whose remains are found in Europe, Asia, and America, in Miocene, Pliocene, and Pleistocene strata. They equalled or excelled their modern relatives in size. The name mastodon refers to the mammillary cusps or teat-like prominences on the molar teeth. See ELEPHANT.

Masûdi, ABUL HASSAN ALI, an Arab traveller and author (died 957), was born at Bagdad about the end of the 9th century, and spent great part of his life in travel, visiting Egypt, Palestine, the Caspian shores, India, Ceylon, Madagascar, and perhaps even China. His chief works are the *Annals*; *The Meadows of Gold*, printed with a French translation by Meynard in 1861-77 (one vol. of an English translation by Sprenger in 1841); and the *Indicator* (1894).

Masulipatam, the principal seaport of Kistna district in the Presidency of Madras, lies 215 miles N. of Madras City. Vessels anchor 5 miles from shore. Here the English established an agency in 1611, and after 1628 it became the centre of their trade in those parts. Since 1841 the town has been an active missionary centre. In 1864 a storm-wave destroyed 30,000 lives. Pop. (1881) 35,056; (1921) 43,940, many of whom weave cottons.

Masuri, or MUSSOORIE, a hill-station and sanatorium in Dehra Dûn district, United Provinces, and practically one town with Landaur (q.v.). It contains numerous schools for the education of European and Anglo-Indian children. Pop. 8000, more than doubled in the hot season.

Masurians, MASOVIANS, or MAZOVIANs, a Polish (or closely kindred) people inhabiting the south of East Prussia ('Masurenland') and the adjacent parts of Poland (q.v. for the mediæval duchy of Mazovia, which included Warsaw). In the East Prussian region the townsmen are German, and the whole so far germanised and Protestant as to vote almost unanimously for German nationality in 1921. There is a maze of great lakes (Spirdingsee, Löwentinsee, Mauersee, &c.). See TANNENBERG, WAR (GREAT). Polish Mazovia is Roman Catholic.

Masurium, an element of atomic number 43, whose discovery by Dr Nonnack and Frl. Tacke was announced in 1925.

Matabeleland, a country stretching northwards from the Limpopo River, which separates it from the Transvaal, and having Khama's territory on the south-west. It measures about 180 miles from north to south and 150 from east to west, and embraces the watershed between the Zambezi and Limpopo systems. The Matabele, the inhabitants of the country, are a warlike Zulu people of mixed stock, who, driven out of the Transvaal by the Boers in 1837, crossed the Limpopo under their chief Mosilikatze. After remaining for a while in what is now the Transvaal they finally settled in 1840 beyond the granitic Matoppo Mountains, subduing and almost exterminating the peoples they found there—the Mashona (see

MASHONALAND), and the closely allied Makalaka and Banyai, the first now occupying the mountain fastnesses in the northern part of the country, the second now dwelling south-east of the Makalaka, along the middle course of the Limpopo. In 1890 the country was handed over to the Imperial British South Africa Company, who, as the Matabele renewed their raids and forays in July and August 1893, organised an expedition in three columns supported by some regular British troops and by Khama and his Bamangwato, against King Lobengula, the son of Mosilikatze. The expedition, which advanced on 2d October, was completely successful against the savage warriors, who could not stand before the Maxim guns, and, after some sharp fighting, broke up their military organisation. Lobengula died in hiding in February 1894. Soon after the Jameson Raid into the Transvaal (at New Year 1896) the Matabele seized the opportunity of reasserting their independence; the native armed police mutined, and Bulawayo, the capital, was blockaded. The British South Africa Company, its officers, and settlers strained every nerve, and had practically pacified the country by the end of the year. The Matabele in place of warriors are now herdsmen and agriculturists. Quartz reefs rich in gold exist in various parts of the country. Matabeleland, with Mashonaland, now forms Southern Rhodesia. See RHODESIA.

Matadi, a river-port of Belgian Congo, on the left bank of the Congo, about 100 miles from its mouth, is the starting-point of the railway to Stanley Pool (250 miles).

Matanzas, a fortified town and seaport of north Cuba, 47 miles E. of Havana. It is a well-built town, situated in an exceedingly rich and fertile district; has a cathedral, a castle, an excellent harbour, a large trade in sugar, molasses, rum, and cigars; and contains several distilleries, iron-foundries, petroleum and other works. The celebrated white limestone caves of Belamar and the beautiful Yumuri valley are near. Pop. 45,000.

Matapan, CAPE, the southernmost point, bold and precipitous, of the Morea in Greece, 36° 22' N. lat.

Mataró, a seaport of Spain, 20 miles NE. of Barcelona, has cotton, sailcloth, glass, and machinery factories, iron-foundries, and shipbuilding-yards, besides a marine school; pop. 28,000.

Matches, the name now given to splints of wood tipped with some composition (often containing phosphorus) to produce a light by friction. These came into general use about the year 1834. Before that the common light producer was the flint and steel along with a tinder-box. The tinder (charred cotton) was set on fire by sparks from the flint and steel, but did not burst into flame. For more primitive methods see FIRE. Among other devices formerly employed were the burning-glass (see HEAT, LENSES, MIRROR); Döbereiner's lamp (see DÖBEREINER); the *oxymuriatic match*, a splint tipped with a mixture of chlorate of potash and sugar, which took fire on contact with sulphuric acid; and the *lucifer match*, which was tipped with a paste containing chlorate of potash and sulphide of antimony that ignited when drawn across sand-paper—it required to be rubbed with a good deal of pressure, and as it gave off sparks it was not free from danger. The introduction of phosphorus in 1834 was a great improvement, and of red phosphorus a greater.

The chief operations in the manufacture of matches embrace (1) cutting the wood splints, (2) immersing the splints in melted paraffin, and (3) preparing the igniting composition and dipping the splints into it. There is also the making of the boxes, which, in the case of safety-matches, have the phosphorus composition glued

upon their sides. Pine or aspen is the wood used for the splints.

There are several kinds of splint-cutting machines. One of the simplest is a special kind of lathe for which the tree trunks to be operated upon are sawn across in pieces 14 inches long, and the bark removed. One of these pieces is the length of seven matches, and is fixed on the chuck of the lathe and cut into a continuous slice or shaving equal to a match in thickness. The principal cutting tool is fixed on the slide-rest, and as the shaving comes away it is divided into seven equal widths by cutters placed above the chief slicing tool. After the two-inch-wide shavings are cut into six-foot lengths, they are divided into single splints by a guillotine cutter similar to that used for cutting paper. In favourable circumstances this machine will cut a million splints an hour.

A filling-machine supplies the splints to the dipping frame, in which they are held in rows between laths. The igniting composition is spread of the proper thickness on a heated iron table, and the splints dipped into it to form them into matches. The rooms where the igniting-mixture is prepared and the matches dipped are, or at least were, the most unhealthy parts of a match-factory. In former days especially, among those who worked in these rooms, cases of necrosis or caries of the lower jaw ('phossy jaw') occurred from the action of the phosphorus fumes; now, however, by the lessened quantity of phosphorus used in the dipping-mixtures and by improved ventilation this disease has diminished; it never occurs at all where red or amorphous phosphorus (see PHOSPHORUS) is employed. In 1906, at an international conference in Bern, seven states, joined later by the United Kingdom, signed a convention prohibiting the use or sale of matches in which white (or yellow) phosphorus was used. The extension of this convention was referred to the first International Labour Conference (at Washington, 1919) under the League of Nations.

The paste used for the dipping of matches consists of a combustible material as red phosphorus, phosphorus sulphide; an oxidising agent or agents as chlorate of potash, nitrate of potash (which gives a more noiseless match than the chlorate), oxide of manganese, the red oxide or the dioxide of lead; a binding material as glue, gum, dextrine; a material to increase friction or retard chemical action as powdered glass, sand, whiting; a colouring matter as vermilion, ultramarine, umber, aniline dye; and, of course, some water (slightly heated) is also used. Nearly every manufacturer has his own special mixture. For one kind of *safety* or 'Swedish' match, a match, that is, which can only be struck on a specially prepared surface, the dipping composition consists of chlorate of potash, of sulphide of antimony, and of glue; and the rubbing-surface of a mixture of amorphous phosphorus, of sulphide of antimony, and of glue.

Vestas only differ from ordinary matches in the stalks being formed of bits of stearin tapers (called wax-tapers) instead of wood splints. *Vesuvians* used by smokers consist of a hard wood, or sometimes a hollow glass stalk, with a bulbous head formed of some slow-burning compound, such as a mixture of charcoal, saltpetre, sand, and gum, tipped with the igniting composition of ordinary matches. *Flamers*, also for the use of smokers, have a thick head of a flaming mixture, with either a 'wax-taper' or wood stalk. See W. H. Dixon, *The Match Industry* (1925).

Matchlock. See FIREARMS.

Mate is an assistant, a deputy, or a second in any work. In the navy the use of the term is now confined to petty officers, such as boatswain's-mate,

gunner's-mate, &c. In the merchant-service the mates are important officers, holding functions not greatly inferior to those of lieutenants in the royal navy. The first mate ranks next to the master or captain, commands in his absence, and is immediately responsible for the state of the vessel; the second and third (and fourth in large vessels) have various analogous duties.

Maté, or PARAGUAY TEA, a drink extensively used in South America, and almost universally through Brazil. It consists of the leaves and green shoots of certain species of Holly (q.v.),



Maté (*Ilex paraguayensis*).

more especially *Ilex paraguayensis*, dried and roughly ground; the leafy portion being reduced to a coarse powder, and the twigs being in a more or less broken state. Some species of *Symplocos* (family *Symplocaceæ*), especially *S. lanceolata* and *S. Itatiaia*, of southern and central Brazil, are also reported to be used. The term *maté*, which has by usage attached to this material, belonged originally to the vessels in which it was infused for drinking; these were usually made of gourds or calabashes, often trained into curious forms during their growth. Into the hollow vessels thus formed a small quantity of the material, more properly called *Yerba de Maté*, is put, and boiling water is added; it is then handed round to those who are to partake of it, and each, being provided with a small tube about eight inches in length, with a small bulb at one end, made either of basket-work of wonderful fineness or of perforated metal, to act as a strainer and prevent the fine particles from being drawn up into the mouth, dips in this instrument, which is called a *bombilla*, and sucks up a small portion of the infusion, and passes the *maté*-bowl on to the next person. It is usual to drink it exceedingly hot, so much so as to be extremely unpleasant to Europeans. Its effect is much the same as tea, stimulating and restorative; and it derives this property from the presence of a large proportion of the same principle which is found in tea and coffee—viz. *Theine*. The collection and preparation of *maté* is a large industrial occupation in Paraguay and Brazil.

Matera, a city of the Italian province Potenza, situated 37 miles NW. of Taranto. Pop. 18,000. Here is the cathedral of the archbishopric of Acerenza and Matera. There are numerous caverns and stone-quarries in the vicinity.

Materialism is the theory of the world which professes to find in matter (monistic or philosophical materialism), or in material entities (atomistic materialism), or in material qualities and forces (scientific or physical materialism), a complete explanation of all life and existence.

whatsoever. Early philosophies are generally either theogonies or cosmogonies. Cosmogonies tend to postulate animated or living matter (hylozoism). Out of the earliest hylozoistic philosophemes of the Ionic school in Greece arose the atomistic materialism of Leucippus and Democritus, explaining the cosmos as an aggregation and segregation of ultimate indivisible material entities or atoms. The atomic theory of Democritus became the basis of the sensationalistic psychology and ethic of Epicurus, and was transmitted in the glowing verses of Lucretius' great didactic poem, *De Rerum Natura*, on to the later Roman period. Materialism as a basis for scientific research we find revived in history wherever a movement arose in favour of the methods and aims of experimental or natural science, as in the Renaissance period in Europe generally. Gassendi, though, it is who must be regarded as the renewer *par excellence*, in modern times, of systematic materialism. He developed the doctrine of Democritus, by endowing the atoms with force and even with sensation. Lamettrie, by his materialistic account of the functions of the mind, prepared the way in France for the comprehensive materialism of Baron Holbach, whose *Système de la Nature* is the *chef-d'œuvre* of French materialism. In Holbach materialism reaches its high-water mark. Applying materialism to anthropology, he seeks to show that man is only a physical being, and that morality or virtue is independent of the supports of positive religion and of theism.

The empirical method of Bacon and Locke, taken along with some things Locke said about matter being possibly made to think, and eagerly caught up by men like Voltaire, had countenanced in England as well as in France a materialistic treatment of the mental and spiritual powers of man, as in the works of Hobbes, Hartley, and Priestley. In Germany philosophy was in the main idealistic and speculative until the death of Hegel, but Vogt about 1850 applied the principles of materialism to psychology, holding that physiology pronounced definitely and categorically against the idea of individual immortality, as indeed against all notions founded on the idea of the independent existence of the soul. Moleschott and Büchner are associated with Vogt as upholders of materialism. Büchner's *Kraft und Stoff* ('Force and Matter') is the Bible of German materialism. Feuerbach and Strauss may be mentioned as philosophers who exchanged the spiritualistic monism of Hegel for materialistic monism.

The form in which materialism now appears has been determined by the doctrine of evolution. Materialism indeed might be said to have been absorbed in the wider theory of evolution, which goes beyond the mere antitheism or atheism of materialism, and seeks *positively* to show how the diversities and differences in the world can be accounted for by natural as opposed to supernatural or creative process. Haeckel became perhaps the most prominent upholder of a materialism based on evolution.

Materialism may be examined from many points of view. (1) Materialism is scientific realism. It believes, i.e., in real physical entities, such as atoms and forces, and spaces and times. Now a belief in atoms leads, in physics, in chemistry, and in astronomy, to insoluble contradictions: atoms, for example, for physical purposes must be at once absolutely impenetrable and unalterable, and yet absolutely elastic and alterable. It would be more correct, in fact, to reduce matter to forces than to atoms, as many theorists have done. But it is difficult to think of forces existing without some sort of substrate. Spaces and times, too, are not physical things. Thus science is full of hypotheses; nor can it dispense with hypotheses. Complete physical realism or materialism is, in short, theo-

retically impossible. (2) Even granting—which in strictness we cannot—the existence of 'mere matter,' science has as yet found insuperable difficulty in passing from unorganised to organised matter. (3) Psychology has as yet been unable to regard organic states as accounting for psychological or mental states. The two are totally different, and, though correlated, cannot be said to be causally connected. (4) Materialism cannot furnish a complete or consistent ethical theory. If man is entirely the product of natural forces, and in fact the sport of natural forces, it is meaningless to think or speak of him as morally obliged either to follow or to resist nature. Man not only follows and resists nature, but in mechanical and artistic construction commands and anticipates and surpasses nature. Of course to materialism the belief in human freedom, which practically makes history, is an illusion, but it is difficult to see how on the materialistic hypothesis even this illusory belief could have arisen. (5) Although materialistic evolution may succeed in showing that we ought not to regard certain natural adaptations and productions as special and final creations, it cannot and does not avoid the question of teleology. Neither hylozoism nor mechanism, nor unconscious selection and adaptation accounts for that relativity of everything to everything, which is really what at bottom is meant by teleology. There must be a world-soul or world-thought for whom the universe is realised end. (6) There is the philosophical question about mere matter. It has again and again been confessed by scientists as well as by philosophers that by matter can only, in the last resort, be meant what J. S. Mill calls the permanent possibility of sensation. There is in fact no object (or objective thing) without a subject (or consciousness). If the materialist at once reply that there is no subject without an object, he is in the right as against the thesis. The idealist, in short, and the materialist are in the right as against each other. Subject and object imply each other. We cannot begin with either in order to explain from it the other.

Materialism brings prominently before us that side of the universe which is compassed by the methods of physical science. But physical science, like (say) economic or theological or mental science, takes a one-sided or 'abstract' view of experience. All sciences 'abstract' from the concrete whole of experience certain facts which they propose to investigate in detail. Physicists, like metaphysicians and theologians, are apt to become dogmatical about spheres of inquiry of which they know professedly nothing.

BIBLIOGRAPHY.—Text-books of Materialism which have not already been mentioned are: Gassendi, *De Vita, Moribus, et Doctrinis Epicuri* (Leyden, 1647); Lamettrie, *L'Homme Machine* (Leyden, 1748); Haeckel, *Natürliche Schöpfungsgeschichte* (1868; Eng. trans. 2d ed. 1875-76); *Die Welträtsel* (1899; Eng. trans. new ed. 1913); Wiener, *Grundzüge der Weltordnung* (1863-69); and Huxley's Address at Belfast, 1875. For an examination of Materialism, see any account of Kant's *Critical Philosophy*, or the statement of Dogmatism given in *Fichte*, by Adamson; also *As regards Protoplasm*, by Dr Hutchison Stirling; *Concepts of Modern Physics*, by J. B. Stalls, containing a sifting examination of the atomic theory; *Reign of Law*, by the Duke of Argyll; and St George Mivart's books. The best history of Materialism is Lange's *Geschichte des Materialismus* (trans. 1881; new ed. 1925).

Materia Medica is that department of the science of medicine, belonging partly to pharmacology, partly to therapeutics, which treats of the materials employed for the alleviation and cure of disease, their properties, physiological actions, and uses. See PHARMACOPŒIA, POISONS, MEDICINE, APERIENTS, and articles on the various drugs.

Mathematics (Gr. *mathēma*, 'learning'), the science which has for its subject-matter the properties of magnitude and number. It is usually divided into *pure* and *mixed* or *applied*; the first including all deductions from the abstract, self-evident relations of magnitude and number, the second the results arrived at by applying the principles so established to certain relations found by observation to exist among the phenomena of nature. The branches of pure mathematics which were first developed were, naturally, *Arithmetic*, or the science of number, and *Geometry*, or the science of quantity (in extension). The latter of these was the only branch of mathematics cultivated by the Greeks, their cumbrous notation opposing a barrier to any effective progress in the former science. Algebra or the science of numbers in its most general form is of much later growth, and was at first merely a kind of universal arithmetic, general symbols taking the place of numbers; but its extraordinary development within the last two centuries has established for it a right to be considered as a distinct science, the *science of operations*. Combinations of these three have given rise to trigonometry and analytical geometry. All those sciences in which a few simple axioms are mathematically shown to be sufficient for the deduction of the most important natural phenomena are regarded as belonging to applied mathematics. This definition includes those sciences which treat of pressure, motion, light, heat, sound, electricity, and magnetism—usually called *Physics*—and excludes chemistry, geology, political economy, and the other branches of science, which, however, receive more or less aid from mathematics. See *GEOMETRY*, and the works there cited; as also, besides articles on the subjects named above, and many others, the following:

Astronomy.	Ellipse.	Graphic Statics.	Logarithms.
Calculus.	Energy.	Hydrodynamics.	Optics.
Centre.	Equations.	Hydrostatics.	Parabola.
Circle.	Fluxions.	Hyperbola.	Probability.
Dynamics.	Friction.	Lenses.	Quaternions.

Mather, INCREASE, a famous American colonial divine, was the sixth son of Richard Mather, an English Nonconformist minister, who emigrated to Massachusetts in 1635. He was born at Dorchester, Massachusetts, June 21, 1639, graduated at Harvard College in 1656, and again at Trinity College, Dublin, in 1658. His first charge, at Great Torrington in Devonshire, was given him on the advice of John Howe. He next preached in Guernsey, but in 1661, finding it impossible to conform, returned to America, and in 1664 was ordained as pastor of the North Church, Boston, where he remained till his death, August 23, 1723. In 1681 he was also chosen president of Harvard College. An industrious student, he published no less than 136 separate works, most of which are now very scarce. Of these the most interesting, *Remarkable Providences* (1684), was reprinted in London in 1856. The *History of the War with the Indians* (1676) was reprinted at Boston in 1862. Mather's influence was great in the colony, and in 1689 he was sent to England to lay its grievances before the king. He was successful in obtaining a new charter from William III., and on his return was thanked by the speaker of the general assembly. The same year he became the first D.D. of Harvard. To his credit he was far less an alarmist about witchcraft than his son, and he had the good fortune to be absent in England during the time of fiercest excitement in the Salem mania. His *Causes of Conscience concerning Witchcraft* (1693) did much to cool the heated imaginations of the New England colonists, and saved lives by refuting the doctrine of 'spectral evidence.'

His son, COTTON MATHER, was born in Boston,

February 12, 1663, and graduated in 1678 at Harvard, where his precocious learning and piety excited great expectations. He entered upon a course of fasting and vigils, cured a habit of stammering by speaking with 'dilated deliberation,' studied theology, and became the colleague of his father in the ministry of the North Church at Boston. His industry was phenomenal and his learning remarkable, while his vanity and fluency enabled him to pour from the press as many as 382 books. He took a fatal interest in witchcraft, and his *Memorable Providences relating to Witchcraft and Possessions* (1685) did much to fan the cruel fury of the New Englanders. The first phenomena of the notorious Salem witchcraft mania occurred in 1692, and Mather plunged into the discussion, and to convince the world wrote his *Wonders of the Invisible World* (1692). While it is true that his contemporaries fully shared his belief in witchcraft, none pursued the inquiry with such hateful zeal, and on the head of none rests a heavier burden of bloodguiltiness. Even himself afterwards confessed that 'there had been a going too far in that affair.' Mather died February 13, 1728.

Cotton Mather's chief work is *Magnalia Christi Americana* (1702), an undigested mass of materials for the church history of New England. His feeble *Essays to do Good* (1710) was much esteemed by Franklin. His life was written by his son, Samuel Mather (1729). See also Charles W. Upham, *History of the Salem Delusion, 1692* (1831); Enoch Pond, *The Mather Family* (1844); and Wendell, *Cotton Mather* (1891).

Mathew, THEOBALD, commonly known as FATHER MATHEW, an eminent Irish apostle of temperance, was born at Thomastown in Tipperary, 10th October 1790. He studied for the Roman Catholic priesthood at Kilkenny and for a short time at Maynooth, but instead of becoming a secular priest entered the religious order of the Capuchins, in which he took priest's orders in 1814, and was sent to the church of his order in the city of Cork. Here he devoted himself to the ceaseless labours of his calling with untiring zeal, and, finding that the poverty and degradation of his people were to a great extent directly due to over-drinking, was driven by his enthusiastic temper to advocate the drastic remedy of total abstinence. In 1838 he began his crusade, which quickly grew beyond the bounds of Cork, and extended to Dublin, to the North, to Liverpool, Manchester, London, Glasgow, and the other chief seats of the Irish population, even in the New World itself. His success had something of the marvellous in its character. The form of engagement partook of the religious, and was accompanied by the presentation of a medal, to which the utmost reverence was attached by the recipient. The enthusiasm declined amid the sufferings of the potato-famine, and Father Mathew died, worn out by his labours, 8th December 1856. See Harriet Martineau's *Biographical Sketches*, and Lives by J. F. Maguire (1863), F. J. Matthew (1890), and Katherine Tynan (1908).

Mathews, CHARLES, comedian, was born in London, 28th June 1776, and educated at Merchant Taylors'. His father was a bookseller, and intended his son to follow the same 'serious calling'; but his early inclination for the stage overcame parental counsel, and he made his first appearance as an amateur—in the part of Richmond—at the Richmond theatre in 1793, and as a professional comedian in the Theatre Royal, Dublin, the following year. He then served an apprenticeship in the famous York company under Tate Wilkinson, and made his first appearance in London on 15th May 1803 at the Haymarket, then managed by George Colman. Next year he played at Drury Lane, and he afterwards acted at Covent Garden and the

Lyceum; but he was not satisfied with the class of part given to him, and in 1818 he took up the profession of 'entertainer' and made an immense success with his 'At Home' and other entertainments. In this he passed the remainder of his life, appearing frequently in the provinces and visiting America twice. He died at Plymouth on 28th June 1835. Mathews was a true comedian, with extraordinary powers of impersonation, entering into the very mind of the persons he imitated. He was not merely a 'mimic'—one who reproduces oddities and peculiarities: he *was* the person he represented. See his *Memoirs* by Mrs Mathews (4 vols. 1838-39).—His son, CHARLES JAMES (born 26th December 1803; died 24th June 1878), was a delightful light comedian, with no depth of feeling, but with charming grace and delicacy. In 1838 he married the famous Madame Vestris. See his *Life, chiefly Autobiographical*, edited by Charles Dickens (2 vols. 1879).

Mathias Corvinus. See MATTHIAS.

Mathurá. See MUTTRA.

Matico (*Piper angustifolium*), a shrub of the Piperaceæ, a native of Peru, remarkable for the styptic property of its leaves which are used for stanching wounds, and for other medicinal qualities.

Matilda (1102-67), 'the Empress Maud,' was the only daughter of Henry I. (q.v.) of England. She was married in 1114 to the Emperor Henry V., and after his death in 1128 to Geoffrey of Anjou, by whom she became mother of Henry, afterwards Henry II. (q.v.) of England. There was civil war between her and Stephen (q.v.) from 1139 to 1147.

Matilda, Countess of Tuscany, well known in history through her constant support of Pope Gregory VII. in his long struggle with the Empire, was a daughter of Boniface, Count of Tuscany, and of Beatrice of Lorraine, and was born in 1046. She married first Godfrey (surnamed the Hunchback), Duke of Lorraine, from whom she lived apart in Italy, and afterwards, when over forty years of age, the boy Guelf of Bavaria. Both marriages were mere alliances of policy. In 1077 she made a gift of all her vast possessions to the church, a bequest that caused a long contest. It was at her castle of Canossa that Henry IV. did his celebrated penance to Pope Gregory. Four years later she alone stood by the pope when Henry poured his troops into Italy; she supported him with money when he was besieged in Rome; and after his death at Salerno boldly carried on the war against the emperor. 'The great Countess' died in 1115. See *Life* by Nora Duff (1909).

Matins. See BREVIARY.

Matisse, HENRI, post-impressionist painter, was born in 1869 in the north of France. Influenced at first by Impressionism and then by Gauguin, he developed from an almost academic draughtsman into the chief of the Fauves (see PAINTING). His paintings—landscapes, figures, still-life—are notable for a sureness and simplicity of drawing, and for an arbitrary distortion of natural form, partly based on the study of negro art. Historically he is important as a pioneer of the doctrine that mere actuality is unimportant in pictorial representation; he marks a stage on the way, indeed, to the abstract non-representative art of the Cubists. He may also be regarded as the introducer of 'shock tactics' into art. His 'Head of a Woman' is a representative work.

Matlocks, THE, a Derbyshire urban district, 17 miles N. by W. of Derby, comprising Matlock, Matlock Bath, Cromford, and Tansley, which extend for about 3 miles along the romantic valley of the Derwent. Matlock is noted for its hydro-path and hydropathics. Matlock Bath has hot

springs of 68° F., the waters of which are largely charged with carbonic acid, and were first used for curative purposes in 1698. In the neighbourhood are the High Tor (400 feet), the Heights of Abraham (650 feet), and the Masson (1110 feet), and a number of large stalactite caverns with 'petrifying' wells. There are manufactures of cotton, paper, and spar ornaments, and bleaching, dyeing, woollen and hosiery works. Pop. 10,500.

Matoppo Hills, the watershed between the Limpopo and the Zambezi in which the Matabele tableland (itself rising to 4000 feet) culminates. Bulawayo is on their slopes, and among them Cecil Rhodes and Sir Starr Jameson were buried.

Matrah, a northern suburb of Muscat (q.v.).

Matriarchate. See FAMILY.

Matsumoto, a town of Honshu, Japan, 130 miles NW. of Tokyo, manufactures silks, baskets, and preserved fruits; pop. 40,000.

Matsushima, a pine-clad archipelago (over 800 islets) in Sendai Bay, E. coast of Honshu, is one of the three natural wonders of Japan.

Matsuyama, a town in the western part of Shikoku, Japan, 5 miles from its port, Mitsu, has a large feudal castle; pop. 50,000.

Matsuyce, a town in an inlet of the Japan Sea, 140 miles W. by N. of Kyôto, has large manufactures of paper; pop. 35,000.

Matsys, or MASSYS, QUENTIN, Flemish painter, born at Louvain about 1466, was said to have been a blacksmith who turned artist. He settled in Antwerp in 1491, was admitted a member of the painters' guild of St Luke in that city, and died there in 1530 or 1531. He was a link between the Van Eycks and the later Dutch school. His pictures are mostly religious, treated in a reverent spirit but with decided touches of realism, and are remarkable for their glow of colour, their absence of light and shade, and their exquisite finish, especially in minor details. An altarpiece for the cathedral of Antwerp—the 'Burial of Christ' flanked by the 'Martyrdom of John the Baptist' and the 'Martyrdom of John the Evangelist'—is his masterpiece. Such genre-pieces as 'The Money-changers,' 'The Gaoler,' and others, exhibit his realistic tendencies. Matsys also takes high rank as a portrait-painter. A beautiful wrought-iron well-covering at Antwerp is attributed to him.

Matter is that which moves from place to place, and which, when accessible, is amenable to our guidance and arrangement by an act of will interpreted and made effective by our nerve and muscle system. Matter reacts against muscular or other force, and by this reaction or resistance its presence is primarily known or inferred. It is the vehicle of kinetic energy whenever this is conveyed without change or alternation of form.

The term 'matter' by no means covers everything in the material universe, for neither sound, light, heat, electricity, nor ether, is matter, and yet these things are physical, and may be called 'material' in the sense of belonging to the material universe, and as antithetic to 'mental' and 'spiritual.'

The most fundamental property of matter is *inertia*, also called massiveness and *mass*, whereby it reacts against any force in direct proportion to the acceleration which it is made to undergo. Acceleration may be a simple increase of speed, or it may be the negative kind more commonly called retardation, or it may be a change in the direction of the velocity or a curvature of path. In all cases the resultant force which produces the effect is measured by the product of mass into acceleration, a fact which is called Newton's Second Law of Motion, and is the most fundamental

truth in mechanics. Of late years the electrical theory of matter, and the doctrine of Relativity (q.v.), have concurrently shown that inertia is not absolutely constant, as had been thought, but depends to a slight extent on speed; so that if matter moves at an excessive speed through the ether its apparent inertia is increased. The full consequences of this notable fact have not yet been worked out.

The common mode of measuring mass or inertia is by utilising the secondary property which matter possesses—that of mutual gravitative attraction between its parts. Every piece of matter attracts every other with a force which is extremely small between masses of ordinary humanly-manageable size, but which becomes important, and is known as *weight*, when one of the masses is enormous like the earth.

From the fact that every kind of matter if dropped to earth, in the absence of a resisting medium, falls at one and the same rate, Newton proved (most accurately by experiments on pendulums) that weight and mass are proportional; though the reason for this apparently exact correspondence is at present unknown, or only a matter of speculation. Nor has any satisfactory explanation been as yet given for the hourly encountered phenomenon of gravitational attraction itself. It is believed to extend throughout the universe, and it is believed that nothing can disturb or intercept it. Matter is supposed to be essentially indestructible. Certainly experience shows that whatever is done to a piece of matter, whether it be heated, or cooled, or dissolved, or evaporated, or corroded, or crushed, or burnt, or, in popular language, 'destroyed' in any way, it still weighs, as far as can be tested, precisely the same, and therefore presumably consists always of precisely the same fundamental substance. It may have combined with extra material, or it may have shed fractions of itself which cannot be collected, but what the doctrine of indestructibility asserts is that if all accretions were removed and every original fragment collected, the weight would be unchanged. This is indeed a special case of the meaning of *existence*, for anything of which such conservation can be predicated must have a real substantial or fundamental existence. Energy is in the same category in this respect, and these two things, matter and energy, are probably the only things in the material world of which such an assertion can be thoroughly made. Certainly no one asserts it of any particular *form* of energy, such as sound or heat; nor of any particular form of matter, such as uranium or radium; but of energy as a whole, and of matter as a whole, conservation is believed as an article of scientific faith. It is of course impossible to prove such things beyond the limits of refined experimental accuracy; but as the outcome of many experiments and much experience, these and other fundamental axioms or dogmas are confidently held by those who have made these phenomena a special study and therefore have a right to judge. But see concluding paragraphs of this article.

States of Matter.—Any particular kind of matter is determined by the chemical constitution of its atoms and molecules; but when in bulk it can make a different appeal to the senses, and to physical tests, according to the way in which the molecules are crowded together or are separate.

In the solid state, the molecules are joined or crystallised together so that no locomotion of parts is possible without dislocation or breaking, or without a resilient effort at recoil into some stable and less strained condition. This is called elasticity of shape, or *rigidity*.

In the liquid state no shape is fixed, the parts

are readily mobile, being restrained only by *viscosity*—a kind of friction which is proportional to speed, and which therefore becomes insignificant when the parts slide over each other slowly enough. Accordingly, a liquid adapts itself to the shape of the containing vessel. But the particles still cohere together, and therefore the liquid occupies a definite space or volume, and has a free or bounding upper surface. A liquid resists compression in an elastic manner, and this property is known as volume elasticity, or metrical incompressibility; a property which solids also intrinsically possess.

In the third or gaseous state the cohesion is greatly reduced, and locomotion of the parts is not only easy but is molecularly vigorous, and accordingly the gas or vapour adapts itself not only to the shape but also to the size of the containing vessel, and completely fills it. The amount of pressure which a given mass of gas exerts on the walls diminishes as the space occupied by it at a given temperature enlarges. When the diminution of pressure is exactly proportional to the increase of volume ($\frac{dp}{p} = -\frac{dv}{v}$) the liquid condition is completely departed from, and the gas is said to be 'perfect.' It is then said to obey Boyle's Law. So also when the expansion or contraction or distortion of a solid is exactly proportional to the strain which causes it, the substance is said to obey Hooke's Law, or to be perfectly elastic.

The volume elasticity of a perfect gas is not an intrinsic property characteristic of the material, but is simply equal to the pressure upon it; except when the compression is sudden, when by reason of the generation of heat the volume elasticity is greater than the pressure, by a factor which is an important constant, characteristic of the substance—characteristic, in fact, of the number of degrees of freedom which the molecule of the substance possesses. For a monatomic molecule the factor is, both theoretically and practically, $\frac{2}{3}$; for a diatomic molecule it is $\frac{5}{2}$; for a tri- or polyatomic molecule the factor is $\frac{3}{2}$; these numbers being reduced by any so-called 'imperfection' of the gas or cohesive force between its molecules. This factor is technically known as the ratio of the two specific heats, also as the ratio of the adiabatic to the isothermal elasticity; and it is measured experimentally by determining the velocity of sound in the gas, or, what is the same thing, the wave-length corresponding to a note of given pitch. In this way, such gases as argon and helium have been shown to be monatomic, whereas most familiar gases have two atoms in their molecule. An imperfect gas is often styled a vapour, and there is a gradation of properties from solid to liquid, investigated by Andrews of Belfast and Van der Waals of Holland, and expressible in various generalised forms of Boyle's Law. See MOLECULE.

The well-known fact that water can occur in all three states, as ice, water, and steam, is only typical of what is true of almost every substance. Certainly every substance can be solidified, but the conditions required by liquidity involve a rather delicate adjustment, since the freezing and boiling points of some substances are very close together; or the boiling-point may even be the lower of the two, in which case the liquid state is impossible. Again, there is a critical temperature for every substance, above which it cannot exist in the liquid state; or, rather, above which the liquid and gaseous states merge into one another so as to be indistinguishable. Most permanent gases are in this predicament, and cannot be liquefied by the extremest pressure unless they are at the same time cooled below the critical point. The critical

point for water is very high, approximating to a red heat, but water can be brought to it under sufficiently immense pressure.

Some solids would be decomposed or charred or otherwise chemically altered before they were hot enough to evaporate in bulk; though it is probable that every substance evaporates slightly, in the sense that a few molecules are constantly escaping from it; and this presumably accounts for the *smell* of nearly all substances. The escape of a few million molecules per second would hardly be noticeable to the most delicate weighing until after the lapse of hundreds of years.

The existence of the gaseous state, with its very special features, has enabled us to obtain great insight into the structure of matter. For experiment has assured us that a gas is not a continuous substance, but an assemblage of an enormous number of perfectly distinct and independent particles, each of which moves freely till it collides with another, and thus, some eight thousand million times per second, has its motion completely changed. The number of such separate particles in a single cubic inch of air contains twenty-one figures—i.e. is expressed in hundreds of trillions. Yet they are very far from filling that space. Their total bulk probably amounts to less than the five-hundredth part of it.

In vacuum tubes under electric discharge what Crookes described as a fourth or ultra-gaseous state of matter is experienced, a state which is of great interest. But J. J. Thomson proved that the particles flying with immense velocity in such tubes are not atoms of ordinary matter, but are corpuscles of incomparably smaller size. They are believed to be what Maxwell had already spoken of as atoms of electricity, and what Dr Johnstone Stoney had prophetically denominated Electrons (q.v.). There is every reason to believe that they are disintegrated from atoms of matter; they are found to be identical, whatever form of matter is their source; and there is some reason to suspect that they may re-group themselves, under conditions unknown, to re-form atoms again; in which case the various numbers and groupings would be expected to be capable of accounting for the various kinds of element, and with further discovery may be hoped to account for some of their chemical and physical properties. Their number in the respective atoms of the series of chemical elements has now been counted by Moseley, and less directly by Rutherford. The number ranges from 1 in hydrogen to 92 in uranium. The temporary element radium has 88. Several much more temporary elements are known, and it is uncertain if any atomic grouping is absolutely permanent. One element can change into another when one or more of its constituent electrons are expelled.

There is little or no doubt now that each atom of matter is composed of opposite electric charges; and a great deal has been discovered about the number and arrangement of these charges to form the different chemical atoms. This is too elaborate a subject to deal with here. Books, such as Sir Oliver Lodge's *Atoms and Rays*, may be consulted.

The electrical constitution of matter is only emphasised here in order to issue a caution about the conservation of matter, spoken of above. It seems possible that occasionally, perhaps only at very high temperatures, the positive and negative ingredients or constituents of an atom may meet and neutralise each other, thereby generating radiation or waves in the ether. If that ever happens, matter as such disappears; so that we might say, energy is conserved but not matter. According to the theory of relativity, indeed, matter is one of the forms of energy, which may conceivably be transmuted into other forms. It would not be

suitable here to enter into details about such apparently revolutionary ideas, but it is well to bear the possibility in mind. On this view matter may ultimately be resolvable not only into electric charges, as it is now, but into a special kind of intrinsic motion in the ether of space.

Mere speculation, of course, is of use in science only in so far as it originates or directs inquiry, so that we must be content simply to express the idea that the ether may be the one material substance in the universe (*urstoff*), gross matter being simply differentiated portions of it—denser or less dense than the rest, perhaps mere cavities or bubbles. For the extreme form of the electro-magnetic theory—that matter ultimately consists of particles of electricity—see Sir J. J. Thomson's *Corpuscular Theory of Matter* (1907), Sir Ernest Rutherford's *Radioactive Substances* (1913), and other works.

Matterhorn, called by the French MONT CERVIN, and by the Italians MONTE SILVIO, a peak of the Alps between the Swiss canton of Valais and the Italian compartment of Piedmont, rises to the altitude of 14,705 feet. The actual peak was first scaled by the Englishmen Lord Francis Douglas, Hudson, Hadow, and Whymper, with three guides, in July 1865, when the three first-named were lost. See Whymper's *Matterhorn* (1880) and *Zermatt* (1897), and Guido Rey's *Il Monte Cervino* (1904; trans. as *The Matterhorn*, 1907).

Matthew, one of the apostles and the reputed author of the first gospel. Little is known about him apart from the few references in the gospels. He was originally a revenue officer at Capernaum (Matt. ix. 9), but was called by Jesus 'at the customs house' to become his disciple. In Mark and Luke his name is given as Levi, but there is no reason for doubting the identification of the two names, as in each case the man is described as 'the son of Alphaeus,' and represented as engaged in the same business. Double names frequently occur in the New Testament—e.g. John Mark, Barnabas Justus, 'Saul, who is also called Paul.' On the day of his call Matthew gave what was probably a farewell banquet to his friends, at which Jesus was present. His name appears in all the lists of 'the twelve,' and occupies either the seventh or eighth position. Tradition represents him as an evangelist, but no reliance can be placed upon the details which are given of his work in apocryphal literature. Nor can we attach any importance to the statement that he suffered martyrdom, in view of the explicit denial in the writings of Clement of Alexandria.

The earliest writer to connect Matthew with the first gospel is Papias, who says: 'Matthew composed the Oracles in the Hebrew dialect, and each one interpreted them as he was able.' The tradition that Matthew wrote in Hebrew or Aramaic is afterwards repeated by Irenæus, Pantænus, Origen, Eusebius, Jerome, and many others. Modern criticism, however, challenges this position. The Gospel of Matthew is not as it stands a translation from the Hebrew. Papias's description of Matthew's work as 'the Oracles' or 'Logia' does not seem appropriate to our gospel, though instances have been adduced where the word is loosely applied to books which are mainly narrative. On the whole, the majority of modern scholars adopt the theory that what Matthew wrote was not our present gospel, but the Logia source which has been embodied in it.

Our gospel is obviously based upon sources (see GOSPELS), and makes free use both of Mark and the Logia source known as Q. It has, however, well-marked characteristics of its own. There is

ample evidence that it was originally addressed to the Jewish people. The great stress which is laid upon the argument from prophecy in the opening chapters is a clear indication that the author was attempting to commend Christianity to his Jewish friends. The argument from prophecy was the sheet-anchor of early apologetics, and the Gospel of Matthew affords us some of the best illustrations as to the manner in which the method was applied. The writer always, too, speaks from the Jewish standpoint. He nearly always uses the phrase 'kingdom of heaven,' for instance, in place of Luke's 'kingdom of God.' And it is only in Matthew that the favourable attitude of Jesus to the Jewish law is mentioned (v. 17), and it is only Matthew who records the saying of Jesus in the commission to the twelve, 'Go not into any way of the Gentiles, . . . but go rather to the lost sheep of the house of Israel.' The date of the gospel is difficult to determine, because the data are insufficient and insecure. Many scholars think that the eschatological discourses point to a date earlier than the destruction of Jerusalem in 70 A.D. In speaking of the fate which is to befall the city Matthew uses the phrase of Daniel, 'the abomination of desolation,' and adds the note, 'Let him that readeth understand.' If the destruction of Jerusalem had already occurred, it is probable that this phrase would have been modified by the event, as it has been modified in Luke. This argument, however, is not final, because it is just possible that the author of Matthew may have repeated the version of the prophecy of Jesus as it had come down to him, and did not feel at liberty to alter it at all. The arrangement of the gospel is artificial when compared with that of the other synoptics. Matthew arranges his material in blocks. Thus we have groups of miracles, sayings, parables, &c.; and there is no attempt to write a chronological narrative.

The best modern commentaries are those of Plummer, M'Neile, and Allen in English; and Wellhausen, Zahn, Holtzmann, Gressman, and J. Weiss in German.

Matthew of Westminster, long supposed to be the author of the meritorious *Flores Historiarum*. Sir F. Madden considered his existence as more than doubtful, the work being merely a special abridgment of the larger work of Matthew Paris, made under that writer's supervision down to 1249; brought down at St Albans to 1259, at which year Paris's chronicle ends; thereafter continued there down to 1265; next brought down to 1325 at Westminster, in part by John Bever, *alias* John of London. Sir T. D. Hardy, however, thinks it based on the original writer who preceded Wendover as historian at St Albans, whom he identifies as one Walter of St Albans, precentor and librarian in the latter half of the 12th century. Copies of his chronicle would become disseminated, and that at Westminster, by its borrowings from the works of Wendover and Matthew Paris, might well have been taken for a mere abridgment of these. Luard finally demolished the hypothetical author in his edition of the *Flores* (Rolls Series, 1890). A translation by Yonge was published in 1853.

Matthew Paris. See PARIS.

Matthias Corvinus, king of Hungary, the second son of John Hunyady (q.v.), was born at Klausenburg probably in 1440. His father having died, his elder brother was slain and himself imprisoned by order of Ladislaus Posthumus, king of Hungary and Bohemia. After the death of this king Matthias was elected by the magnates to the vacant throne (1458). But it cost him a six years' hard struggle against Turks, Bohemians, the Emperor Frederick III., and disaffected mag-

nates before he could venture to have himself crowned at Stuhlweissenburg. He drove the Turks back across the frontiers of his kingdom, and made himself master of Bosnia (1462), and of Moldavia and Wallachia (1467), before he granted them a truce. This breathing-space Matthias employed in making war upon Podiebrad, king of Bohemia, his own father-in-law, whose crown had been offered to him by the pope. Podiebrad died in 1470, but the war was continued against his successor, Ladislaus of Poland. In the midst of the war the magnates rebelled, because their king disregarded their political rights and influence, and offered his throne to Casimir, brother of Ladislaus. But Matthias managed to appease them, and in 1478 he concluded peace with Ladislaus, obtaining Moravia, Silesia, and Lusatia. Out of this war grew another with Frederick III., in which Matthias besieged and captured Vienna (1485). This he made his capital, and two years later he took possession of a large part of Austria proper. Since 1469 the Turks had renewed their terrible invasions of Hungary; but at length in 1479 they met with just chastisement, at Kenyermezö, at the hands of Stephen Bathori of Transylvania. But Matthias, who died at Vienna on 6th April 1490, was more than an ambitious conqueror. He greatly encouraged arts and letters: he founded the university of Buda, built an observatory, summoned scholars and artists to his court, adorned his capital with the works of renowned sculptors, employed a staff of literary men in Italy to copy valuable manuscripts, and so founded a magnificent library. This was scattered when the Turks captured Budapest in 1526. The surviving books were restored by the sultan in 1877. Besides all this the finances were brought into a flourishing condition, industry and commerce were promoted by wise legislation, and justice was administered strictly to peasant and noble alike. But his rule was arbitrary and his taxes heavy; he wasted much money in pompous display; and he overrode the rights of the magnates.

Matto Grosso ('dense forest'), an inland state of Brazil, bordering on Bolivia; it is second to Amazonas alone, both in size and sparsity of population. Area, 532,000 sq. m.; population, 247,000, nearly all Indians and blacks. Within this vast territory several great rivers rise, including the Madeira and the Paraguay; but in most parts there is a scarcity of water during the dry season. The vegetation is generally scanty, grass, bush, and low trees covering the sandstone plateau; high trees and rich vegetation are confined to the river valleys. The gold and diamonds which formerly constituted the wealth of Matto Grosso have been exhausted, and agriculture (insufficient for the wants of the state) and cattle-raising, with the gathering of medicinal plants by the Indians, are now the principal industries; but manganese is mined. The capital is Cuyabá (q.v.). The former capital, Matto Grosso, on the Guaporé, decayed with the gold-mining industry.

Mattoon, a city of Illinois, 160 miles S. by W. of Chicago. It contains railway-shops, flour-mills, and grain-elevators, and manufactures castings and drain tiles. Pop. 13,500.

Maturin, CHARLES ROBERT, dramatist and romancer, was born in 1782, waged warfare with poverty as curate of St Peter's, Dublin, and died there, 30th October 1824, after making his name at least notorious by a series of extravagant novels that outdid Mrs Radcliffe. These were *The Fatal Revenge*, *The Wild Irish Boy*, *The Milesian Chief*; and, later, *Women*, *Melmoth* (most famous and most hyperbolic of them all), and *The Albigenes*. His tragedy, *Bertram*, had a success at Drury Lane in 1816; its successors, *Manuel* and *Fredolpho*, were promptly damned.

Maubeuge, a fortified town in the French department of Nord, 4 miles from the Belgian frontier, was in German hands during the Great War; pop. 21,000.

Mauch Chunk, a mining-town of Pennsylvania, capital of Carbon county, is situated among picturesque hills on the Lehigh River, 70 miles NNW. of Philadelphia. There is a switch-back railway, 9 miles long, from the town to Summit Hill—famous for its ‘burning mines,’ smouldering since 1858. Pop. 4000.

Mauchline, a town of Ayrshire, 12 miles ENE. of Ayr, and 10 SSE. of Kilmarnock. It has long been noted for its wooden snuff-boxes and similar nicknacks. There is a monument (1830) to five martyred Covenanters; and 1 mile N. is Moss-giel, Burns’s farm from 1784 till 1788; whilst in the village itself are ‘Poosie Nancy’s,’ the scene of his *Jolly Beggars*, and Mauchline kirk, of his *Holy Fair*. Pop. 1500.

Maud. See MATILDA.

Maude, SIR FREDERICK STANLEY (1864–1917), British soldier, educated at Eton and Sandhurst, served in the Sudan and South Africa, was military secretary to the governor-general of Canada (1901–4), and later was employed at the War Office. In the Great War he commanded a brigade in France, took part in the Gallipoli evacuation, and becoming commander-in-chief in Mesopotamia, soon turned failure into complete success, culminating in the taking of Bagdad, where he died of cholera. See WAR (GREAT), and Life by Callwell (1920).

Maudsley, HENRY, a prominent student of mental pathology, was born near Giggleswick in the West Riding of Yorkshire, 5th February 1835, and was educated at Giggleswick grammar-school and University College, London. He graduated M.D. at the university of London in 1857, was for a time physician to the Manchester Royal Lunatic Asylum, but returned to London in 1862 to be a consulting physician. From 1869 to 1879 he filled the chair of Medical Jurisprudence at University College. He published, besides minor works, *The Physiology and Pathology of the Mind* (1867), *Responsibility in Mental Disease* (1872), *Body and Will* (1883), *Natural Causes and Supernatural Seemings* (1886); and, still materialist and teleologist, *Life in Mind and Conduct* (1903), and *Organic to Human* (1916). He died 23d January 1918.

Maugham, WILLIAM SOMERSET, English novelist and playwright, born at Paris in 1874, was educated at Heidelberg, and became a physician and surgeon at St Thomas’s Hospital, London. Since his first novel, *Liza of Lambeth* (1897), he has used the scalpel on the human mind. The better known of his novels include *The Making of a Saint* (1898), *The Moon and Sixpence* (1919), and *The Painted Veil* (1925), a powerful portrayal of conditions in China. It is his plays, however, which have brought him most fame. Among the chief are *Lady Frederick* (1909); *The Tenth Man* (1910); *The Circle* (1921), by many considered his best; *East of Suez* (1923), a melodramatic presentation of the old problem of East and West; *Our Betters* (1923); *The Camel’s Back* (1924); and *Rain* (1925), a powerful if sordid drama. A trail of tragic experience, apt to become monotonous, runs through all Maugham’s work, and irony is perhaps his most marked characteristic, although humanity cannot be denied to his creations. Some of his plays are cynical and light.

Maulmain, or MOULMEIN, a town in the division of Tenasserim, Burma, near the mouth of the Salwin River. It is backed by a fine range of hills, on whose heights flash the gilded spires of innumerable pagodas; and there, too, are built

many pretty residences, commanding a fine view of the town, river, and adjacent country, which for picturesque beauty and varied scenery has few equals. There are numerous public buildings, churches, chapels, and missionary establishments, several charitable and educational institutions, barracks, a hospital, and jail. The population is about 61,000, consisting, besides Burmese, of Hindus, Malays, Europeans, Anglo-Indians, Chinese, Armenians, and Jews. The principal exports are teakwood and rice; the imports consist of general merchandise, chiefly piece-goods, hardware, provisions, and sundries. See BURMA.

Mauna Loa, a great volcano in Hawaii (q.v.).

Mauder, SAMUEL, compiler, was born about 1785, and died 30th April 1849. He was a brother-in-law of William Pinnock, assisted him in the preparation of his catechisms, and amongst other works which he compiled are *Biographical Treasury*, *Scientific and Literary Treasury*, *Treasury of Knowledge*, *Treasury of History*, &c. These books have been frequently revised and reissued.

Maundeville. See MANDEVILLE.

Maundy-Thursday, the Thursday of Holy Week (q.v.). The name *Dies mandati* is derived from the ancient custom of washing the feet of the poor on this day, and singing at the same time the anthem *Mandatum novum*, which is taken from John, xiii. 34. This rite, called *mandatum* or *lavapedum*, is of great antiquity, both in the Eastern and Western churches. In more modern times it came to be accompanied by a distribution of ‘doles,’ placed in small baskets, thence called ‘maunds.’ In the royal usage of the maund in England, the number of doles distributed is reckoned by the years of the monarch, and their value is 1d. for each year of the sovereign’s life. James II. was the last English sovereign who performed this ceremony in person; but the Austrian emperor, Francis Joseph, continued the custom from 1849 till 1888, washing every year the feet of twelve old men. In Madrid the ceremony is retained, the feet of twelve old men and twelve old women being touched with a sponge and towel by the sovereign, who afterwards serves them at table; and in 1889 the feet of twelve boys were washed in the Roman Catholic pro-cathedral at Kensington by one of the bishops, each boy also receiving a piece of money. During the middle ages the maund was held in all monasteries and great houses; and in the Household Book of the Earl of Northumberland, which begins in 1512, there are entries of ‘al maner of things yerly yevin by my lorde of his Maundy and my laidis and his lordshippis childeren.’ See Skeat’s edition of *The Vision of Piers the Plowman* (vol. i. p. 488, l. 140, note).

Maupassant, GUY DE, a clever French writer, was born 5th August 1850, at the castle of Miromesnil in Normandy, and, after carrying a musket through the Franco-German war, was initiated by Gustave Flaubert into the craft of letters. He attached himself to the younger branch of the naturalistic school, and wrote himself in by a story contributed to the *Soirées de Médan* (1880). He next produced a play, *Histoire du Vieux Temps*, and a striking volume of lyrics published under the title *Des Vers* (1880). But he won his real reputation as a novelist and storyteller, with *La Maison Tellier* (1881), *Les Sœurs Rondoli* (1884), *Contes du Jour* (1885), *Contes et Nouvelles* (1885), *Monsieur Parent* (1885), *Bel-Ami* (1885), *La petite Roque* (1886), *Pierre et Jean* (1888), and *Fort comme la Mort* (1889). He became insane in 1892, and died in an asylum, 6th July 1893.

Maupertuis, PIERRE LOUIS MOREAU DE, mathematician, was born at St Malo on 17th

July 1698, and after five years in the army devoted himself to science. His able advocacy of Newton's physical theory, in opposition to that of Descartes, gained him admittance to the Royal Society of London in 1728. In 1736-37 he was placed at the head of the Academicians whom Louis XV. sent to Lapland, to obtain the exact measurement of a degree of longitude, whilst the same thing was being done in Peru by La Condamine. This operation Maupertuis described in *De la Figure de la Terre* (Paris, 1738). In 1740 he went to Berlin, on the invitation of Frederick II., who made him president of the Academy. Having accompanied the Prussian army to the field, he was taken prisoner at Mollwitz by the Austrians in 1741. He returned to Berlin in 1744; but his morbid *amour-propre* and tyrannical disposition excited general dislike. Besides being engaged in a bitter quarrel with König as to the merits of Leibniz, he incurred the enmity of Voltaire, who satirised him in *Micromégas* and *Diatribes du Docteur Akakia*, whereby Maupertuis was driven away to Basel to recoup his health, and to enjoy the society of the Bernouillis, but he died there, 27th July 1759. Maupertuis was a mathematician of good ability, but owed his celebrity as much to the idiosyncrasies of his manners and disposition as to his merit. His *Works*, 4 vols., appeared at Paris in 1752, and at Lyons in 1768. See *Life* by La Beaumelle (1856) and Lesueur (1897).

Maurepas, JEAN FRÉDÉRIC PHELYPEAUX, COMTE DE (1701-81), a French statesman, born at Paris. He was brought up for public life, and was early entrusted with office, but contrived to displease the all-powerful Pompadour, and was banished from court in 1749. He was recalled and made first minister at the accession of Louis XVI. (1774), and, by helping the American colonists in their war for independence, he succeeded in his policy of humiliating England; but his was not the hand to hold the helm in the face of fast-gathering storms. Yet he brought into the ministry men far greater and wiser than himself—Turgot, Malesherbes, and Necker. His secretary, Sallé, edited his *Mémoires*.

Mauretania, Maurétanie. See MAURITANIA.

Maurice, PRINCE OF ORANGE and COUNT OF NASSAU, one of the most skilful generals of his age, was the son of William the Silent, Prince of Orange, and was born at Dillenburg, 13th November 1567. After his father's assassination in 1584, the provinces of Holland and Zealand, and afterwards Utrecht and the others, elected him their stadtholder. A great portion of the Netherlands was still in the hands of the Spaniards; but, under the admirable leadership of Maurice, the Dutch, aided by an English contingent under the Earl of Leicester and Sir Philip Sidney, rapidly wrested cities and fortresses from their enemies. In 1590 Breda, and in 1591 Zutphen, Deventer, Nimeguen, and other places fell into their hands, in 1593 Geertruidenberg, and in 1594 Groningen. In 1597 he defeated the Spaniards at Turnhout in Brabant, and in 1600 won a splendid victory at Nieuwpoort. Then for more than three years he baffled all the power of Spain by his defence of Ostend. Finally, in 1609, Spain was compelled to acknowledge the United Provinces as a free republic. But from this time keen dissension grew up between the Orange party, who favoured the Gomarists, and the Remonstrants or Arminians, who found their chief supporters in aristocratic republicans like Olden Barneveldt (q.v.; see also ARMINIUS). The former emerged victors from the struggle, and Maurice at once (1621) renewed the war with Spain. He died, unmarried, at The Hague, 23d

April 1625. See Groen van Prinsterer, *Maurice et Barneveldt* (Utrecht, 1875).

Maurice, JOHN FREDERICK DENISON, one of the most influential thinkers and social reformers of his age, was the son of a Unitarian minister, and was born at Normanston, near Lowestoft, 29th August 1805. In 1814 the family removed to Frenchay, near Bristol; and in 1823 he went up to Trinity College, Cambridge, thence migrating to Trinity Hall. His reputation at the university for scholarship stood high, but, being at this time a dissenter, he left Cambridge in 1827 without taking a degree, and commenced a literary career in London. He wrote a novel, *Eustace Conway*, and for a time edited the *Athenæum*, then recently started. His spirit had, however, been profoundly stirred and influenced by Coleridge, and he resolved to take orders in the Church of England. He proceeded to Oxford, where he took the degree of M.A., and was ordained a priest in 1834. He became chaplain to Guy's Hospital in 1837; in 1840 professor of Literature at King's College, London, where he was professor of Theology from 1846 till 1853. In 1846 he was appointed chaplain of Lincoln's Inn, and left Guy's Hospital. He continued chaplain of Lincoln's Inn until 1860, when he accepted the incumbency of Vere Street Chapel, which he held until his election as professor of Moral Philosophy at Cambridge in 1866. He died in London on 1st April 1872, and was buried at Highgate. The publication in 1853 of his *Theological Essays*, in which he dealt with the difficulties which hinder the acceptance of faith in Christ, lost him the professorship of Theology in King's College. The controversy turned on the doctrines of the atonement and eternal life. The atonement he declared to be not a terrible necessity but a glorious gospel, not of pardon for sin but deliverance from sin (see ATONEMENT); while Christ's definition of life eternal he maintained was opposed to the popular doctrine, which he regarded as a mixture of paganism and Christianity. The views set forth in this and other works were mainly these: that Christ was not the founder of 'a religion,' but king of all men, ruling now where he least seems to rule; that Christ's church does not consist of a few privileged persons, but is the body which represents 'the marriage of the Lamb,' that marriage being the incarnation, or uniting of the Godhead with manhood; that the 'fall of Adam' is not the centre of theology, but an incident in the early education of the race, important only as representing the weakness of man apart from Christ, in whom he lives and moves and has his being; that the curse of Adam was the condemnation of the false position of the man apart from God, resting on his own strength; that Christ came preaching 'the kingdom of heaven,' that is, the actual reign of righteousness in the world, the revelation of which is not contained in a closed book, but is always going on, and looks not backward to the restoration of an Eden of tropical fruits and easy culture, but forward to the cultivation by work and rest of all man's faculties unto the measure of the stature of the fullness of Christ; that faith consists in trust in this King of men, and belief in the power of right and the impotence, despite its seeming strength, of evil, not in the acceptance of formulæ: that creeds, the Bible, the church, are valuable just in so far as they set forth Christ the King as the object of the faith of man; as substitutes for that faith they are only mischievous. His principal books are his *Moral and Metaphysical Philosophy*, *Religions of the World*, *Prophets and Kings of the Old Testament*, *Patriarchs and Lawgivers of the Old Testament*, *The Kingdom of Christ*, *The Doctrine of Sacrifice*, *Theological Essays*, *Lectures on the*

Ecclesiastical History of the First and Second Centuries, Gospel of St John, The Conscience, and Social Morality. Maurice strenuously controverted Mansel's views on our knowledge of God, and denounced as false any political economy founded on selfishness and not on the Cross as the ruling power of the universe. He was the mainspring of the movement known as Christian Socialism, and the president of the society for promoting working-men's associations; and was also the founder and first principal of the Working-man's College, and the founder and the guiding spirit of the Queen's College for Women, in both of which he taught. He vehemently repudiated the position of a party-leader, and his influence consequently extended throughout all parties in the church. He denounced the whole party-system as tending to divide Christ's body, both in church and state. See the *Life* (1884), based mainly on his letters, by his son, Major-general Sir J. F. Maurice (1841-1912), a distinguished soldier and lecturer and author on military history, including the history of the South African War.

Maurice. See BYZANTINE EMPIRE; CHARLES V.; RUPERT; and SAXE.

Maurier. See DU MAURIER.

Maurists, a reformed congregation of Benedictines, originally established in Lorraine, but from 1618 onwards named after the 6th-century St Maur, and established at the abbey of St-Maur-sur-Loire, 14 miles NW. of Saumur. Originally noted for their austerity, they were afterwards especially known for their services to learning. The headquarters of the order was subsequently in three houses near Paris, especially St-Germain-des-Prés. The congregation was dissolved with other monastic orders in 1792, and the splendid conventual buildings at St Maur destroyed during the revolutionary troubles. Amongst the learned fathers of St Maur were such scholars as Mabillon, Montfaucon, D'Achéry, Martène, Rivet, Tassisi, Bouquet, Ruinart, Lami; and amongst the works published, besides admirable editions of the fathers, the *Art de Vérifier les Dates* (1750), a new edition of Du Cange's *Glossarium, De Re Diplomatica, Acta Sanctorum S. Benedicti* (9 vols. 1668-1702), *Annales Ordinis S. Benedicti* (6 vols. 1703-39), *Gallia Christiana, Veterum Scriptorum Amplissima Collectio, Histoire Littéraire de France*, &c.

Mauritania, or MAURETANIA, the ancient name of Morocco and western Algeria, was derived from its inhabitants, the Mauri or Maurusii (see MOORS). It reached on the south to the Atlas Mountains, and was originally separated from Numidia by the river Mulucha, now the Muluya, though later it extended as far east as the Ampsaga. In ancient times it yielded great quantities of corn and valuable timber. See MOROCCO. The modern Maurétanie, a French colony since 1921, lies farther south, between Morocco and Senegal. Area, 347,400 sq. m.; pop. 262,000, mostly nomad Moors.

Mauritius, or ISLE OF FRANCE, an island in the Indian Ocean, belonging to Great Britain, and situated 550 miles E. of Madagascar. Area, 720 sq. m. It is of volcanic origin and elliptical in shape. A girdle of reefs, broken only by passages opposite the mouths of the small streams, renders it somewhat difficult of approach. The contour rises rapidly into a tableland that shoots up into ridges 500 to 2700 feet in height. Of individual peaks, Pouce (2650 feet) resembles the human thumb, Pieter Botte (2676), a sharp cone, supports a gigantic crag on its summit, and Rivière Noire (2711) is the culminating point of the island. Lavas abound, and volcanic lakes, as Grand Bassin, are not uncommon. During the French occupation (1715-1810) Mauritius, or, as they

called it, Île de France, was well wooded. Its picturesque beauty forms the appropriate background of Bernardin de St Pierre's idyl, *Paul and Virginia*, and is well described in Besant and Rice's novel, *My Little Girl*. But during the 19th century the forests were cut down to make room for sugar-cane plantations. Consequently but little of the native flora remains. The more conspicuous trees and plants are the ebony-tree, coconut and other palms, bamboo, benzoin, ironwood, aloe, traveller's tree, and numerous tropical fruits, besides food plants, such as sugar, vanilla, coffee, cocoa, maize, rice, yams, manioc, &c. The existing fauna consists almost entirely of imported domestic animals. The extinct fauna embraced the interesting Dodo (q.v.), the rail called Aphanapteryx, and a short-winged heron. Fossil tortoises of great size have been discovered. The birds resemble those of Madagascar; and the neighbouring seas swarm with fish. Owing to the deforesting of the island the rainfall is uncertain. Though pleasant enough in the cool months, the climate, except in the elevated plains of the interior, is very hot during the rainy season (December to April or May), and terrific cyclones are common, though less common, it is believed, since the woods have been felled. In 1854 cholera carried off 17,000 people, and thirteen years later 30,000 perished of a malignant fever. The upper classes, very intelligent, cultured, and well educated, are mostly descended from the old French colonists, except that the government officials, with a few others, are English. There is a large number of half-castes, and a considerable body of Negroes, Malagasy, Singhalese, Malays, Chinese, &c. But the greater part of the population consists of Indian coolies, who work the sugar-fields. Pop. (1881) 359,874; (1921) 376,680, of whom 265,884 were Indians. The people of European origin are mostly Roman Catholics (some 122,000), though there are also about 1000 Protestants; the Indians are mostly Hindus. The chief towns are Port Louis (q.v.), the capital, on the north-west coast, partly ruined by the destructive cyclone of April 1892; Curepipe, to which the government and merchants of the capital retire in the hot season; and Mahébourg. From Port Louis railways run round the northern half of the island, across to the east, and by way of Curepipe to the south and south-east (Mahébourg). The one great crop and export of the island is sugar. Aloe fibres (known in commerce as Mauritius hemp) and coconut oil are also exported. Cotton goods, iron and steel manufactures, soap, machinery, &c., are imported. The crown colony of Mauritius, with its dependencies Rodriguez (q.v.), Diego Garcia (q.v.), and several minor islands—total area, 90 sq. m.; pop. 8400—is administered by a governor, aided by an executive council; the Seychelles were made a separate colony in 1903. There is also a Council of Government, consisting of the governor and twenty-seven members, of whom ten are elected, nine are nominated by the governor, and eight are *ex officio*. Port Louis is fortified. Education is free, but not compulsory. Besides primary schools, there is the Royal College for secondary education, as well as other secondary schools. There is a Roman Catholic bishop of Port Louis, and a Protestant bishop of Mauritius. The European discovery of the island was made by the Portuguese between 1506 and 1528, tradition says by Mascarenhas (whence it and the neighbouring islands are called the Mascarenes); at that time it was uninhabited. The Portuguese having abandoned it after ninety years' possession, it was seized by the Dutch in 1598, who named it after their Prince Maurice (q.v.); but they in their turn abandoned it in 1710. It was the French governor Mahé de Labourdonnais (1735-46) who established the sugar-growing

industry, and laid the foundation of its prosperity. During the Napoleonic wars the privateers of Mauritius worked mischief on British shipping, and the island was occupied by Britain in 1810, and in 1814 was definitely acquired by her by the Treaty of Paris. Theodore Hook was treasurer in 1812-18. Under the British slavery was abolished in 1835, and in 1885 the first of various measures of representative government was introduced. At the time of the occupation Britain agreed to the retention of the existing laws, customs, religion, and Mauritius in consequence continued largely French in language and habits; after the Great War, however, an agitation by a section of the Europeans of French descent for the retrocession of the island to France met with no more than limited support.

See works by Grant (1801), Flemyng (1862), Ryan (1864), Boyle, J. G. Baker, G. Clark, Keller, Macmillan (1914), and Hart (1921); Bruce in *Scot. Geog. Mag.*, Feb. 1908; S. B. de Burgh-Edwardes, *History of Mauritius* (1922).

Maurocordatos, or MAVROCORDATO, a Fanariote family, distinguished for ability and political influence, and descended from Greek merchants of Chios and Constantinople.—ALEXANDER MAUROCORDATOS (circa 1637-1709), doctor of philosophy and of medicine of Bologna, became dragoman or interpreter to the Porte in 1681, rendered valuable service in negotiations with Austria, and drew up the treaty of Carlovitz (1699), becoming for a time one of a triumvirate in whose hands all power in the Ottoman empire rested.—His son, NICHOLAS (1670-1730), was the first Greek who was hospodar of Moldavia and Wallachia.—CONSTANTINE, son of Nicholas, became hospodar of Wallachia in 1730, and abolished serfdom in that country.—His brother's grandson, ALEXANDER MAUROCORDATOS, born at Constantinople on 15th February 1791, took an active part in the Greek struggle for liberty, and prepared the declaration of independence and the plan of a provisional government, being himself elected president of the executive body. In 1822 he undertook an expedition to Epirus, which ended in his defeat at Peta; but he saved the Peloponnesus by his resolute defence of Missolonghi (1822-23). In the subsequent strife of factions he continued to labour earnestly in the cause of Greek independence and union, but incurred unpopularity through his English sympathies and his opposition to the 'Russian' party. After the accession of King Otho he was at different times cabinet-minister and ambassador of Greece at various courts. At the outbreak of the Crimean War he was placed once more at the head of the government, but soon resigned. He died at Ægina, 18th August 1865.

Maurras, CHARLES, French writer, was born in 1863 at Martigues, and educated at the Catholic College of Aix. Coming to Paris he found work in journalism, literary criticism and politics being his themes. Intellectually he had been powerfully influenced by Comte and the classics, and in 'order' claimed to find the ideal in art and in government. In criticism he stood opposed to romanticism, and in the *Gazette de France* and other journals made a classical renaissance his aim. In politics, a nationalist first and last, he assailed the democratic ideas of his time, and in the interests of decentralisation, in the *Action Française* (a monthly reorganised by him in 1899 and changed into a daily in 1908), the *Figaro*, and other prints, championed a return to the hereditary monarchy. Among representative works are *Jean Moréas* (1891); *Trois Idées politiques: Chateaubriand, Michelet, Sainte-Beuve* (1898); *L'Enquête sur la Monarchie* (1900); *Anthinea* (1901), an account of a trip to Greece,

Italy, Corsica; *L'Avenir de l'Intelligence* (1905); *Le Dilemme de Marc Sangnier* (1906), an essay on religious democracy; *Kiel et Tanger* (1910); *Athènes antique* (1918). Maurras is recognised as one of the foremost French prose-writers of his day. His essays in poetry, as *Inscriptions* (1921) and *La Langue Intérieure* (1925), are of little merit. There are works on him in French by Descoqs (1913), Truc (1917), Ségard (1919), Thibaudet (1920).

Maury, JEAN SIFFREIN, French orator and prelate, was born on 26th June 1746 at Valréas (dept. Vaucluse), and his studies completed at Avignon, he went to Paris. Eloquent *éloges* on the dauphin, Charles V. of France, St Louis, St Vincent de Paul, and others, gained him the abbacy of Frinade, and in 1784 admission to the Academy. In 1786 he was made prior of Lihons-en-Santerre, and in 1789 was sent by the neighbouring clergy to the States-general, where as an orator he rivalled Mirabeau. At the dissolution of the Constituent Assembly he withdrew from public life, and even from France. The pope, admiring his devotion to Louis XVI., made him Archbishop of Nicæa in *partibus*, and cardinal in 1794; but in 1804 Maury made his submission to Napoleon, who in return appointed him Archbishop of Paris (1810). This step cost Maury the favour of the pope; that of the Bourbons he had of course already lost, and three years after their restoration he died in disgrace, 11th May 1817. Maury wrote *Essai sur l'Éloquence de la Chaire* (2 vols. 1810), 'one of the best books in the language'; his *Œuvres Choisies* were published in 5 vols. in 1827. See Lives by his nephew, L. S. Maury (1827), Poujoulat (1835), and Ricard (1887); also Sainte-Beuve, *Causeries du Lundi*, vol. iv.

Maury, MATTHEW FONTAINE, hydrographer, was born near Fredericksburg, Virginia, 14th January 1806. In 1825 he entered the United States navy, and during a voyage round the world commenced his well-known *Navigation* (1834). Lamed for life in 1839, he was appointed superintendent of the Hydrographical Office at Washington (1842), and of the observatory (1844). Here he wrote his *Physical Geography of the Sea* (1856), and his works on the Gulf Stream, Ocean Currents, and Great Circle Sailing. On the outbreak of the Civil War he joined the Confederate navy, and became head of land defences. Afterwards he occupied the chair of Physics in the Virginia Military Institute at Lexington, where he died 1st February 1873. There is a Life (1888) by D. F. Maury Corbin, his daughter.

Mausoleum, a sepulchral monument of large size containing a chamber in which urns or coffins are deposited. The name is derived from the tomb erected in 353 B.C. at Halicarnassus (q.v.) to Mausolus, satrap of Caria, by his widow (and sister), Artemisia. It was esteemed one of the seven wonders of the world. Although apparently in good condition as late as the 12th century, it fell into decay during the following two centuries. The ruins were ransacked for building materials by the Knights of St John in the 16th century. The site was rediscovered in 1857 by Newton, who was instrumental in getting the remains carried to the British Museum (q.v.). The mausoleum consisted of a basement 65 feet high, on which stood an Ionic colonnade 23½ feet high, surmounted by a pyramid, rising in steps to a similar height, and on the apex of that stood a colossal group, about 14 feet in height, of Mausolus and his wife in a *quadriga*; these statues are supposed to have been the work of the celebrated Scopas. Later instances of large and magnificent mausoleums are Metella's tomb, Hadrian's (Castle of San Angelo), and that of

Augustus, all at Rome, the mausoleum of Frederick-William III. and Queen Louisa at Charlottenburg, that of the House of Hanover at Herrenhausen, of the Prince Consort and Queen Victoria at Frogmore in Windsor Park, of Napoleon III. at Farnborough, of A. T. Stewart at Garden City (q.v.), not to speak of Lick Observatory (q.v.) and other American monumental erections. See **BURIAL**.

Mauvaises Terres, or **BAD LANDS**, extensive waste lands of the western United States consisting of soft horizontal strata deeply eroded into fantastic architectural and other forms; at a little distance they appear like fields of ruins. The name was first applied to a Tertiary (Miocene) area in the region of the Black Hills in South Dakota along the White River, but there are similar lands in Colorado, Arizona, New Mexico, Texas, and elsewhere.

Mauve, **ANTON** (1838-88), Dutch landscape painter, born at Zaandam, was chiefly self-taught. With Israëls and Jakob Maris he is in the front rank of modern Dutch artists. He painted in both oil and water colours. 'The Sand Cart,' 'The Flock of Sheep,' 'The Flock Returning,' 'On the Heath,' and 'Evening' are among his best pictures.

Maw-seed, a name by which poppy-seed is sold as food for cage-birds when moulting.

Maxim, **SIR HIRAM STEVENS** (1840-1916), an inventive civil, mechanical, and electrical engineer, born in Maine, settled in London in 1883. He is best known as the inventor of the Maxim-gun (see **MACHINE-GUNS**), but had over one hundred patents for other inventions, the 'maximite' smokeless powder being an important one. Latterly he devoted himself to aeronautics. See *My Life* (1915), and a Life by Mottelay (1920).

Maximilian I., German emperor, the son of Frederick III., was born at Wiener-Neustadt, 22d March 1859. By his marriage with Mary, heiress of Charles the Bold, he acquired Burgundy and Flanders. But this involved him in war with Louis XI of France, and after the early death of his wife (1482) he was forced to give Artois and Burgundy to Louis. In 1486 he was elected king of the Romans. In 1490 he drove out the Hungarians, who, under Matthias Corvinus, had seized (1487) great part of the Austrian territories on the Danube; and at Villach in 1492 he routed the Turks, who had been raiding in Carinthia, Carniola, and Styria. Thereafter he set about revenging himself on Charles VIII. of France, who, on promise of papal dispensation and having rejected Maximilian's daughter, his betrothed since 1482, in 1491 married Anne of Brittany, to whom in 1490 Maximilian, with an eye to extending his dominions, had himself been wedded by procuration; but little support was given to the quarrel, and in 1493 the strife was composed in the peace of Senlis, Maximilian, however, obtaining Artois and Franche-Comté. On the death of his father in 1493 Maximilian became emperor. He subsequently married Bianca Sforza, daughter of the Duke of Milan, and turned his ambition towards Italy; but after years of war, he was compelled (1515) to give up Milan to France and Verona to the Venetians. Then in 1499 the Swiss completely separated themselves from the German empire. The hereditary dominions of his house, however, were increased by the peaceful acquisition of Tyrol; the marriage of his son Philip with the Infanta Joanna united the houses of Spain and Hapsburg; whilst the marriage in 1521 of his grandson Ferdinand with the daughter of Ladislaus of Hungary and Bohemia brought both these kingdoms to Austria. Two years after his accession the new emperor put an end to the intestine

feuds of his nobles by proclaiming at Worms the Eternal Peace. He also improved the administration of justice by establishing the Imperial Tribunal and the Imperial Aulic Council, and by admirable police regulations. The empire was divided into six (afterwards ten) circles, each ruled by a separate governor. Maximilian greatly encouraged the arts and learning, especially favoured the universities of Vienna and Ingolstadt, and caused to be written *Theuerdank* in verse and *Weisskunig* in prose, of both of which he himself is the hero, and of both of which he was probably in part author. He died at Wels, in Upper Austria, 12th January 1519. Besides being excellently schooled in mental and artistic accomplishments, Maximilian was well versed in all bodily exercises and in popular games; he had, too, a kingly presence, a chivalrous disposition, a genial manner, and has been described as the last representative of mediæval chivalry. See *Lives* by Klüpfel (1864) and 'Christopher Hare' (1913), Seton-Watson's essay (1902), Ulmann (1884-91), and a history of his reign by Hegewisch (1782).

Maximilian, **EMPEROR OF MEXICO**. Ferdinand Maximilian Joseph, Archduke of Austria, was born on 6th July 1832, and was the son of the Archduke Francis-Charles, and the younger brother of Francis-Joseph. He became an admiral of the Austrian navy, and in 1857-59 he was popular as governor of the Lombardo-Venetian territory. In 1863, at the instance of France, whose interference in Mexican affairs (at first in company with England and Spain) had ended in the military occupation of the country, he was offered the crown of Mexico by a French-nominated Mexican Assembly of Notables. After deliberation he solemnly accepted it; and in June 1864 he entered Mexico. For a time all went well; but he vainly tried to reconcile the Mexican parties. Juárez (q.v.) again raised the standard of independence; and soon after (1866) Louis Napoleon had to contemplate the withdrawal of his troops. The Empress Charlotte, a daughter of Leopold I. of Belgium, went to Europe to enlist support for her husband; but in vain, and her reason gave way with her failure. The French were most anxious that Maximilian should leave with their troops; but he felt bound as a man of honour to remain and share the fate of his followers. At the head of 8000 men he made a brave defence of Querétaro against a Liberal army under Escobedo. In May 1867 he was betrayed and tried by court-martial, and on 19th June he was shot. His death was directly due to his edict of 3d October 1865, that all Mexicans taken in arms against the empire should be shot without trial. His writings were published under the title of *Aus Meinem Leben* (7 vols. 1867). See **MEXICO**; and P. F. Martin, *Maximilian in Mexico* (1914).

Max-Müller, **FRIEDRICH**, philologist, was born at Dessau, 6th December 1823. His father, Wilhelm Müller (1794-1827), distinguished not only as a scholar, but also as one of the first German lyric poets, was librarian of the ducal library, but died prematurely. Max-Müller received the elements of his education at Dessau, and then went to Leipzig, where he studied Greek and Latin under Hermann and Haupt, and took his degree in 1843. He began the study of Sanskrit under Professor H. Brockhaus, and soon chose it as his special pursuit. The first fruits of his labours appeared in a translation of the *Hitopadesa* (Leip. 1844). In 1844 he went to Berlin to study under Bopp and Schelling, and consult the Sanskrit MSS. to be found there. In Paris, whither he repaired in 1845, he began, at the instigation of Burnouf, to prepare for an edition of the *Rig-Veda*, the 14th-

century commentary of Śāyanācārya thereupon to be included. With this view he came to England, June 1846, to examine the MSS. in the East India House and the Bodleian Library; and the East India Company commissioned him (1847) to edit the Rig-Veda at their expense (6 vols. 1849-74; new ed. 1890). In 1850 he was appointed deputy Taylorian professor of Modern Languages at Oxford; in 1854 he succeeded to the professorship; in 1858 he was elected a fellow of All Souls; and in 1866 was made professor of Comparative Philology. He published treatises on a variety of philological topics, which did more than the labours of any other single scholar to awaken in England a taste for the science of language in its modern sense. Inheriting the poetic imagination and fire of his father, Max-Müller had at command such a felicity of illustration that subjects dry under ordinary treatment became in his hands attractive. He published a translation into German of Kālidāsa's *Megha-dūta* (1847); *The Languages of the Seat of War in the East* (1854); *Comparative Mythology* (1856); *History of Sanskrit Literature* (1859); *Lectures on the Science of Language* (1861-63); *Introduction to the Science of Religion* (1873). Other works were *Chips from a German Workshop* (4 vols. 1868-75); the Hibbert Lectures on *The Origin and Growth of Religion* (1878); *Selected Essays* (1881); *Biographical Essays* (1883); *Natural, Physical, Anthropological, and Psychical Religion* (Glasgow Gifford Lectures, 1888-92; published 1889-93); and *Science of Mythology* (2 vols. 1897). A novel written in German, *Deutsche Liebe* (1857), went through many editions. He edited the important series of *The Sacred Books of the East*. He died at Oxford, 28th October 1900. *Auld Lang Syne* (1898-99) and *My Autobiography* (1901) are autobiographical fragments; his widow edited his *Life and Letters* (2 vols. 1902).

Maxwell, JAMES CLERK, one of the greatest of modern natural philosophers, was born at Edinburgh 13th June 1831. He was educated in boyhood at the Edinburgh Academy. Before he was fifteen his first published scientific paper was read for him by Professor Forbes to the Royal Society of Edinburgh. He spent three years at the university of Edinburgh, and during this period he wrote two valuable papers, 'On the Theory of Rolling Curves,' and 'On the Equilibrium of Elastic Solids.' He went to Cambridge in 1850, in 1854 was second wrangler, and was declared equal with the senior wrangler in the higher ordeal of the Smith's prize. In 1856 he became professor of Natural Philosophy in Marischal College, Aberdeen, and in 1860 of Physics and Astronomy in King's College, London. He had been successively scholar and fellow of Trinity, and was elected an honorary fellow of Trinity when he finally became in 1871 first professor of Experimental Physics in the university of Cambridge. He died 5th November 1879.

The great work of his life is his treatise on *Electricity and Magnetism* (2 vols. 1873). His great object was to construct a theory of electricity in which 'action at a distance' should have no place; and his success was wonderful. For his electro-magnetic theory of light, see the latter part of the article **ELECTRICITY**, the last paragraph of **MAGNETISM**, and the articles **LIGHT** and **REFRACTION**; and for its practical application, **WIRELESS TELEGRAPHY**, **WIRELESS TELEPHONY**. Another subject to which he devoted much attention was the perception of colour and the cause of colour-blindness. He was the first to make colour-sensation the subject of actual measurement. He obtained the Adams prize for his splendid discussion of the dynamical conditions of stability of the ring-system of Saturn. But he was perhaps best

known to the public by his investigations on the kinetic theory of gases. His Bradford 'Discourse on Molecules' is a classic in science. Besides a great number of papers on various subjects, mathematical, optical, dynamical, he published an extraordinary text-book of the *Theory of Heat* and an exceedingly suggestive little treatise on *Matter and Motion*. In 1879 he edited, with copious and very valuable original notes, *The Electrical Researches of the Hon. Henry Cavendish*. He took a prominent part in the construction of the British Association Unit of Electrical Resistance, and in writing the Association's admirable reports on the subject; and he discovered that viscous fluids, while yielding to stress, possess double refraction. He was excessively ingenious in illustration, especially by means of diagrams, and possessed a singular power of epigrammatic versification. Some of his last and very best scientific work adorns and enriches the ninth edition of the *Encyclopædia Britannica*. His *Scientific Papers* were edited by W. D. Niven (2 vols. Camb. 1890); and his *Life* was written by Lewis Campbell and William Garnett (1882).

Maxwell, MRS JOHN. See BRADDON.

Maxwell, SIR WILLIAM STIRLING- (1818-78), was born at Kenmure House, near Glasgow. Graduating from Trinity College, Cambridge, he travelled in Italy and Spain, and wrote *Annals of the Artists of Spain* (3 vols. 1848), a sumptuous *Don John of Austria* (1883), and works on the Emperor Charles V., on Vesalius (privately issued), and on Velázquez (1885). Having succeeded (1866) to the baronetcy and estates of his uncle, Sir John Maxwell of Pollok, he added the name of Maxwell to his own. His second wife (1877) was the Hon. Mrs Norton (q.v.). He sat in parliament as a Conservative (1852-68, 1874-78). A new edition of his Works was published in 6 vols. in 1891.

May (Lat. *Maius*), the fifth month (31 days) of the year in the Julian and Gregorian calendar, the third in the old Roman. The etymology of the word is uncertain, but is usually connected with the name of the goddess Maia, the mother of Mercury, and a deity of growth and of increase. From primitive times the revival of vegetation, which in certain countries marks Nature at this period, has been celebrated with various ceremonies. Thus the first of May has from time immemorial been a gala day in Britain, although, like most of the festivals of the calendar, it has suffered from the hand of time. It is no doubt a survival of the Floralia of the Romans, who in their turn, it has been suggested, derived their festival from India. The anniversary is still kept up by the Italians under the title of 'Calendi di Maggio,' young people sallying forth at daybreak to collect boughs to decorate the house-doors of their relatives and friends. A remnant of the May festival survives in *Beltane* (q.v.). In England, as we learn from Chaucer and Shakespeare and other writers, it was customary during the middle ages for all, both high and low—even the court itself—to go out on the first May morning at an early hour 'to fetch the flowers fresh.' Hawthorn (q.v.) branches were also gathered; these were brought home about sunrise, with accompaniments of horn and tabor and all possible signs of joy and merriment. The people then proceeded to decorate the doors and windows of their houses with the spoils. By a natural transition of ideas they gave the hawthorn bloom the name of the 'May'; they called the ceremony 'bringing home the May'; they spoke of the expedition to the woods as 'going a-Maying.' The fairest maid of the village was crowned with flowers as the 'Queen of the May,' and placed in a little bower or arbour, where she sat in state receiving the homage and admiration

of the youthful revellers who danced and sang around her. Another conspicuous feature of these festive proceedings was the erection in every town and village of a fixed pole—called the Maypole—as high as the mast of a vessel, on which each May morning were suspended wreaths of flowers, and round which the people danced in rings pretty nearly the whole day. The earliest representation of an English Maypole is that on a window of the time of Henry VIII. or earlier, at Betley, in Staffordshire; it is reproduced in the *Variorum Shakespeare*. A severe blow was given to these merry customs by the Puritans, who caused Maypoles to be uprooted, and a stop put to all their jollities. They were, however, revived after the Restoration, and held their ground for a long time; but they have now almost disappeared. In France and Germany, too, Maypoles were common, and in some places are still to be seen, and festive sports are even yet observed. See Chambers's *Book of Days*. With Catholics, since 1815, the month of May has been specially celebrated as the Virgin's month; and in Scotland, from some time at least before Mary's marriage to Bothwell (1567), as long before with the Romans, it has been deemed an unlucky month to marry in. International demonstrations of workmen in favour of a compulsory eight hours' working day took place in Europe and America on 1st May 1890, and since then the first of May has come to be generally recognised as a labour day, on which labour and socialist demonstrations are held.

May, ISLE OF, an islet of Fife at the mouth of the Firth of Forth. It has a lighthouse, a ruined 13th-century priory, and traces of holy wells of the time when the island was a favourite place of pilgrimage.

May, PHIL (1864–1903), caricaturist, was born at Wortley, near Leeds. Orphaned at nine, he had been foundry time-keeper, colour-grinder for a scene-painter, drawer of shilling portraits of actors, actor, &c., before coming, when about seventeen, to London, where he suffered extreme want until finding employment as a designer to a theatrical costumier, and work on the *St Stephen's Review* as poster artist and cartoonist. In 1884 he went to Australia, where he worked on the *Sydney Bulletin*, but in 1892 returned to London to establish his reputation with his *Annual* and his contributions to *Punch*—in 1896 he became a member of the permanent staff—the *Graphic*, &c. He excelled in depicting East London types, and an extraordinary economy of line was a characteristic feature of his work.

May, THOMAS (1595–1650), dramatist and historiographer, was educated at Cambridge, and became a member of Gray's Inn and a courtier. He produced several dramas (*Antigone*, *Cleopatra*, *Agrippina*, &c.) and comedies, poems, and translations of the Georgics and of Lucan's *Pharsalia*. During the Civil War he was made secretary and historiographer to the Parliament, and produced a *History of the Parliament of England, 1640–1643* (1647; several times republished), and a *Breviary* of the same history (1650).

May, SIR THOMAS ERSKINE, Baron Farnborough, born in 1815, was educated at Bedford School, became assistant librarian of the House of Commons in 1831, clerk-assistant in 1856, and clerk of the House in 1871. He was called to the bar in 1838, was made in 1860 Companion, in 1866 Knight Commander, of the Bath, and shortly after his retirement from office in 1886 was raised to the peerage as Baron Farnborough, but died on 18th May of that year. His most important works are *A Treatise on the Law, Privileges, Proceedings, and Usage of Parliament* (1844), which, acknowledged

as the parliamentary text-book, had gone through six editions before his death; *Constitutional History of England since the Accession of George III., 1760–1860* (1861–63; ed. F. Holland, 1912), a continuation of Hallam; and *Democracy in Europe: a History* (2 vols. 1877), a work characterised by great learning and impartiality.

Mayas, an American Indian people inhabiting Yucatán (q.v.), Chiapas, and other Mexican states, as well as parts of Guatemala, Honduras, and British Honduras. The ruins of Uxmal, Chichen, Mayapan, and other cities in Mexico, and especially Copán (q.v.) in Honduras, richly carved temples and other vast edifices, testify to their high civilisation in ancient times (from perhaps the 1st century B.C. onwards), as do also their underground reservoirs for water in an ill-watered land, their hieroglyphic writing, distinct from that of the Aztecs, and the astronomical lore illustrated by their calendar. See books by Maudslay (1889–1902), Joyce (1916), Gann (1918), and Morley (1920).

Maybole, a town of Ayrshire, $3\frac{1}{2}$ miles inland, and 9 by rail S. by W. of Ayr. In feudal times the capital of Carrick, and a burgh of barony since 1516, it is an old-world place, which once boasted twenty-eight baronial mansions, several of which still remain; besides these, it has a town-hall and a fine Roman Catholic church. Shoemaking is the staple industry. The famous abbey of Crossraguel (q.v.) is in the vicinity. Pop. 4400.

Mayence. See MAINZ.

Mayenne (Lat. *Meduana*), a French department formed out of the old provinces of Maine and Anjou, now containing the arrondissements of Laval, Château-Gontier, and Mayenne, has an area of 1996 sq. m. and a pop. of (1872) 350,637; (1921) 262,447. The valleys of the Mayenne, Vilaine, and Sarthe are fairly fertile, and yield wheat, barley, flax, potatoes, hemp, and fruit (especially apples for cider). Cattle-breeding, coal and slate mining, and cotton spinning and weaving are the other chief industries. Chief town, Laval.—The river Mayenne, after a course of 127 miles in a southerly direction, joins the Sarthe at Angers to form the Maine, a tributary of the Loire. It is navigable up to Laval.—The town of Mayenne, on the river Mayenne, 78 miles by rail S. by W. of Caen, has a picturesque ruined castle (taken by the English in 1424), steep narrow streets, and manufactures of calico and linen. Pop. 10,000.

Mayer, JULIUS ROBERT VON, physicist, was born at Heilbronn, 25th November 1814, studied medicine at Tübingen, Munich, and Paris, began life as a ship's surgeon, and settled in his native town to practise his profession in 1841. Whilst at Batavia in 1840 his attention was first attracted to the studies he afterwards pursued in every interval of leisure. In 1842 he published in Liebig's *Annalen* a preliminary statement of the mechanical theory of heat, in which he clearly determined the numerical relation between heat and work. Three years later he restated his views with admirable clearness and with a great wealth of illustration, and at the same time gave a forecast of his theory of the meteoric origin of the sun's heat, elaborated in 1848. Contemporaneously with Mayer the mechanical theory of heat was worked out independently by Joule (q.v.) in England. Nevertheless a controversy arose as to the priority of discovery. The Royal Society gave him the Copley medal in 1871, and he was ennobled by Württemberg two years before his death, on 20th March 1878.

See his papers collected as *Mechanik der Wärme* (3d ed. 1893), and his letters (1889); also Gross, *Robert Meyer und Hermann von Helmholtz* (1898); and monographs in German by Dühring (1879), Weyrauch (1890), and Friedländer (1905).

Mayfair, the unofficial designation of a fashionable residential district of the West End of London (q.v.) between Bond Street and Park Lane, named from a somewhat riotous fair held there in May as early as the time of Charles II., but suppressed at the end of the 18th century.

Mayflower, May-fly, May Laws. See PILGRIM FATHERS, EPHEMERA, FALK.

Mayhem. See ASSAULT.

Mayhew, AUGUSTUS (1826-75), wrote in conjunction with his brother Henry several notable works of humorous fiction, the best of which are named in the article below. In addition to this, the better-known part of his work, he wrote several stories popular at the time—*Paved with Gold* (1857), *The Finest Girl in Bloomsbury* (1861), *Faces for Fortunes* (1865), &c.

Mayhew, HENRY, born in London in November 1812, ran away from Westminster School under a sense of unjust treatment, was sent on a voyage to Calcutta, and on returning was articled to his father, a solicitor. Mayhew's first adventure in literature was the starting, in conjunction with Gilbert à Beckett, of *The Cerberus*, the production of which was stopped by à Beckett's father. The two youths in disguise left their homes, and with but fifteen shillings between them walked to Edinburgh, hoping to make fortunes there as actors and authors at the theatre of which Mayhew's brother Edward was lessee; this failed, for they were at once sent back. In 1831 they started *Figaro in London*, and the year following *The Thief*, which was the prototype of the 'Bits' journals of to-day. In 1841 Mayhew produced *The Wandering Minstrel*, a farce, and shortly after joined with his brother Augustus in one of the most successful of literary partnerships, during which (as 'the Brothers Mayhew') they produced some remarkably clever works of fiction, the best of which are *The Good Genius that turned Everything to Gold* (1847), *The Greatest Plague of Life* (1847), *The Image of His Father* (1848), *Whom to Marry* (1848), *The Magic of Kindness* (1849), *Living for Appearances* (1855). One of the originators and first editor (jointly with Mark Lemon) of *Punch*, Mayhew was from early in the forties a voluminous writer on many subjects—as on *The Peasant Boy Philosopher* (1854), *The Wonders of Science* (1855), *Shops and Companies of London* (1865), *London Characters* (1874), and the *Criminal Prisons of London*. The work by which he will perhaps be best remembered is his *London Labour and the London Poor* (1851, &c.). Mayhew, who had married in 1844 the elder daughter of Douglas Jerrold, died 25th July 1887.

Mayhew, HORACE (1816-72), brother of the two foregoing, also made some mark in literature, more especially of a humorous and ephemeral kind. He was a constant contributor to *Punch*, of which he was at one time sub-editor.

Maynooth, a village of County Kildare, Ireland, 15 miles NW. of Dublin, is of historical interest as the seat of the Geraldines of whose castle striking ruins still remain, and as the scene of more than one struggle with the English power, especially in the reign of Henry VIII. (the 'Rebellion of Silken Thomas'), and in the war of the Confederates (1641-50). But its chief modern interest arises from its Roman Catholic college, established (1795) by an act of the Irish parliament to meet a necessity created by the destruction, through the French Revolution, of the places of education in France upon which the Irish Catholic clergy, excluded by the penal laws from the opportunity of domestic education, had been driven to rely. Politically its foundation was principally due to the work of Burke and of Grattan. The annual vote

was continued, not without opposition, by the imperial parliament after the Union. In 1845 Peel carried a bill for an increased endowment. The building erected under the original endowment is a plain quadrangle. The new college is a very striking Gothic quadrangle by Pugin, containing professors' and students' apartments, lecture-halls, and a singularly fine library and refectory.

Under the Act of 1845 the college was to receive 500 students, all destined for the priesthood. The patronage of the 500 studentships was divided in the ratio of population among the bishops of the several sees of Ireland.

In 1869, by the Irish Church Act, the Maynooth endowment was withdrawn—a capital sum, fourteen times its amount, being granted to the trustees for the discharge of existing interests. The college was maintained on the same footing, the visitatorial powers created under the act of parliament being exercised by visitors appointed by the trustees. In 1909 Maynooth became an affiliated college of the National University, almost on the footing of a constituent college, but it is not represented on the senate. The college possesses some landed and funded property, the result of donations and bequests. The chapel, originally included in the design supplied for the college by Pugin in 1846, was (with the exception of a tower and spire 275 feet high) completed in 1890. Designed by J. J. McCarthy in the Decorated Gothic style, it consists of a great nave, choir, and sanctuary, ending in a five-sided apse, from which radiate five chapels. The entire length is 220 feet, the width 40 feet, the height from floor to groined ceiling 70 feet. The sides of the chapel are flanked by cloisters which exteriorly present the appearance of aisles. The interior is richly fitted with choir-stalls of finely-carved oak, mosaic pavements of varied devices, altars of Carrara marble, rich painted glass, and a sweetly-toned organ. A great part of the college was burned in 1878, but was soon restored.

See *Maynooth: a Centenary History*, by the Most Rev. Father Healy (1895).

Mayo, a maritime county of the province of Connaught, Irish Free State, is bounded on the N. and W. by the Atlantic Ocean, E. by Sligo and Roscommon, and S. by Galway. The greatest length north and south is 68 miles, the greatest breadth, 57 miles. Area, 2157 sq. m., of which a large percentage is bog or barren, though there are some very fertile regions; of the agricultural land only a relatively small proportion is under tillage, the remainder being in pasture. Pop. (1841) 388,887; (1861) 254,769; (1881) 245,212; (1901) 199,166; (1911) 192,177, almost all Roman Catholics. Agriculture is the leading industry; cattle, sheep, pigs, and poultry are raised, and oats and potatoes are the principal crops. There is also some manufacture of coarse woollen and linen cloths. The eastern half of the county is more or less a plain, the western half mountainous, the highest points being Mulrea (2688 feet), Nephin (2530), and Croagh Patrick (2370). Ironstone abounds, but owing to want of fuel is not worked; and there are several valuable slate-quarries. The chief towns are Castlebar (3700), the county town; Westport (3700); Ballina (4700), formerly partly in County Sligo; and Ballinrobe (1600). The coastline of Mayo is about 250 miles, and is greatly indented, Killala, Blacksod, and Clew Bays, Killary Harbour, and Broad Haven being on this coast, which abounds in picturesque scenery. Off Mayo, too, lie the islands Achill, the largest island off Ireland, Clare, and many others. Loughs Mask and Corrib lie on the southern border, and Loughs Conn, Castlebar, Cullen, Carragh, Corramore within the county. A valuable salmon-fishery exists in the river Moy, and Lough Mask is the home of the

'gillaroo' trout. The Irish language was in 1911 spoken by 1500 persons who did not know English, and by 87,000 who did. Nine members are returned to Dáil Eireann, four for North, five for South Mayo.

Mayo formed part of the extensive territory granted by King John to Hubert de Burgh; but William, the third earl, seizing Galway and Mayo, threw off the English allegiance and adopted the 'customs of the Irish,' together with the Celtic name of Mac-William. The district was not subdued until 1586. The antiquities of Mayo are chiefly ecclesiastical, there being many ruins of monasteries. There are round towers at Killala, Turlough, Meelick, and Balla, an imperfect one at Aughagower, and at Cong the remains of a splendid 12th-century abbey. The celebrated 'Cross of Cong,' now in the Royal Irish Academy's museum, was made at Roscommon in 1120.

Mayo, RICHARD SOUTHWELL BOURKE, EARL OF, Indian statesman, was born in Dublin on 21st February 1822, and educated at Trinity College, Dublin. He entered the House of Commons as a Conservative in 1847, and was appointed Chief-secretary of Ireland in 1852, 1858, and 1866. In 1869 he succeeded Lord Lawrence as Viceroy of India. His administration was notable. He maintained friendly relations with the neighbouring states, treated the feudatory princes and the native people with impartial but temperate justice, put the finances of the country on a sound basis, and effected improvements in gaol discipline, in irrigation works, and in providing educational facilities for the native Mohammedan population. Whilst inspecting the penal settlement at Port Blair on the Andaman Islands, on 8th February 1872, he was fatally stabbed by a convict. See a Life by Sir W. W. Hunter (2 vols. 1875).

Mayonnaise, a thick cold sauce for salads, cold meat, poultry, fish, vegetables, &c., made of the yolk of eggs, salad-oil, and vinegar, with a little salt, cayenne pepper, and meat-jelly; it is sometimes coloured red with powdered lobster coral, or green with spinach or parsley. The etymology of the term is uncertain, and *Bayonnaise* (from Bayonne, the alleged place of invention) and *Mahonnaise* (from Port Malou, Minorca, captured in 1756 by the Duke of Richelieu, 1696-1788, grand-nephew of the cardinal, and the alleged inventor) are both claimed as the correct forms of the word.

Mayor (Fr. *maire*, Lat. *major*; see MAJOR), originally a steward, bailiff, or overseer, thence the chief-magistrate of a city or corporate town in England or Ireland. The mayor is the head of the local judicature, and the executive officer of the municipality; he is elected by the council from the aldermen or councillors, and holds office for a year only. His duties include those of returning officer in all boroughs except those cities and towns which, being counties of themselves, have sheriffs of their own. The first Mayor of London was appointed in 1189, the first Mayor of Dublin in 1409. The mayors of London, York, and Dublin, and now also of Liverpool, Manchester, Leeds, Sheffield, Birmingham, Bristol, Cardiff, Bradford, Newcastle, Belfast, Cork, Norwich, and Hull are called 'Lord Mayor.' The Lord Mayor of London (q.v.)—since 1354 'Right Honourable'—is the representative of royalty in the civil government of the city, is in the position of the lord-lieutenant of a county, and on the demise of a sovereign is summoned to attend the Privy-council. To sustain the hospitality of the city he receives an allowance of £10,000 a year, with the use of the Mansion House (q.v.), furniture, carriages, &c. He is chosen annually by the aldermen from two aldermen nominated by the Common Hall (see LONDON),

being commonly the senior alderman who has not already 'passed the chair.' Although the office is still one of dignity, it is only in the eyes of foreigners that the Lord Mayor of London is one of the most important public functionaries of the realm. The Mayor of Dublin was first styled Lord Mayor by Charles II. in 1665. The title of Mayor is used to denote the chief officer of a city in the United States and the British colonies. In France the Maire is first officer of a town, commune, or district. For the corresponding office in Scotland see PROVOST; and for the Mayor of the Palace, see PEPIN.

Mayotte, one of the Comoro Isles (q.v.).

Maysville, capital of Mason county, Kentucky, on the Ohio River, 69 miles by rail N.E. of Lexington. It is the river-port of a rich territory, and manufactures tobacco, flour, ploughs, cotton, shoes, &c. Pop. 6000.

Mayweed, or STINKING CAMOMILE. See CAMOMILE.

Mazamet, a town in the French department of Tarn, on the Arnette, 43 miles ESE. of Toulouse, has extensive woollen manufactures; pop. 14,000.

Mazanderan, a province of northern Persia, fringing the Caspian Sea for some 200 miles and lying between the provinces of Ghilan and Astrabad, consists of a belt of low marshy coast-land, 10 to 20 miles wide, backed by the well-wooded northern slopes of the Elburz. The climate is very changeable, in summer both rainy and unhealthy, but on the uplands fairly salubrious. Owing to the fertility of the soil, which is watered by numerous small rivers, the Persians call the province the 'Garden of Iran.' Rice, wheat, and other cereals, cotton, mulberry-trees, and a variety of fruits are produced. Horses, asses, and camels are extensively bred. Area, 10,400 sq. m.; pop. estimated at from 150,000 to 300,000. The capital is Sari, though Barfurush (see BALFURUSH) is the seat of the trade with Russia. Iron ores and mineral oils are very abundant.

Mazara del Vallo, a walled cathedral city of Sicily, 25 miles S. of Trapani, in a fertile plain on the seashore. It exports grain, olive-oil, fruit, &c. Pop. 22,000.

Mazarin, JULES (*Giulio Mazarini*), cardinal and chief-minister of France during the minority of Louis XIV., was born 14th July 1602 at Piscina in the Abruzzi. He studied under the Jesuits at Rome, and later at Alcalá in Spain, where he relieved the tedium of study with love-making. He next entered the military service of the pope, but his ability for diplomacy was early recognised. Having accompanied a papal legate to the court of France, he became known about 1628 to Richelieu, who divined his promise and engaged him to maintain French interests in Italy, which he did while still employed by the pope as vice-legate to Avignon (1632) and nuncio to the French court (1634-36). In 1639 he openly entered the service of Louis XIII. and was naturalised a Frenchman; and two years later he received a cardinal's hat through the influence of Richelieu, who before his death (4th December 1642) recommended Mazarin to the king as his successor. His position was one of great difficulty amid the intrigues and jealousies of the time, and the first necessity was that he should make himself indispensable to the queen, who became regent on her husband's death in May 1643. But Mazarin was one of the most supple courtiers that ever bowed the knee before a throne, and moreover he knew how to touch a woman's heart by his romantic devotion. So he kept his place as minister, and it is certain, from his famous *carnets* and many of

the Brühl letters, that the queen gave him her love, if it cannot with certainty be proved that there was a private marriage between them; that this was perfectly possible has been shown by the historian Chéruel, who discovered that the cardinal had never taken more than the minor orders, of which a man could easily divest himself. Mazarin possessed admirable faculty for affairs and so much personal charm that he ruled with greater smoothness than Richelieu, although with almost as unlimited a sway. The parlement of Paris seeing itself threatened in its political rights embarked on a course of determined opposition; but Mazarin caused the leaders of the opposition to be arrested (August 1648), upon which the disturbances of the Fronde (q.v.) began. The court retired to St Germain, but at length triumphed by the aid of Condé, and the truce of Ruel, while it removed the obnoxious taxes, left Mazarin and his subordinates in office. The hatred against him, however, blazed out anew in the provinces, when at his instigation the queen-regent arrested Condé, Conti, and Longueville in January 1650. Mazarin triumphed at Réthel, but soon had to succumb to the strength of the combination against him and retire to exile at Brühl. Meantime the press teemed with pamphlets and satires against him—the famous *Mazarinades*, few of which, however, attained the dignity of literature. The cardinal now perceived the fatal consequences of his policy of isolating himself and the queen from every party in the state, and bent all his masterly powers of intrigue to form a new royal party. Turenne was gained over, and his military genius proved more than adequate as a counterpoise to the opposition of Condé. After one year's absence Mazarin returned to court in January 1652, but eight months later again retired to Sedan to admit of a reconciliation with the *parlement* of Paris. At length in February 1653 he returned in triumph to Paris, and thereafter his power remained secure, while he quickly regained all his popularity. Under his rule the influence of France abroad was greatly increased. He gained the alliance of Cromwell at the price of Dunkirk; secured the preponderance of French influence in southern Germany by the treaty of Westphalia (1648), and the league of the Rhine, formed in 1659; and by the treaty of the Pyrenees (November 7, 1659), and the marriage of Louis XIV. with the Infanta Maria Theresa, brought the succession to the throne of Spain within the range of French ambition. Mazarin died at Vincennes, 9th March 1661, leaving an immense fortune, variously stated at from 18 to 40 million livres. His magnificent library, which had long been placed freely at the disposal of the public, was bequeathed to the Collège Mazarin. His name survives characteristically in the 'Mazarin Bible,' one of the most priceless treasures of Bibliomania (q.v.).

His celebrated nieces whom he brought from Italy to the French court present all the possible contrasts of character and destiny. The eldest of the seven, the virtuous Laura Mancini, married the Duc de Mercœur, son of Henry IV. and Gabrielle, and died young. Anne-Marie Martinozzi, her cousin, married the Prince de Conti, an austere and gloomy hunchback, and also died young. Laura Martinozzi mounted a throne by marrying the Duke of Modena, and became mother of the second wife of James II. of England. Olympe Mancini, who became Comtesse de Soissons, was a woman formed for great crimes, whose true place would have been in the palace of the Cæsars or the Vatican of the Borgias. She plunged deep into a series of discreditable intrigues, and found herself obliged to flee from France to escape the punishment of a poisoner. After fitting awhile

like an evil genius over the face of Europe, she died poor and obscure at Brussels. Hortense Mancini, the most beautiful of the seven, and her uncle's favourite, inherited his fortune, and was sought in marriage by the Duke of Savoy, the Prince of Portugal, and the King of England. The cardinal married her to the Duc de la Meilleraie, who took the name and arms of Mazarin. He was a gloomy bigot, who mutilated with the fury of a Byzantine iconoclast the magnificent antique statues which Mazarin had collected with all an Italian's love for art, shut up his wife, and treated her with a jealous severity which afforded in the morality of the time ample justification for her misconduct. She found at once a refuge from his pursuit in England, and a characteristic recreation in an intrigue with Charles II. Marie-Anne Mancini became Duchesse de Bouillon, and was the generous patroness of Lafontaine and other men of letters. Her reputation was not spotless, but her wit brought her off triumphant from an examination for sorcery before the *Chambre Ardente* which her sister could not face. Marie Mancini, the least beautiful of the seven, was beloved by Louis XIV., who would have married her but for the self-denying opposition of his great minister. She found shelter but not consolation in the arms of Prince Colonna, one of the jealous husbands of old Italian story. She fled from his severity to Provence, to Flanders, and to Spain, but was at length secured and subdued.

See the *Mémoires* of such contemporaries as De Retz, Madame Motteville, La Rochefoucauld, Turenne, Grammont, and Bazin's *Hist. de France sous Louis XIII. et sous le Card. Mazarin* (4 vols. 1846); but especially Chéruel's *Hist. de France pendant la Minorité de Louis XIV.* (4 vols. 1879-80), his *Hist. de France sous le Ministère de Mazarin* (3 vols. 1881-82), and his edition of the *Lettres* (6 vols. 1879-91); also Moreau's *Bibliographie des Mazarinades* (1850-51), and the *Choix de Mazarinades* (1853); Cousin's *Jeunesse de Mazarin* (1865), Rencée's *Les Nieces de Mazarin* (1856), Masson's *Mazarin* (1886), Hassall's *Mazarin* (1903), and Noel Williams's *Five Fair Sisters* (1906).

Mazarrón, or ALMAZARRÓN, a town of Spain in a lead and iron mining district of Murcia, 18 miles W. of Cartagena, and joined by rail (3 miles) to its port (Porta Azoia) on the Mediterranean. There are metallurgical works, and soap and flour mills. Pop. 18,000.

Mazas, a famous prison in Paris, built in 1845-50 (to replace that of *La Force*), but demolished in 1900, in which was made the first trial of solitary confinement in France. It stood on the Boulevard Mazas (now Boulevard Diderot).

Mazatlán, a fortified seaport of Mexico, on the Mazatlán, at the mouth of the Gulf of California. It has a nautical school, and a meteorological and a wireless station. There are saw-mills and foundries, and manufactures of cotton, rope, &c. Its trade, both import and export, is important, and among exports are hides, gold and silver, archil, and mother-of-pearl. Pop. 25,000.

Maze. See LABYRINTH.

Mazeppa, IVAN STEPANOVICH, hetman of the Cossacks, was born in 1644, descended of a poor but noble family of Podolia. He became a page at the court of John Casimir, king of Poland. A Polish nobleman, having surprised him in an intrigue with his wife, caused him to be stripped naked, and bound upon his own horse, which, let loose, carried him, senseless from exhaustion, to its native wilds of the Ukraine. A more credible story is that his horse bore him back, torn and bleeding, to his own home. Mazeppa now joined the Cossacks, became secretary to their hetman, Samoilovich, and in 1687 was elected his successor. He won the confidence of Peter the Great, who loaded him with honours and made him Prince

of the Ukraine; but, on the curtailment of the freedom of the Cossacks by Russia, Mazeppa conceived the idea of throwing off the sovereignty of the tsar, and for this purpose entered into negotiations with Charles XII. of Sweden. His treason was revealed to Peter the Great, who long refused to credit it, but after Pultowa (q.v.) ordered his effigy to be hanged upon the gallows, and his capital, Baturin, to be razed to the ground. Mazeppa's hopes perished in 1709 in the disaster of Pultowa, and he fled with Charles to Bender, where he died miserably the same year. His story is the subject of poems, novels, plays, opera, symphonic poem, and paintings, by Byron, Bulgarin, Gottschall, Tchaikowsky, Liszt, Vernet, &c., and of a masterly history by Kostomarov (1882).

Mazurka, a lively Polish round dance, the music of which is generally in $\frac{3}{4}$ time. The peculiarity of the rhythm, which has a pleasing effect, is what characterises the music of the Mazurka. It is danced by four or eight couples.

Mazzarino, a town of Sicily, 15 miles SE. of Caltanissetta. Its trade is agricultural. Pop. 20,000.

Mazzini, GIUSEPPE, was born at Genoa, 22d June 1805. A clever, precocious boy, he began to study at the university of his native town when only thirteen, and before he was nineteen was practising as an advocate. In April 1821 his heart was deeply stirred through seeing refugees from the unsuccessful rising in Piedmont (see ITALY), and from that moment he conceived the idea of the liberation of his country. At first he assailed the domination of the classical school of literature, and its 'monarchical' tyranny of rule and prescription. But the earnestness of his nature soon pushed him on to make 'the first great sacrifice of his life,' by renouncing 'the career of literature for the more direct path of political action.' In 1829 he joined the Carbonari (q.v.), although he mistrusted their aims, their methods, and the character of their organisation. He was betrayed in July 1830 to the Sardinian police, and imprisoned in Savona. In his prison cell he matured those thoughts which became the ruling principles of his life and work, and shortly after his release, early in the following year, organised at Marseilles the Young Italy Association. The first and last duty of its members was to labour to create a free, independent, and united nation of Italians. The great mass of the people were to be educated to understand their rights, and taught to obtain them, if need were, through insurrection. But Italy must first be freed from the yoke of the foreigner. Nothing but a republic could serve her political needs in the future. Once Italy were regenerated, she 'was destined to arise the initiatrix of a new life, and of a new and powerful unity to all the nations of Europe'—the selfsame rôle that Heine and Young Germany assigned to regenerated Germany. The ultimate goal was the governance of the world by the moral law of progress, through the effective agencies of association, man with man and nation with nation. 'The labour to be undertaken was not merely political, but above all a moral work; not negative, but religious.' It was essentially the practice of a faith, the living of a creed, a religion. It was in this spirit that Mazzini laboured to his life's end—unwaveringly, disinterestedly, through the bitterest humiliations of exile, and at the cost of the greatest personal sacrifices.

Shortly after Charles Albert ascended the throne of Piedmont (April 1831) Mazzini addressed to him a manly appeal, urging him to put himself at the head of the struggle for Italian independence, and to grant needful concessions to his people's cry for liberty. His answer was a sentence of perpetual banishment, Metternich having forced the new

king to take a commission in the dragoonades of reaction. Further, in August 1832 the French authorities expelled him from the country. But he outwitted them, and hid awhile at Marseilles. From this time he led for more than twenty years 'a life of voluntary imprisonment within the four walls of a little room.' But no confinement could quell his spirit or restrain his activity. Henceforward he was the most untiring political agitator in Europe, the man most dreaded by its absolute governments; with Lassalle he was one of the most conspicuously successful of the century. He wrote incessantly, in a strain of such fervid eloquence, and with such an intensity of conviction, that his words kindled in the hearts of those that read them the enthusiasm to do and dare all things. Though by nature frank, open, and bold, no man perhaps learned to understand better the tortuous arts of secret conspiracy. He was driven to adopt this underground method of warfare by the power and vigilance and unscrupulous character of the enemies he contended against, and the close and united front they presented to every revolutionary assault. In 1834 he organised an invasion of Savoy, which failed ignominiously, chiefly through the lukewarmness, if not treachery, of the soldier placed at its head. The next two years Mazzini spent in Switzerland, incessantly active, extending his organisation throughout Italy, instigating his countrymen to insurrection, and scattering broadcast through Europe the bursting seeds of republican revolt. In the year of the Savoy fiasco he drew up, at Bern, for Young Europe—i.e. Young Italy, Young Germany, and Young Poland united—the *Pact of Fraternity*, a code of abstract doctrines dictating to humanity a faith and rules of life. Being in the last days of 1836 banished from Switzerland, he found a refuge in London. Although for some years (1841-48) he struggled hard against poverty, he nevertheless contrived to help his poorer, ignorant countrymen, the organ-boys of London, by gathering them round him in night-classes and teaching them and civilising them. In 1844 he charged the English government with opening his letters, and communicating their contents to the rulers in Italy, and made good his accusation. This raised a great storm of indignation throughout the country, and drew from Carlyle a spirited testimonial to Mazzini in *The Times*. Sir James Graham, the Home Secretary, even felt constrained to apologise in the House of Commons for having publicly repeated the calumnies of his enemies.

On the outbreak of the Lombard revolt in 1848 Mazzini hastened to throw himself into the thick of the struggle. The king of Sardinia sought to win him over by the promise to make him first minister in the new Piedmontese-Lombard state, and to grant him as large a share as he might desire in the framing of a constitution for it. But Mazzini's aims were not of personal ambition, and he would be no party to the aggrandisement of the dynasty of Savoy at the expense, or to the detriment, of a united Italy. After Milan capitulated, he tried with Garibaldi to keep the war alive in the valleys of the Alps; but, when he saw that all was over in Lombardy, he made his way to Tuscany. Leghorn received him with wild enthusiasm on 8th February 1849, the day before the republic was proclaimed at Rome, and elected him her deputy to the republican assembly in the papal city. On 29th March Mazzini, Saffi, and Armellini were appointed a triumvirate with dictatorial powers; they chose as their motto 'God and the People.' But on 25th April the French arrived before the city to reinstate the pope, and after a tough struggle were admitted within the walls. The republic fell, and the triumvirs indignantly resigned on the last day of June.

Mazzini made his way back to London. Not however to rest: he planned the attempted risings at Mantua (1852), Milan (1853), Genoa (1857), and Leghorn (1857). Meanwhile in London he had founded, along with Kossuth and Ledru-Rollin, the European Association, and with them issued in September 1855 its republican manifesto. The Society of the Friends of Italy was organised about this time in England. In 1859 Mazzini condemned the alliance Piedmont had made with Napoleon III.; and the cession of Savoy and Nice to France not only justified his prophetic warning, but filled him (and Garibaldi) with the patriot's sorrowful indignation. He supported Garibaldi in his expedition against Sicily and Naples with all his influence and all his resources; and when Piedmont stepped in to reap the fruits of the soldier's heroic exertions, and even scattered his followers and took him prisoner at Aspromonte (1862), Mazzini broke finally with the monarchical party. The king replied to his fulminant by again passing sentence of death upon him—the third time. But this did not deter him from stigmatising the Convention of September (see ITALY) as a base compromise. In 1866–67 Messina in protest elected him its deputy to the Italian parliament four times in succession. Two years later he was again expelled from Switzerland, and in the following year (1870) was arrested at sea, whilst on his way to Sicily, and carried prisoner to Gaeta. After being detained two months he was set at liberty. He settled at Lugano, but died at Pisa, 10th March 1872, and was buried in his native city, mourned by the entire nation he had done so much to create.

Although from one point of view a utopian idealist and political dreamer, the apostle of the new democratic evangel, and from another point of view a restless demagogue, a dark conspirator, and disturber of the peace of Europe, Mazzini must be acknowledged by both parties alike to have been a man of immense energy and resource, and of great organising power, who unquestionably had the full courage of his convictions, and was consistent and thoroughly sincere and disinterested in his aims. His temperament and the constitution of his mind made him feel impatience and scorn of the moderates, the calm, cautious watchers and waiters for opportunities. He was averse to nibbling advantage after advantage, and had no sympathy for the compromises and half-measures of statesmen and diplomatists. His was the spirit that burns the bridges behind it, stakes all on one critical throw, and puts forth all its energy to bring about a decisive and final result. Cavour was of an opposite temperament: he was essentially the cautious, calculating statesman. Hence the fundamental antagonism between the two men. Cavour was a man of aristocratic birth and training, and the levelling doctrines of the new republicanism were in the highest degree repugnant to him. No wonder then that he disliked Mazzini, the ardent apostle of equality, fraternity, and humanity, the uncompromising enthusiast of action. And no wonder too that Mazzini failed to sympathise with the methods of Cavour: he saw in them no ruling principle beyond advantaging the House of Savoy, no desire to labour for the people, no plan, no promise for their progress, and nothing like faith in their future. Nevertheless, on more than one critical occasion he abstained from embarrassing the Sardinian government, even when he did not approve of its proceedings. His own ability to govern is best evidenced in his successful organisation of the difficult forces of secret insurrection; his brief tenure of office at Rome was beset by so many untoward conditions as effectually to preclude him from showing his real mettle. Mazzini has been called the prophet of

Italian unity, Garibaldi its knight-errant, and Cavour the riveter of the bolts that finally united the *dissecta membra* of the nation. Perhaps it would be more correct to say that Mazzini prepared the soil, sowed the seed, and fostered the growing plant, that Garibaldi did the work of gathering in the ripe fruit, but that Cavour gained the final advantage of the harvest.

All Mazzini's writings are desultory in character, some few literary and critical, but most political, germane to the questions of the hour. His longest productions are *On the Duties of Man*, an excellent primer of ethics, and *Thoughts upon Democracy in Europe*, a discussion of the prominent schools of economics and socialism of the time. Apart from his eloquence, the features of his writing that most forcibly arrest attention are his manly, outspoken tone, his candid fairness—except sometimes when he is speaking of the moderates—his sterling love of justice and of freedom, but above all things else his keen and accurate insight into the historical tendencies of modern Europe.

The best source for Mazzini's life and works is the collected edition of his *Scritti, Editi ed Inediti*, 16 vols., the first eight (1861–74) prepared by himself, the last eight (1877–89) by Aurelio Saffi, his brother-in-law at Rome. The English *Life and Writings of Mazzini* (6 vols. 1864–70; new ed. 1890–91) is formed of selections from the *Scritti*. See also the memoir by E. A. Venturi (2d ed. 1877); Clarke, *Selected Essays of Mazzini* (1887); the Life by Bolton King (1903); and works by Luzio (Milan, 1905), Rodman (1922), Hinkley (1924).

Mead, a fermented liquor made from honey. The honey is mixed with water and fermented. Cottagers sometimes use the honey which remains in the combs after the usual processes of dropping and squeezing for making mead, which is a thin and very brisk, but at the same time luscious beverage. Mead has been in use from very ancient times, and was known equally to the polished nations of southern Europe and the barbarous tribes of more northern regions. The Greek name is *Hydromeli*.

Meade, GEORGE GORDON, American general, was born, 31st December 1815, at Cadiz, where his father was a merchant and United States navy agent till 1816. He graduated at West Point Military Academy in 1835, served against the Seminoles, but in 1836 resigned from the army and adopted the profession of civil engineer. In 1842 he was reappointed to the army, and fought in the Mexican War, but was mostly employed on survey duty and in the construction of lighthouses, until, on the outbreak of the Civil War, he obtained a brigade of volunteers. During the peninsular campaign he was severely wounded. He distinguished himself at Antietam and at Fredericksburg, and in 1863 was placed in command of the Army of the Potomac, superseding Hooker (q.v.) on the night of 27th June. A week later he had defeated Lee at Gettysburg and had prevented him carrying the war into the country north of the Potomac. Meade became brigadier-general in the regular army on 3d July, and major-general in 1864. After the war he commanded various military departments until his death at Philadelphia, 6th November 1872. There is an equestrian statue of him (1887) in Fairmount Park there. See work by Penny-packer (New York, 1901).

Meadow Saffron. See COLCHICUM.

Meadows-Taylor. See TAYLOR.

Meadville, capital of Crawford county, Pennsylvania, on French Creek, 113 miles by rail N. of Pittsburgh. It manufactures woollens, machinery, agricultural implements, &c., has oil-refineries, sawmills, ironworks, and large railway-shops, and is the seat of Allegheny College (Methodist,

founded 1815), and of a Unitarian theological school. Pop. 15,000.

Meagher, THOMAS FRANCIS, Irish patriot and American soldier, was born in Waterford, 3d August 1823, son of a wealthy merchant. He was educated at the Jesuit college of Clongowes Wood in Kildare and at Stonyhurst, and early devoted himself to the patriotic cause as a prominent and fearless member of the Young Ireland party. In 1848 he was convicted of high-treason and sentenced to death, but was sent for life to Van Diemen's Land instead. He made his escape in 1852, studied law in the United States, but on the outbreak of the Civil War volunteered into the national army. In 1861 he organised the 'Irish brigade' for the Federals, and distinguished himself by his courage in the seven days' battles around Richmond, at the second battle of Bull Run, at Fredericksburg, and at Antietam. After the war he became secretary of Montana territory, and, while taking measures as temporary governor to keep the hostile Indians in check, fell from the deck of a steamboat into the Missouri, near Fort Benton and was drowned, 1st July 1867.

Meal. See BREAD.

Meal-tub Plot, a conspiracy fabricated in 1679 by Thomas Dangerfield to gain credit as an informer equal to that of Titus Oates and Bedloe. The son of a Roundhead farmer, he was born about 1650 at Waltham in Essex, and he had first started with the baseless assertion that the Presbyterians were conspiring to destroy the government and set up a republic. When this was discovered to be a lie he was flung into Newgate, whereupon he rounded at once upon the Roman Catholics, declaring that the pretended Presbyterian plot was only a cover for their own design upon the king's life, and that the papers would be found concealed at the bottom of a meal-tub in the house of one Mrs Cellier, who, together with Lady Powis, was actually tried and acquitted for the plot. Dangerfield himself was whipped and pilloried in June 1685, and on his way back from Tyburn was killed by a blow in the eye from the cane of a barrister, Robert Frances, who was executed for the murder.

Meal-worm, the larva of a small black beetle, *Tenebrio molitor*, allied to the common Blaps (q.v.). Both adults and larvæ are too common about bakeries, granaries, and stores, for the eggs are laid in meal, flour, and similar food-stuffs, on which the emerging larvæ feed voraciously. The adult resembles Blaps, and is about half an inch long; the larva is decidedly longer, thin and round, yellowish in colour. An American species, *T. obscurus*, has also become common in Britain. The preventive is thorough cleanliness. The meal-worms are often used as food for cage-birds.

Mealy Bug (*Coccus adonidum* or *Dactylopius longispinus*; see COCCUS), an insect naturalised in our hothouses, and very commonly found on such plants as Stephanotis and Camellia, orchids and pine-apples. The young appear like small reddish-brown moving specks on the leaves and small branches, to which they afterwards affix themselves by the beak. As they grow older they become darker in colour, and are covered over with a white powdery-looking substance. After fertilisation, which usually takes place in spring, the female, remaining in the position described, lays her eggs between her body and the surface of the plant, after which her body shrivels up until it forms a covering for the mass of eggs, rendered more effectual by the large amount of cottony material formed over it. The young can be seen developing in scores in the midst of this material, from which they afterwards free themselves, and run about on the plant. The Mealy Bug is disliked by gardeners

chiefly on account of the amount of dirt that collects round it on the leaves and branches, and the injury it does to the flowers and fruit. Lightly syringing the plants with soft soap and quassia solutions with a little paraffin oil in addition is generally sufficient to check the ravages of this little pest, especially if put on before the larvæ acquire their mealy coats. On valuable plants the solution should be painted on with brushes. Tobacco smoke proves useful in the early stages.

Mean, in Mathematics, is a term interpolated between two terms of a series, and consequently intermediate in magnitude. The Geometrical Mean (q.v.) of two numbers is always less than their Arithmetical Mean (q.v.) and greater than their Harmonic Mean, and the geometric mean is itself a geometric mean between the two others.

Meanee. See MEEANEE.

Mearns. See KINCARDINESHIRE.

Measles (known also as RUBEOLA and MORBILLI) is one of the group of infectious diseases termed *Exanthemata* (q.v.), because they are accompanied by a characteristic eruption which appears upon the surface of the body. It is communicable from person to person, chiefly in the early stage when it is indistinguishable from an ordinary cold; and it seldom occurs more than once in the same individual. Its period of incubation—i.e. the time that elapses between exposure to the contagion and the first appearance of the febrile symptoms which precede the eruption—is usually about a fortnight; then come lassitude and shivering, which are soon followed by heat of skin, increased rapidity of the pulse, loss of appetite, and thirst. The respiratory mucous membrane is also affected, and the symptoms are very much the same as those of a severe cold in the head, accompanied by a dry cough, a slight sore throat, redness and watering of the eyes, and sometimes tightness of the chest.

The eruption which is characteristic of the disease usually appears upon the fourth day from the commencement of the febrile symptoms and the catarrh—seldom earlier, but occasionally later. It is a rash, consisting at first of red papules of various sizes, which, as they multiply, coalesce into crescentic patches. It is two or three days in coming out, beginning on the face and neck, and gradually travelling downwards. The rash fades in the same order as it appears; and, as it begins to decline three days after its appearance, its whole duration is about a week. The red colour gives way to a somewhat yellowish tint, and the cuticle often desquamates slightly.

Measles is distinguished from Scarlet Fever (q.v.) or scarlatina (1) by the presence at the outset of catarrhal symptoms, which do not occur in the latter disease, at any rate prior to the eruption; (2) by the absence of the characteristic throat-affection, which always accompanies well-marked cases of scarlet fever; (3) by the character of the rash, which in measles is said to present somewhat the tint of the raspberry, and in scarlet fever that of a boiled lobster; which in measles appears in crescentic patches, and in scarlet fever is universally diffused over the parts affected; which in measles usually appears on the fourth day, and in scarlet fever on the second day of the disease.

In ordinary uncomplicated measles the prognosis is almost always favourable. The chief danger is from inflammation of the bronchial tubes spreading to the lungs; and in weakly children it may leave chronic pulmonary mischief behind it. No age is exempt from the disease, but it is much more common in childhood than subsequently. The reason probably is that most persons have it in

early life, and are thus protected from an attack at a later period.

In mild forms of the disease nothing more is requisite than to keep the patient on a low diet, attend to the state of the bowels, and prevent exposure to cold, which is best accomplished by keeping him in bed with the ordinary warmth to which he is accustomed in health. While the eyes are red and irritable, it is desirable that he should be shaded from the light. If the chest-symptoms become urgent, they must be treated according to their nature. Bronchitis (q.v.), sometimes extending into Pneumonia (q.v.), is most to be feared. If the eruption disappear prematurely, it may sometimes be brought back by placing the patient in a warm bath. In such cases stimulants are often required, but must, of course, only be given by the advice of the physician. The patient must be carefully protected from exposure to cold for a week or two after the disease has apparently disappeared, as the lungs and mucous coat of the bowels are for some time very susceptible to inflammatory attacks. In some cases considerable debility remains for a long time after the attack; and the hearing is very liable to injury from inflammation of the middle ear, often accompanied by perforation of the drum and a purulent discharge.

German Measles is a name somewhat loosely used of a disease, or possibly several diseases, resembling measles, but milder and less prolonged. The incubation period is about three weeks, there is swelling of the glands as well as a rash which appears on the second day and lasts about a week.

Measures. See WEIGHTS AND MEASURES.

Meat, DISEASED, may not be sold under heavy penalties. The Public Health Acts, 1875, &c., regulate the powers of medical officers and inspectors of nuisances to examine game, flesh, milk, &c., and to have it destroyed, if unfit for human food, by order of a justice. See BOTULISM, PTOMAINES, PYÆMIA, TAPEWORM, TRICHINA, &c.

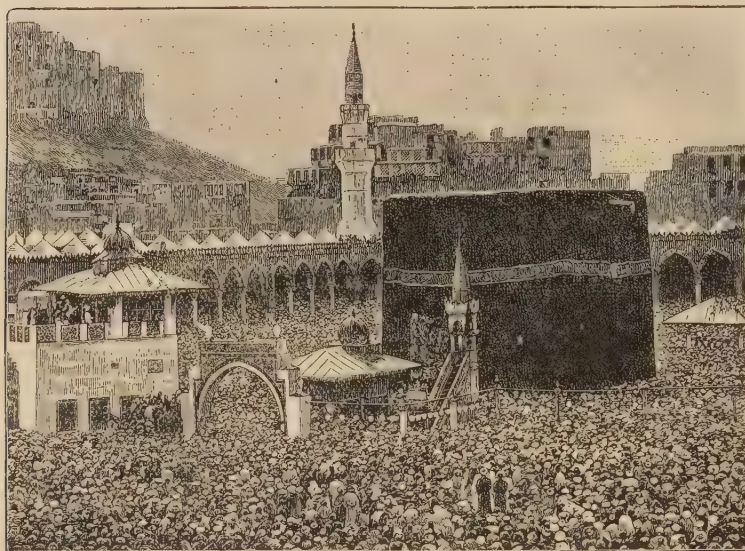
Meath, a maritime county of Leinster, Irish Free State, bounded on the east by the Irish Sea for 10 miles and by the counties of Dublin and Louth; area, 906 sq. m., of which only a small proportion is waste, bog, &c. Maximum measurements, north to south, 40 miles, east to west, 47 miles. Pop. (1841) 183,116; (1861) 110,373; (1881) 87,469; (1901) 67,497; (1911) 65,091, of whom 60,000 were Roman Catholics. The soil is a rich loam, and extremely fertile; but the extent under crops (chiefly oats and potatoes) is much exceeded by the area devoted to pasture. The surface is for the most part undulating, being the eastern part of the great limestone plain of Ireland. The chief rivers are the Boyne and Blackwater; the Royal Canal passes along the southern border of the county. The principal towns are Trim, Navan, and Kells. A little linen and coarse woollen is manufactured. Anciently Meath, which included West Meath, Longford, and parts of the adjoining counties, formed one of the kingdoms into which Ireland was divided, the royal seat being Tara (q.v.), where ancient earthworks still remain. After the English invasion it was occupied by Strongbow, and was erected into a county palatine by Henry II., who conferred it on Hugh de Lacy. In the end of the reign of Henry VIII. it was separated into East and West Meath. Celtic remains abound along the Boyne and Blackwater. John's Castle at Trim is one of the most extensive monuments of English rule in Ireland. There are a round tower and sculptured crosses at Kells, a round tower at Donoughmore, and monastic ruins survive at Bective, Clonard, Duleek. Meath returns three members to Dáil Éireann.

Meaux, a French town in Seine-et-Marne, on a height above the river Marne, 28 miles ENE. of Paris. In its noble Gothic cathedral (12th to 16th century, but still unfinished) is the grave of Bossuet (q.v.), bishop for twenty-three years. There is a large trade with Paris in corn, flour, cream-cheeses, &c. Meaux was besieged by the serfs of the Jacquerie (1358), and captured from the League (1594). During the Great War it was slightly damaged by shell-fire, and in September 1914 fell just within the extreme limit of the German advance on Paris. Pop. 14,000.

Mecca (also anciently called *Becca*), the Makoraba of Ptolemy, is one of the oldest cities of Arabia and the capital of the Hejaz, and as a holy city and focus of pilgrimage it may be called the metropolis of Islam. It is situated in 21° 30' N. lat. and 40° 8' E. long., 245 miles S. of Medina and 65 E. of Jiddah, its port on the Red Sea, in a narrow barren valley, surrounded by bare hills penetrated by two passes, and so secluded from observation that it is not visible until closely approached. The barrenness of the soil compelled the inhabitants to go outside for provisions, and the command of the principal caravan roads, both from north to south and from the coast to the highlands, gave the Meccans unusual facilities for commerce, and thus from a very early period the city was a notable trading centre. But the chief cause of the prosperity was its reputation as a holy place, possessing sacred objects, which well repaid a pilgrimage; though whether the original attraction was the Black Stone or fetish of the Kaaba, or the medicinal spring Zemzem, is a matter of dispute. The city itself, which is mainly modern owing to the frequent devastations caused by the winter torrents from the hills around, is about 1½ miles long and from ½ to ¾ of a mile wide, and is divided into the upper and lower city. Along and beyond it runs the celebrated sacred course, a broad road extending from Safa to Marwa, which is run over by all pilgrims, and also forms a frequented bazaar. The streets are broad and airy, but unpaved and filthy, and the houses, climbing the hills on either side, are of stone, and well built, sometimes three or four stories high, with flat roofs and overhanging lattice-windows. The interiors are well kept, since the greater part of Mecca is devoted to the annual pilgrimage, which is the main support of a multitude of lodging-house keepers, guides, and the other attendants of a fashionable sanctuary. There are charitable lodgings for the poorer pilgrims, and also public baths, and a hospital. Sanitation, if long neglected, is improving, and there is plenty of water. Provisions, meat, fruit, &c., are readily procured from neighbouring parts of Arabia. The population, which is notorious for its vice and corruption of every sort, is given as 70,000; but these are normally reinforced by at least some 200,000 pilgrims a year. The latter, however, are not numerous enough to satisfy the natives, who fleece them without remorse, and are too idle to supplement their extortions by any industry more vigorous than the manufacture of sacred relics. The Great Mosque of Mecca stands in the broadest part of the valley, and consists of a large quadrangle, capable of holding 35,000 persons, surrounded by arcades or cloisters, with pillars of marble and granite, &c., and entered by nineteen gates surmounted by seven minarets. In the centre is the Kaaba (i.e. cube), which was the temple of Mecca ages before the time of Mohammed, and then attracted pagan pilgrims just as now it draws thousands of Moslems. It has been twice rebuilt in historical times (most recently in 1627), but the old form has been preserved. It is about 40 feet long, 33 feet wide, and 50 feet high. When

Mohammed converted the heathen shrine into a Mohammedan focus the original notion of an idol temple with a miraculous fetish was abandoned, and the legend was invented that the Kaaba was built by Abraham on the occasion of the outcasting of Ishmael. The celebrated Black Stone is apparently a meteorite, about 9 inches long, built into the south-east corner at the proper height for kissing. There is also a 'Southern Stone,' of only inferior sanctity. The pilgrim circumambulates the Kaaba seven times, kisses the Black and touches the Southern Stone, and also goes round the Hijr or semicircular enclosure containing the so-called graves of Hagar and Ishmael. The Kaaba has always been richly decorated, and externally has long been annually re-covered (leaving only apertures for the two stones) with handsome brocaded hangings—the Kiswa, popularly known

Stone, and kept it for twenty-two years. Mecca afterwards fell under the influence of whatever dynasty—Fatimite, Ayyūbite, or Mameluke—happened to rule in Egypt; and thus it came into the possession of the Ottoman sultans, whose power, however, was nominal, whilst the real governor was the sherif, or reputed head of the descendants of the Prophet, who long held the chief authority in the Hejaz. The Sherif Husein ibn Ali in 1916 made himself independent king of the Hejaz, but in 1924 was forced to abdicate, and was succeeded by Ali, his eldest son, under whom, in October 1924, Mecca was captured by the sultan of Nejd. Few non-Mohammedans have entered Mecca; Ludovico di Varthema, an Italian, did so in 1503, and Joseph Pitts, an Englishman, about 1680; Burekhardt (in 1814–15) and Burton (in 1853) have left the best accounts.



Pilgrims round the Kaaba. (From a private Photograph.)

as the 'Holy Carpet'—brought with much state by the Egyptian Hajj (q.v.) at the same time as the traditional Mahmal, an empty covered litter emblematic of Egyptian sovereignty. The other chief decorations are the silver-gilt door, seldom opened, the marble inlay and silver-gilt plating and silk hangings of the interior, which contains little of interest. Hard by, and also within the court, is the celebrated well of Zemzem, a deep shaft covered by a cupola; the tepid water of which may once have been mineral, and is still regarded as miraculous, although the largest item in its present analysis consists of sewage matter. This important attraction for pilgrims was long lost, but was rediscovered by Mohammed's grandfather. Another object of veneration is 'Abraham's Stand,' the stone of which, with the imprint of his foot, is concealed from view. Outside the Great Mosque are no sacred or antiquarian buildings of importance, though several houses are pointed out by the guides as dwellings of persons famous in the early days of Islam. In the time before Mohammed Mecca was under the control of the Kosaites, and then of the Koreish, from whom the Prophet reconquered it in 627, five years after his Flight or Hegira (q.v.) therefrom. It long remained under the rule of the khalifs, who spent large sums in its adornment. In 930 it was sacked by the Karmathians, who carried off the Black

See Snouck Hurgronje, *Mekka* (1888); Robertson Smith in *Ency. Brit.* (1883 and 1911); *Travels of Aly Bey* (1816); Wüstenfeld, *Chroniken d. Stadt Mekka* (1857–59); Burton, *Pilgrimage* (1855; new ed. 1898); Burekhardt, *Travels in Arabia* (1829); Wavell, *A Modern Pilgrim in Mecca* (new ed. 1918).

Mechanics is the science which treats of the nature of forces and of their action on bodies, either directly or by the agency of machinery. See **FORCE**, **ENERGY**, **DYNAMICS**. The action of forces on bodies may be in the form of pressure or pull or of impulse, and may or may not produce motion. When the forces are so balanced as to preserve the body affected by them in a state of equilibrium, their actions are investigated in that branch of mechanics called **Statics** (q.v.); when

motion is produced, they are considered under the head of **Kinetics** (see **DYNAMICS**). See also the articles on **Kinematics**, **Hydrostatics**, and **Hydrodynamics**.

Machines are instruments interposed between the moving power and the resistance, with a view of changing the direction of the force, or of modifying its amount. Machines are of various degrees of complexity; but the simple parts, or elements of which they are composed, are reducible to a very few. These elementary machines are called the **Mechanical Powers**, and are usually reckoned as six in number, three being primary—viz. the *lever*, *inclined plane*, and *pulley*; and three secondary, or derived from the others—viz. the *wheel-and-axle* (derived from the lever), the *wedge*, and the *screw* (both derived from the inclined plane). What is special to each machine will be found under its name.

Mechanics' Institutes, voluntary unchartered associations of mechanics or working-men for the purpose of providing themselves, at small individual cost, with instruction in elementary and technical branches of knowledge, by means of a library, reading-rooms, classes, and lectures. The germ of the **Mechanics' Institute** was a class for journeymen mechanics formed by Dr Birkbeck (q.v.) at Glasgow in 1800; but the first **Mechanics' Institute**, properly so called, was

organised also by Birkbeck in London in 1824. The original aim was to teach mechanics the principles of their respective trades. Subsequently the basis was enlarged, and the giving of a general education aimed at. The institutes were wholly or in great part self-managed. Out of them have grown, through the introduction of means of recreation, the Working-men's Social Clubs and Educational Institutes.

Mechanism. See LIFE.

Mechtarists, a congregation of Armenian Christians who entered into communion with the Church of Rome, when Clement XI. was pope, in 1712. They derive their name from Mechtar (i.e. the Comforter) da Petro (1676-1749), who in 1701 founded at Constantinople a religious society for raising the intellectual and spiritual condition of his countrymen, and for diffusing a knowledge of the old Armenian language and literature. Two years later, however, their Uniati propaganda led to their removal to the Morea, and thence, on the conquest of that portion of Greece by the Turks in 1715, to Venice, which in 1717 granted them the island of San Lazzaro. Their most useful occupation is printing the classic writings of Armenian literature, as well as valuable editions of Armenian translations of works by Ephraem Syrus, Philo, Eusebius, and other writers, of which the Greek and Syriac originals have been lost. At San Lazzaro they possess a large and valuable library of oriental works, and at Vienna (since 1810) an academy, with a printing-office, &c., to which non-Armenians are admitted. See Langlois, *Le Couvent Arménien de Saint-Lazare de Venise* (1863).

Mechlin. See MALINES.

Mecklenburg, the common name of two states, formerly grand-duchies, of Germany, distinguished as MECKLENBURG-SCHWERIN and MECKLENBURG-STRELITZ, and situated between the Baltic on the N. and Brandenburg on the S., whilst Pomerania lies on the E. and Sleswick-Holstein and Lübeck on the W. Mecklenburg-Schwerin is a compact territory, abutting on the Baltic for 65 miles, its area being 5197 sq. m. (much less than Yorkshire). Mecklenburg-Strelitz (1144 sq. m.) consists of two detached portions—the former grand-duchy of Strelitz, SE. of Mecklenburg-Schwerin, and the former principality of Ratzeburg, wedged in between Schwerin and Lübeck. The region forms part of the great North German plain, but is crossed by a low ridge of hills from the south-east to the north-west, the water-parting between numerous small rivers that drain to the Elbe and to the Baltic. Along the line of this ridge there are more than 500 lakes, some of fairly large size. Canals, too, connect many of the lakes and navigable rivers, especially towards the Elbe. Except for sandy tracts and turf moors the soil is fertile; agriculture is the chief occupation. The merino sheep are the finest in Germany. There is some iron-founding, making of agricultural implements and tiles, manufacturing of beet-root sugar, distilling, brewing, and tanning. Amber is obtained on the coast and from some of the lakes, and peat is dug. The chief ports are Wismar and Rostock (Warnemünde), both in Schwerin. The population of Schwerin in 1890 was 578,342; in 1900, 607,770; in 1919, 657,330: of Strelitz in 1890, 97,978; in 1900, 102,602; in 1919, 106,394. The rural population are almost entirely Germanised Slavs, the former nobility and the town-dwellers for the most part of Lower Saxon stock. The popular dialect is Platt-Deutsch or Low German; the religious confession Lutheran. Rostock (q.v.), the largest town in Schwerin, has a university. The capital of Schwerin is Schwerin; of Strelitz, Neustrelitz. Society in Mecklenburg was till the revolution (1918) still

organised on a feudal basis, and in the early part of the 19th century was not so advanced as England in the 13th century; serfdom was abolished only in 1824. At the head of each grand-duchy stood a grand-duke; but both grand-duchies were represented in one and the same national assembly, which met every autumn at Sternberg and Malchin alternately. This body embraced all landowners (about 680), who also represented the peasantry and agricultural labourers, and representatives of forty-nine towns. The principality of Ratzeburg, and the towns of Wismar and Neustrelitz, had each an independent administration. A permanent college of nine members, representing the assembly, sat all the year round at Rostock. The executive was in the hands of four ministers in Schwerin, and one minister in Strelitz. No financial statements were published in either grand-duchy. In Schwerin, however, there were three separate budgets, one controlled by the grand-duke, one, very small, controlled by the estates, and one by both parties in common. As republics the two states have each a diet, elected by a general equal direct vote, with proportional representation. The evils under which the country workmen suffered in the middle of the 19th century, and of which Fritz Reuter, the great Platt-Deutsch writer, gives a painful description in his poem *Kein Hüsung*, have been greatly mitigated. The restraints imposed upon marriage by the landowners led to a relatively high proportion of illegitimate children. Reuter's works give admirable pictures of the semi-patriarchal, semi-feudal life of his native country.

In the 6th century Slavic races settled in the districts now called Mecklenburg, which had just been left vacant by the Vandals. From the 9th to the 12th century the German emperors and the Saxon dukes attempted at different times to convert the inhabitants to Christianity. The country was only definitely incorporated in the German empire in 1170. It was divided over and over again, from 1229 onwards for more than five hundred years, amongst different branches of the descendants of the original Slavic princes. Of these dukes (dukes after 1348) the only one deserving special mention is Albert III., who, called to ascend the throne of Sweden in 1363, was kept a prisoner for many years by Margaret, queen of Denmark, Norway, and Sweden. The Thirty Years' War ruined the independent peasant proprietors. Wallenstein casting covetous eyes upon the duchies, they were sold (1628) to him by the emperor, but were restored to their dukes in 1635. The two lines of Mecklenburg-Schwerin and Mecklenburg-Strelitz date only from 1701; in 1755 they agreed that the line which survived longest should inherit the territories of the other, and when both became extinct Prussia should be heir. The title of grand-duke was assumed by both reigning dukes in 1815. The year 1848 brought disturbances and tumults in Mecklenburg; a representative assembly was called together, and other reforms initiated; but the reaction of 1850 and following years restored things to their original condition. The two states were again agitated by reform questions in 1871-78. The grand-dukes promised a constitution in 1907. On the death of the grand-duke of Mecklenburg-Strelitz in February 1918, the grand-duke of Mecklenburg-Schwerin claimed the succession. In November, however, both states became republics.

Meconium (Gr. *mēkōn*, 'a poppy'), the inspissated juice of the poppy. *Meconic Acid* is an acid present in Opium (q.v.) to the extent of about 4 per cent. in combination with the alkaloids.—Meconium is also the name given to the matter first discharged from the bowels of a new-born infant.

Meconopsis, a genus of Papaveraceæ, represented in Britain by the yellow-flowered Welsh poppy, *M. cambrica*.

Medal (the same word as *metal*, through a Low Latin *medalla*), a piece of metal in the form of a coin, not issued or circulated as money, but struck to preserve the portrait of some eminent person or the memory of some illustrious action or event. Large medals are termed medallions; and works rectangular in form are known as plaques or plaquettes, according to their size. The study of medals, which forms a branch of the science of numismatics, is interesting in an historical and antiquarian point of view, and important as illustrating the contemporary state of art. Like coins, medals are made in gold, silver, and copper, and some also consist of lead and alloys of other base metals. As they are generally produced in very limited numbers compared with coins, other methods of preparing them than by striking are available; and while all classical medals, and the bulk of those of modern times, are made in the same way as contemporary coinage, many of the most

a scale of one-half the original size the obverse and reverse of one of the most famous medals of Pisano. It celebrates the visit of the Eastern emperor, John VIII. Palæologus, to the Council of Florence in 1439; the legend on the obverse being in Greek, and the reverse inscription, *Opus Pisani Pictoris*, being also repeated in Greek. Generally speaking, it may be said that all mediæval medals, previous to the 16th century, were made by casting in the *cire perdue* process; and it was not till the beginning of the 16th century that medals struck from engraved dies, like coins, were issued, the first so produced being the medal of Pope Julius II., by Francia, struck about 1506. The larger medals of the 16th century, however, continued to be cast. The most elaborate and beautiful of the struck medals of the 16th century were the work of Benvenuto Cellini; and it may be remarked that with the introduction of dies for medal-striking the work passed into the hands of gem-engravers and jewellers, whose methods and excellences lie in quite a different direction from those of the 15th-century artist-medallists.

Next to Italy, Germany was the country in which the medallie art flourished in mediæval times, Nürnberg having been a centre from which many important works were issued. Of the German school, Albrecht Dürer was the most famous of the early exponents. In Holland a remarkable series of *jettons* or medalets were issued in the 16th and the early part of the 17th century which give a record of the important events of which that country was then the theatre. In the 16th century the most important medals of French origin were



Fig. 1.



Fig. 2.

important and valuable of the mediæval medals were cast by the *cire perdue* process (see FOUNDING). Important medals have also been made by *striking-up* or *repoussé* work (see REPOUSSÉ), and highly esteemed works are also made simply by engraving. The earliest medals are medallions of ancient Rome, existing examples of which are principally in bronze, though some are in silver and in gold. They vary in size, being mostly about $1\frac{1}{2}$ inch in diameter, but in weight they are so diverse as to exclude the notion that they were ever circulated as money. Medallions, prior to the time of Hadrian, are rare and of great value, one of the most beautiful and most famous being a gold medallion of Cæsar Augustus; from Hadrian to the close of the empire they are comparatively numerous. In some of them a ring or rim of lighter-coloured metal (brass or orichalcum) surrounds the centre of bronze, and the inscription extends over both metals.

From the fall of the Roman empire till the end of the 14th century there is a blank in the production of medals. The revival of the medallie art was one of the first fruits of the Renaissance movement, and practically its earliest, as for all times its greatest exponent was Vittore Pisano (c. 1380-1456), the painter of Verona. His medallions, generally marked *Opus Pisani Pictoris*, and those of his numerous followers, including Matteo de Pasti, Guacialotti, Sperandio, Sangallo, and many others, are distinguished by their vividness of sculptural portraiture, and their singular breadth and simplicity of treatment. Figures 1 and 2 show to

produced by Jacques Primavera and Germain Pilon, and in the succeeding century Briot and Dupré were the great medallie portrayers of contemporary personages and events. English medals begin only with Henry VIII., and from Edward VI. onwards there is an unbroken succession of coronation medals. The earlier medals are cast in a very inferior manner, and are certainly not the work of native artists; indeed, it is not till the period of Elizabeth that we find native talent developed in the direction of medal-working, and even thereafter it was largely to Dutch, French, and Italian artists that the principal English medals were due. The Scottish coronation medal of Charles I. by Briot is the first medal struck in Britain with a legend (*Ex Auro ut in Scotia reperitur*) on the edge. The medals of the Commonwealth and Charles II. are principally by Rawlins and the brothers Simon, and under Charles II. the three brothers Rottier did important medallie work in England. In the 18th century J. A. Dassier, a native of Geneva, executed a series of medals of English monarchs from the time of William I., and other important works were the production of Croker, Richard Yeo, and Thomas Pingo. Of 19th-century English medals the best are due to the Italian Pistrucci and to Thomas and William Wyon and their successors.

Official medals at the present day are principally issued to the fighting services. To these ribbons distinctive in colour are attached. The first war medal given in England was the 'Ark in flood medal' bestowed by Queen Elizabeth in 1588 on

naval heroes. The first English military medal was granted by Charles I. in 1643, and in 1650 an oval medal was executed by order of parliament for distribution amongst Cromwell's officers and soldiers engaged in the battle of Dunbar. Medals have been distributed to the troops in every victorious engagement and campaign since 1793 till the present time, but previous to the reign of Queen Victoria the Waterloo medal was the only one of this series struck. It was issued by order of the Prince Regent in 1816, and conferred on every officer and soldier present at the battle. The medal is of silver, with the head of the Prince Regent on the obverse, and on the reverse a figure of Victory seated on a pedestal, inscribed 'Waterloo,' with, beneath, the date June 18, 1815, and above, 'Wellington.' The Peninsular medal, for military services between 1793 and 1814, was issued only by the Queen in 1847, and conferred upon every surviving officer and private present at any battle or siege during these years. It carries no fewer than twenty-eight clasps for as many separate engagements, the first of which is Egypt, 1801. Long-service and good-conduct naval and military medals of silver were instituted in 1830 and 1831. The Victoria Cross (q.v.) was instituted in 1856. During the Great War various new medals for distinguished service in the naval and military forces were instituted, as also the first medals for such service in the air force; the 'Victory Medal' was a commemorative medal common to the Allies, and additional to the ordinary British War Medal, 1914-18. Similar medals for military, naval, and air force services are issued by foreign powers.

See A. Heiss, *Les Médailleurs de la Renaissance* (vol. viii. 1890); Grueber, *Guide to the English Medals in King's Library, British Museum* (1881); Cochran-Patrick, *Catalogue of the Medals of Scotland* (1884); Lohbat, *Medallie History of the United States* (2 vols. 1878); D. Hastings Irwin, *British War Medals and Decorations* (new ed. 1910); T. Carter, *British War Medals* (new ed. 1890); A. A. Payne, *Handbook of British and Foreign Orders, War Medals, and Decorations* (1911); W. A. Steward, *War Medals and their History* (1915); Marquis of Milford Haven, *British Naval Medals* (1919), and *Naval Medals of France, the Netherlands, Spain, and Portugal* (1921); and Dorling, *Ribbons and Medals* (1920).

Medea, in Greek legend, a famous sorceress, the daughter of Æetes, king of Colchis, and of the Oceanid Idyia, or of Hecate. When Jason, the leader of the Argonauts, came to Colchis in search of the Golden Fleece, she fell in love with the young hero, helped him to obtain the Fleece, and fled with him. She prevented her father from pursuing by killing her brother Absyrtus and strewing the sea with his limbs. She avenged her husband upon the aged Pelias by persuading his daughters to cut him in pieces and boil him in order to make him young again. Being deserted by Jason for Glauce or Creusa, daughter of Creon, king of Corinth, she revenged her wrongs by sending to her rival a poisoned robe or diadem which destroyed both her and her father. Medea then slew the children she had borne to Jason, and fled to Athens in a chariot drawn by dragons, which she obtained from Helios. There she was received by Ægeus, to whom she bore Medos; but, afterwards being compelled to flee from Athens, she took Medos to Aria, the inhabitants of which were thenceforth called Medes. She finally became immortal, and the spouse of Achilles in the Elysian Fields. The story of Medea was a favourite theme of the tragedians, but only the masterpiece of Euripides has come down to us. It was treated by Corneille and Grillparzer in drama, and by Cherubini in opera.

Medellín, (1) a small town of Spain, the birth-place of Cortes, on the Guadiana, 52 miles E. of Badajoz.—(2) The second city of Colombia, capital of the department of Antioquia, lies in a lovely mountain-valley, 4850 feet above the sea, and 150 miles NW. of Bogotá. It is a handsome town, with a cathedral, university, college, school of mines, &c. It is the chief industrial (cotton, woollen, tobacco, panama hats, crockery) and coffee centre of the country, and trade in gold and silver is important. Pop. 80,000.

Medford, a city of Middlesex county, Massachusetts, on the Mystic river and lakes, 5 miles N. by W. of Boston, has several historic buildings and a Universalist college; pop. 39,000.

Media, in ancient times, corresponded to the north-west of modern Persia. The Medes were an Aryan people like the Persians; their state religion was Zoroastrianism, and the Magi (q.v.) its priests. They were at first a bold and war-like race, very skilful with the bow, and noted horsemen. The Median tribes, who seem to have been in part subject to the king of Assyria, began towards 700 B.C. to be cemented together under a chief named Deioces (Dajaukku), who chose as his capital Ecbatana (q.v.), identified with the modern Hamadan. Their power grew stronger under his son Phraortes, who subdued the Persians, but perished in war with the Assyrians. Cyaxares, the son of Phraortes, renewed the war against Assyria, but it was interrupted by an invasion of Media by the Scythians. Having treacherously murdered their chiefs, he expelled their warriors. Then, in alliance with Nabopolassar, king of Babylon, he overthrew the Assyrian empire by capturing Nineveh about 607 B.C. Having annexed the northern provinces of the Assyrian empire, he began a war against Lydia; but the eclipse of 28th May 585, the same which had been foretold by Thales, terrified both parties into peace. Cyaxares was succeeded by his son Astyages. Against him the Persians, under their prince Cyrus, revolted about 550 B.C., and, being joined by a portion of the Median army under a chief named Harpagus, they took Ecbatana and deposed the Median king. From this time the two nations are spoken of as one people. Ecbatana became the summer residence of the Persian kings. After the death of Alexander the Great (323 B.C.), the north-western portion (Atropatene) of Media became a separate kingdom, which existed till the time of Augustus. The other portion, under the name of Great Media, formed a part of the Syrian monarchy. In 147 B.C. Mitridates I. took Great Media from the king of Syria, and annexed it to the Parthian empire. About 36 B.C. it had a king of its own, named Artavasdes, against whom and his ally, Phraates IV. of Parthia, Mark Antony engaged in a disastrous campaign. Under the Sassanian dynasty the whole of Media was united to Persia (q.v.).

See G. Rawlinson, *Five Great Monarchies of the Ancient Eastern World* (3 vols. 1879); Duncker, *History of Antiquity* (6 vols.; Eng. trans. 1877-83); Lenormant, *Sur la Monarchie des Mèdes* (1871); Oppert, *Le Peuple et la Langue des Mèdes* (1879); A. von Gutschmid, *Neue Beiträge zur Geschichte des alten Orients* (1876); and the popular *Media, Babylon, and Persia*, by Z. A. Ragozin ('Story of the Nations' series).

Mediatiation. See GERMANY (*Social Organisation*).

Medical Jurisprudence, also called Forensic Medicine, is the branch of medicine which brings medical science to bear on legal questions, in determining criminal and civil responsibility. It has regard mainly either to civil rights or to injuries to the person. See BLOOD-STAINS, POISONING, &c.

Medici, a distinguished Florentine family which attained to sovereign power in the 15th century,

owed its earliest distinction to the success with which its members pursued various branches of commerce, and the liberality which they showed in devoting their wealth to the public good. Their well-known arms, representing six balls (from whence their war-cry of 'Palle'), were popularly but without reason believed to represent pills, as their name to show that they had been originally apothecaries. In 1465 Louis XI. of France honoured the Medici by conferring on them the right to wear the French fleur-de-lis on one of the balls. From the beginning of the 13th century the Medici took part in the government of their native republic, and from the period (1378) when Salvstro de' Medici was elected gonfaloniere the family rose rapidly in greatness. It was, however, Giovanni (born 1360) who amassed the immense fortune, and by his generosity and affability gained the position of influence hitherto unparalleled in the republic, to which his sons Cosimo and Lorenzo succeeded. With Cosimo (1389-1464), surnamed *Il Vecchio* ('the Ancient') and '*Pater Patriæ*,' began the glorious epoch of the family; while from his brother Lorenzo was descended the collateral branch of the Medici which in the 16th century obtained absolute rule over Tuscany.

Cosimo's life, except during the brief period when the Albizzi and other rival families succeeded in successfully opposing the Medici influence in the government and exiling him from Florence, was one uninterrupted course of prosperity. He was successful in his political alliances, and procured for Florence security abroad and peace from civil dissensions within her walls. He employed his great wealth in encouraging art and literature. He made Florence the most brilliant centre of the revival of classic learning which distinguishes the 15th century, he enriched her with splendid buildings, and gave unrivalled treasures to the great libraries which he founded. Although his all-powerful influence was not explicitly recognised in the state, and the form of government remained republican, Cosimo in reality was entirely master of the town, and filled the public offices with his partisans. He was succeeded by his son Pietro I., surnamed *Il Gottoso* ('Gouty'), who, feeble in health and in character, was assisted in the government by the precocious talents of his son Lorenzo (1448-92), afterwards famous in history as Lorenzo il Magnifico.

On his father's death (1469) Lorenzo and his brother Giuliano were recognised as '*principi dello stato*.' The growing power of the Medici had roused much envy amongst other great Florentine families; and in 1478 these malcontents, headed by the Pazzi and in league with the pope, Sixtus IV. (*Della Rovere*), who saw in the Medici a powerful obstacle to his schemes of temporal aggrandisement, formed a plot to overthrow their power, known as the conspiracy of the Pazzi. Only Giuliano was victim of the assassins who were to have killed both brothers during service in the cathedral, and the popularity of Lorenzo was increased by the courage and judgment shown by him in this crisis. Lorenzo was a worthy descendant of his famous grandfather, just in his government, magnanimous to his enemies, and not only a munificent patron of art and literature, but himself a man of wide culture and a distinguished lyric poet. To enlarge on the institutions, universities, and schools founded by him, and on the famous names of painters, sculptors, architects, philosophers, and poets who surrounded him would be to write the history of the Renaissance. He was one of the most zealous promoters of the art of printing, and established under Cennini a printing-press in Florence. Although he used his power in the state well, yet he sapped the existing forms

of government; and, in seeking only the advancement of his family to more absolute power, he left Florence at his death weakened and ready to be the prey of her enemies during the troublous times which began with the 16th century.

Lorenzo left three sons, Pietro, Giuliano, and Giovanni. His eldest son, Pietro II. (born 1471), possessed neither capacity nor prudence, and showed himself treacherous alike to friend and foe. He allied himself with the king of Naples against Lodovico Sforza of Milan, and the latter in 1492 called to his aid Charles VIII. of France and his army (see ITALY). Pietro, terrified at the advance of the powerful invader, hastened to meet the French troops on their entrance into the Florentine dominions, and surrendered to them Pisa and Leghorn. The magistrates and people, incensed at his cowardice and treachery, drove him from Florence and declared the Medici traitors and rebels, and deposed them from participation in the government. Pietro was drowned (1503) in the Garigliano, near Gaeta, having joined the French army in their attempted conquest of the kingdom of Naples. All efforts of the Medici to regain their power in Florence were vain until in 1512 the pope, Julius II., consented to send the Spanish army to invade Tuscany. Prato, near Florence, was taken and sacked, and the Florentines, helpless and terrified, drove out their gonfaloniere, Piero Soderini, and recalled the Medici, headed by Giuliano II. (born 1478). In 1513 the elevation of Giovanni de' Medici to the papal chair under the name of Leo X. (q.v.) completed the restoration of the family to all their former splendour and reduced Florence to a papal dependency. Giuliano II. at the pope's desire surrendered the government to Lorenzo II., son of his elder brother Pietro II. Giuliano, created Duke of Nemours on his marriage with a relative of Francis I. of France, died in 1516. The young Lorenzo II., born 1492, and the last legitimate male descendant of Cosimo '*Pater Patriæ*,' on whom the pope had also conferred the duchy of Urbino, was feeble, arrogant, and licentious. He died in 1519 leaving only one legitimate child, a daughter, Catharine (q.v.), afterwards wife of Henry II. of France, who played a conspicuous rôle as regent during her son's minority. An illegitimate son, Alexander, born 1510, was afterwards duke.

The power now passed into the hands of the Cardinal Giulio de' Medici, a natural son of the elder Giuliano, assassinated in the conspiracy of the Pazzi; and Giulio was created pope in 1523 under the name of Clement VII. During the invasion of Italy by the Emperor Charles V. in 1527, and the consequent weakening of the papal power, Florence rebelled against the regents imposed on her by the pope, and expelled them along with the young Prince Alexander. The pope and emperor, however, soon made peace, and their united forces were directed against Florence, which, during the famous siege lasting ten months, made her last desperate and unsuccessful stand for liberty. After the surrender of the town, August 1530, Alexander de' Medici was proclaimed hereditary Duke of Florence. His reign was one of unparalleled license and tyranny. He was assassinated in 1537 by his cousin Lorenzino, a descendant of the collateral branch which had its origin in Lorenzo, brother of Cosimo '*Pater Patriæ*.' To this younger branch belonged also the next ruler of Florence, Cosimo I. (born 1519). He was son of the famous captain of free-lances, Giovanni delle Bande Nere ('of the Black Bands'). Cosimo, sometimes called the Great, possessed the astuteness of character, the love of art and literature, but not the frank and generous spirit of his greater predecessors. He was cruel and relentless in his enmities, but a just ruler. He

extended his territories, and in 1570 was created Grand-duke of Tuscany, and crowned by Pope Pius V. He died in 1574, and was succeeded by his son Francesco I. (born 1541). This duke possessed few of his father's abilities and many of his faults. He became a tool in the hands of his mistress, the unscrupulous Bianca Cappello, whom he married in 1578. The almost simultaneous death of Francesco and Bianca (October 1587) raised suspicions that they had been poisoned by the duke's brother and heir, the Cardinal Ferdinando. For Francesco's daughter, second wife of Henry IV. of France, see MARIE DE' MEDICI. Ferdinando I. and his son Cosimo II. were popular, and contributed to the prosperity of their country. But at the beginning of the 17th century the race rapidly degenerated; and, after several of its representatives had suffered themselves to become mere puppets in the hands of Austria or Spain, the family became extinct in 1737 at the death of its last male representative, Gian Gastone, the seventh grand-duke. His only sister, the Electress Palatine, the last of all the Medici, died in 1743.

See works cited at FLORENCE, Roscoe's works on Lorenzo and Leo X., and books by Reumont (trans. 1876), Armstrong (1896), Horsburgh (1908), Janet Ross (1910), and G. F. Young (1909).

Medicine. The healing art is found existing among the rudest savages of the present day, and in point of time is coeval with the earliest prehistoric peoples. Lucretius imagines for us the first attempts of early man to heal the injuries received in contest with wild beasts; and the 'Father of Medicine,' Hippocrates, has among his shorter works a treatise on *Ancient Medicine*. Prehistoric skulls are found showing signs of having been trephined with an instrument of flint, and Egyptian bodies from the time of the 5th dynasty still bear the splints with which attempts had been made to treat fatal injuries before death occurred.

In the early history of the highly civilised Euphrates valley regulations were made for the practice of surgery, and the amounts of fees were fixed on the stele of Hammurabi, king of Babylon, over 2000 years B.C.; also, many baked cuneiform tablets have been discovered bearing prescriptions and directions for the management of illness. Into this early medicine much ritual and invocation enters, so that the remedies are both material and theurgic. Egypt, at the time of the 18th dynasty (c. 1500 B.C.), possessed a well-developed system of medical practice. Here, again, medical methods were much involved with religious ritual, and apparently the practitioners of the art were much bound by conservative tradition. The Ebers Papyrus of this period is called the *Book of the Preparation of Medicines for all the Corporeal Parts of Individuals*. In this can be recognised such drugs as salts of lead, lime, soda, peppermint, cedar-wood oil, turpentine, gentian, opium, linseed, castor-oil, mustard, yeast; though many are unidentifiable. Among instruments and applications mentioned are the knife, the cautery, forceps, massage, plasters, poulices, enemata, inhalations, douches, and fumigation. From appearances found in mummies and in bodies buried in the sand, the important fact is clear that the processes of disease were much the same three thousand years ago as they are to-day. The names and portraits of practitioners holding high positions even at this early epoch have come down to us—e.g. Auta, Imhotep, Neneksekmet. The Israelites were in medical matters followers of the Egyptians, and, as with the latter, cleanliness and ritual form two dominant notes of their practice.

The sacred books of the Indians, which show the practices of many centuries B.C. (*Rigveda* and *Atharvaveda*), contain spells against the

demons of disease. Later, during the Brahmanical period extending up to 1000 A.D., medicine attained a high degree of rationalism and skill. The three leading names are those of Charaka, Susruta, and Vagbhata, whose lives are generally placed in the 1st, 5th, and 7th centuries respectively of the Christian era. The vital processes are supposed in Indian physiology to be actuated by air, bile, and phlegm, and health is regarded as due to a proper relationship of these. The materia medica of India was particularly rich in drugs, of which many have been imported into Western medicine. A great number of surgical instruments were employed, apparently with considerable skill, and the Indian surgeons were specially adept at cataract operations and reparative surgery by skin-grafting, methods which also found their way through the Arabs into Western surgery. Dietetics and bodily cleanliness played an important part in treatment, and much attention was given to antidotes for poisons, such as snake-bite, and to aphrodisiacs. It is hard to say how much the medicine of India owes to that of Greece. Many significant parallels exist between the two, and while it is probably not correct to assume, as many authorities do, that Indian medicine was derived indirectly from the schools of Greece, there was probably, even before the time of Alexander the Great, much mutual influence through the intercourse between Greece and India by way of Persia.

Chinese medicine, on the other hand, was formal, and its literature showed no advance with time. A large number of drugs were employed, such as rhubarb, aconite, opium, sulphur, and mercury, as well as many disgusting substances like the excrement of animals. There was little operative procedure beyond the application of burning cones or moxæ to the skin, and acupuncture with fine needles of gold or silver. Japanese medicine was originally derived from that of China, but with the remarkable assimilative power of this people, they quickly adopted Western medicine from the time at which they first were brought into contact with it in the 16th century.

Western medicine took its origin in Greece at the time when that country was at its highest intellectual development. Even in the *Iliad* of Homer (1000 B.C.) the medical man is said to be 'worth many others both to cut out arrows and to apply soothing remedies'; and again, in the *Odyssey*, the healer of the people is described as a welcome guest equally with the godlike minstrel and the builder of ships. The chief tutelary deity of the healing art among the Greeks was Apollo, but later his son, Asklepios (or Æsculapius), and Hygieia, daughter of the latter, received especial veneration, and many shrines of Asklepios were scattered throughout the Grecian world. Asklepios is generally represented bearing a staff round which a serpent, held sacred to him, twines; and his temples formed resorts for the sick, who, after sacrifices and other religious observances, practised the rite of 'incubation' or 'temple-sleep,' in the expectation that the method of their cure would be revealed in a dream. Before the 5th century B.C. the healing art was in the hands of three types of person. Firstly, there were the philosophers, usually identified with some special school, such as Thales of Miletus, Pythagoras of Krotona, Empedocles of Agrigentum. These made in many cases considerable contributions to both the theory and the practice of medicine. Secondly, the priests and priestesses in the temples of Asklepios, mentioned above, carried out a form of faith or mental healing, which was in great repute, though it is humorously satirised in the *Plutus* of Aristophanes. The large number of people intent on pleasure or healing, who frequented, for example, the shrine

of Asklepios at Epidauros, may be judged from the fact that outside the temple precincts stood an open-air theatre which held 12,000 persons, and a stadium which could accommodate 20,000 spectators. The third type of healer comprised the regular practitioners, who were bound together into Asklepiad guilds. The secrets of the medical art were conserved among the members of certain families with the pupils whom they admitted, and were handed down jealously from father to son. Instruction in the art began in boyhood; and before he was admitted to practice, the votary bound himself by the celebrated 'Hippocratic oath.' The practitioner, attended by his pupils, saw patients either at their homes or in his consulting-room (*iatreion*), which was provided with instruments, bandages, splints, medicines, and various pieces of apparatus required for such purposes as the reduction of dislocated joints. Some of the more celebrated physicians travelled from place to place as consultants, and many of the towns employed salaried medical officers at the state's expense.

Hippocrates (460-370 B.C.) is the most celebrated of these early Greek practitioners. Springing from an Asklepiad family in the island of Cos, he lived in Athens, a contemporary of Plato, Thucydides, and Pericles, and rendered valuable services to that city in connection with epidemics. In the general body of medical literature of his time a large number of treatises are attributed to him, the Aphorisms and the treatises on Fractures and Dislocations and on the Sacred Disease (Epilepsy) being the most celebrated. The striking features of his works are their rationalism, with an entire absence of the earlier mysticism and superstition; and the high position that he assigns to observation, with but little recourse to theorising. He notes carefully the history of his cases, the symptoms they present, and records many simple signs drawn from examination of the urine, the complexion, temperature, respiration, percussion, and auscultation by laying the ear on the patient's chest. Prognosis, or the foretelling of the course of the disease, assumed great importance in his eyes, and was intimately connected with his theory of critical days. Another theory which had been introduced by Pythagoras, that the humours or fluids of the body were the determining factors in disease, received great attention from Hippocrates, and long dominated medicine. Simple forms of diet held one of the chief places in treatment, ptisan or barley-water, honey in water, and diluted wine being the favourite forms of nourishment. Externally, cold affusions, the bath, massage, and, for wounds, boiled water or wine, are recommended. The drugs employed by Hippocrates were not many in number, but include some of Egyptian and even of Indian origin.

Following Hippocrates, the most noted names are those of Aristotle and Theophrastus, the former of whom made many discoveries in the structure and functions of the bodies of animals, the latter doing much the same for plants. According to the historian Pausanias, it was from Aristotle that his pupil Alexander the Great derived his great interest in medicine. The school of medicine at Alexandria was the most celebrated of the ancient world. Though it passed away leaving little record, many of its teachers, especially anatomists and surgeons, are mentioned by Celsus and Galen. Herophilus and Erasistratus, famous both as practitioners and as discoverers in anatomy, were its most celebrated representatives. About the beginning of the Christian era, the development of certain 'medical sects' is noteworthy. The *Dogmatists* were those followers of Hippocrates who made a theoretic system out of his doctrine of the humours

and qualities of substances. The *Empirics* went to the opposite extreme, and not only rejected reasoning and every form of theory as to the nature of disease, but denied that medicine could be founded upon the sciences of anatomy and physiology, trusting only clinical observation and their own experience in treatment. The *Methodists* formed a sect holding the belief derived from Asklepiades of Bithynia, that all disease is due to an improper arrangement of the particles and pores of the tissues; later modified by his pupil Themison to the idea of too great rigidity or too great laxity; treatment therefore became a matter of great simplicity, intended to restore the tissues to their proper soft or tonic state, as the case might be. An important adherent of this sect was Soranus of Ephesus, who wrote a text-book on obstetrics, preserved in a Latin translation. The *Pneumatists*, as a sect, held to a system dependent on the theory that all disease is due to some defect of the vital air; and the *Eclectics*, while closely allied to the latter, assumed the right to choose in any given circumstances the methods of treatment which seemed best to the individual. Rufus of Ephesus and Aretæus of Cappadocia, belonging to this sect, have left medical writings. The names of some of these sects have persisted to the present day, as applied to modern tendencies in medical theory.

At Rome in republican days medicine was little pursued, or rather a slight practical knowledge of medicine, conducted by herbs and simple surgical procedures, formed part of the general knowledge of every patrician. This is exemplified in the *De Re Rustica* of M. P. Cato. One patrician, A. C. Celsus, has left in his *De Medicina* a picture of medicine at the commencement of the empire as formed by Greek influences, which ranks with the works of Hippocrates and Galen as one of the chief monuments of classic medicine. In the first two of his eight books are given rules for diet and hygiene, the general causes, symptoms and prognosis of diseases, and a discussion of different forms of treatment. The third and fourth books deal with the treatment of general and local diseases, including insanity; books V. to VIII. deal with surgical matters, and include concise and clear descriptions of operations for hernia, lithotomy, couching the lens for cataract, and of the arrest of bleeding by ligation of vessels, treatment of wounds by various mild antiseptics, &c. Various other general Roman writers have dealt with the subjects of hygiene and of drugs—such as Vitruvius, who attributed many diseases, e.g. goitre, to drinking-water; Varro, who believed malaria to be due to infection with minute, invisible animals bred in marshes; and Pliny, who in his *Natural History* describes the properties of many important drugs. Dioscorides, an army surgeon under Nero, towards the end of the 1st century published a most complete and accurate account of all the remedies then in use, and from the clear descriptions that he gives of the plants, &c., almost all his remedies can be readily recognised at the present day. Scribonius Largus, physician to the Emperor Claudius, has left an excellent book of prescriptions.

Under the Roman empire physicians from the schools of Greece flocked to the imperial city, where their services were in great demand. Wealthy patricians employed slaves or freedmen, who had been trained in medicine, to attend their family and dependents. The various theatres, training-places for gladiators, and similar bodies had their special medical attendants. State or municipal medical officers (*archiatri*) were appointed both in Rome and provincial towns to attend the poor and perform other public offices. The army was well provided with medical officers, one for

every cohort, with legionary officers of higher rank. Specialism was pushed to an extreme, for not only was there a division into physicians and surgeons, but Galen mentions also oculists, aurists, dentists, hernia-specialists, lithotomists, gynaecologists, dermatologists, and others. Unfortunately there was no legal supervision of medical practice, and the practitioners belonged to all social grades, some of them presenting the most barefaced charlatanism. It forms a complaint both by Juvenal and Martial that the profession generally was in low repute, carpenters and smiths and undertakers flocking into it, often with only a training of six months.

Claudius Galen (131-200 A.D.) was the greatest figure in ancient medicine, and his works exercised so lasting an influence that they remained the chief authority in medicine to the Renaissance. This was partly due to their inherent worth, and partly because Galen's teleological conception of medical facts and his frequent praise of the Creator's wisdom and design appealed to the fathers of the early church. After a prolonged study of philosophy in his native Pergamos and of medicine at Alexandria, he settled in Rome; subsequently became the friend and physician of the Emperor Marcus Aurelius and numerous other persons in high positions; delivered public lectures, and above all was a man of boundless energy and an indefatigable writer on medical subjects. Galen was a fervent admirer of Hippocrates, whom he copied in the inductions as to treatment to be drawn from clinical signs; he also strove to set diagnosis upon a firm anatomical and physiological basis. His system errs, however, in being too complete: every question is provided with an answer, which gives his opinions a false appearance of infallibility. He divides diseases into three classes: (1) those affecting simple tissues like the muscles, nerves, or connective tissues; (2) those of the organs, such as heart, lungs, liver; and (3) those affecting the body generally, especially the four humours, blood, phlegm, bile, and black bile. When the humours are mixed in proper amount there is a state of health or 'eucrasia,' but as a rule the mixture is not correct, and the result is some form of 'dyscrasia' or special temperament, such as the sanguine, bilious, phlegmatic, melancholic, according to the humour in excess. The causes of disease he classified as (1) exciting, usually some external influence; (2) predisposing, usually some internal condition; and (3) proximate, which constitutes the disease. To illustrate his attitude by a modern example, in pneumonia the exciting cause would be the growth of bacteria in the lung, the predisposing cause the debility, weakness of the mucous membranes, &c., which permit of this, and the proximate cause would be the phenomena of inflammation in the lung which produce the illness. He placed great reliance on the examination of the pulse in diagnosis; and in treatment he elaborated a system of 'indications,' the chief of these being to remove the cause of the disease or prevent its action; secondly, if the symptoms were against nature, to treat these by contraries; otherwise to assist nature's efforts at cure; still other sources of indications were the patient's temperament, the external conditions, and—a curious point much in accord with some modern physicians—the patient's dreams. Drugs act, according to Galen, by their potential 'qualities' of heat, cold, dryness, or moisture, each of these being divided into four degrees; and drugs are to be given in opposition to these qualities as they are manifested in disease. Galen produced some 500 treatises, of which over 100 have come down to us. The chief of these are *On Practical Anatomy*, *On the Use of the Parts of the Body* (physiology), *On the Pulse*, *Compounding and*

Action of Simple Remedies, and *On Therapeutics*. The knowledge handed down by him from the Alexandrian school forms the foundation on which the superstructure of modern medicine is laid.

Since the followers of Galen regarded medicine as having reached an unsurpassable height in his teaching, little advance followed for many centuries after his time. Numerous well-known medical men, however, at Byzantium during the declining years of the empire made selections from the best writers, and of these compilations the most noteworthy are those of Oribasius (4th century), Aetius of Amida (6th century), and Paulus of Aegina (7th century). Whilst the decadent empire was losing all power of initiative, the Arabs, in the time of their flower from the 7th to the 13th century, warmly took up medicine. Much of their activity in this art consisted simply in translating and commenting upon the old Greek medical writers, but they also described some diseases for the first time, such as smallpox and measles (Rhazes), introduced important hygienic measures, founded large charitable hospitals, and brought from the East many new drugs and new clinical and therapeutic procedures. Their large hospitals possessed pharmacopœias or lists of selected drugs, and that of Mesuë of Damascus (11th century) was used by the Royal College of Physicians of London in framing their pharmacopœia during the reign of James I. Among the drugs introduced by these pharmacopœias are senna, rhubarb, camphor, cloves, cassia, musk, nutmeg, cubebs, orange, lemon, sugar, and new methods of preparing drugs are detailed, as, for example, the various volatile oils and alcohol produced by distillation, and the solution of drugs in syrups and tinctures. Among the greatest names of the Eastern Khalifate are those of Rhazes (10th century), Haly Abbas (10th century), and Avicenna (980-1036 A.D.); while in the Western Khalifate, Abulcasis (938-1013 A.D.), the great surgeon of this people, Avenzoar (12th century), and Averroes (12th century) are the most distinguished.

During the early middle ages the medicine of north-western Europe was of a very primitive nature. The earliest extant medical manuscript of an Anglo-Saxon people is the Leech-Book of Bald, dating from the time of Alfred the Great. Although it shows traces of Greek influence, it consists merely of a mass of herbal remedies mingled with prayers and spells supposed to be useful for various disorders. As the church was the repository for learning of all kinds, so the practice of medicine came to be a calling followed by the monks in the numerous religious houses which were provided with physic-gardens where simple remedies were produced, and with small hospitals where the sick were treated. The priests, monks, and readers of the monasteries, however well they might know the theory of medicine, could not follow its practice into every corner of daily life, to the battle-field, &c., and in consequence of this detachment a very low class of itinerant lay practitioners came into being, who both earned the contemptuous criticism of the clerics and brought the healing art at times into great disfavour with the public. Before the 9th century, however, there had been growing up in Italy, not far from Naples, the school of Salerno, where philosophy, law, and medicine were taught. It attracted in the succeeding three centuries great numbers of students in pursuit of learning, and of bishops and nobles in search of health. The school was said to have been founded by four doctors of different nationalities, and among its early teachers were Gariopontus, Platearius, Copho, Constantine the African, and Ægidius of Corbeil. The school was at the height of its fame from 1000 to 1200 A.D., during which time Robert of Normandy, son of the

Conqueror, stayed there for the cure of a wound in his arm. To him the medical fraternity dedicated a Latin poem, the 'Regimen Sanitatis,' on the preservation of health, which was much translated and greatly prized. Here, too, women took a prominent part in the study and practice of medicine, and the names of Trotula, Constanza, Sicelgaita, and Stephanía are celebrated for their medical learning. The most important occurrence at Salerno in regard to medicine was the institution by the Emperor Frederick II. in 1224 of examinations for a license to practise. This edict, with the earlier provision of Roger of Sicily in 1140, was the first attempt in Europe to bring the practice of medicine under state control. Soon after this, however, other schools sprang up and displaced Salerno, which was finally closed by an edict of Napoleon in 1811.

Several movements from the 12th century onwards helped to the restoration of medicine. A great humanitarian development, which owed its beginnings largely to Louis IX. and Pope Innocent III., had as one of its principal results the establishment of large charitable hospitals all over Europe. According to Virchow, by the 14th century probably no town of 5000 inhabitants was without its hospital. Combined with this, the rise of the great universities—Paris (1110), Bologna (1113), Oxford (1167), Montpellier (1181), Cambridge (1209), Padua (1222)—did a great deal to render the thorough study of medicine possible, and to free it from the church. Another influence was the translation in the 13th century of many of the Arabic medical works by such men as Albertus Magnus, Arnald of Villanova, and Michael Scot; and the production in the following century of vigorous, original, though often fanciful, medical works, such as those of Gilbert the Englishman, Bernard de Gordon, John of Gaddesden, and St Hildegard of Bingen. In the 15th century the intellectual Renaissance burst into flower in the Italian cities, and the sunshine of princely and municipal favour produced a corresponding growth in medicine. Latin translations from original Greek works, by physicians who were also scholars (such as Thomas Linacre, 1460–1524, in England), produced an accurate acquaintance with the medical knowledge of the ancient world. At Florence, where the Renaissance movement was very strong, association in the same guild of the physicians with artists like Leonardo da Vinci and Michelangelo, who were capable anatomists, greatly fostered the study of human anatomy. The borrowed Arabist medicine was thus displaced by a return to the original classic sources, but the awakened spirit of criticism tended to sweep away all dogmatism and authority in medicine, just as the Reformation did in the religious sphere. The outbreak of the widespread plague in the 14th century, the sweating-sickness of England, and the appearance of syphilis in the 15th century, demonstrated diseases not treated by the ancients, and threw practical medicine upon its own resources. The introduction of firearms in the 14th century performed a similar office for surgery. Paracelsus (1493–1541), who in Germany is regarded as a reforming Luther in medicine, and who elsewhere passes rather as a charlatan and mystic, was a voice crying in the wilderness against the dominance of ancient authority. A saner influence towards the same end was the publication by Vesalius (1543) of his great text-book on human anatomy, which demonstrated the insufficiency and sometimes incorrectness of the Galenic teaching. Padua, in the late 16th century, displaced Paris and Montpellier, as these had superseded Salerno, in being the great medical school to which students flocked from the whole of Europe. Here Vesalius, Fallopius, Cæsalpinus,

Galileo, and Fabricius were teachers. Under the last-named studied William Harvey (1578–1657), who, in 1628, published his little book on the *Motion of the Heart*; this had the effect of showing the value of painstaking research, of demonstrating essential fallacies in old theories, and of opening up entirely new conceptions regarding the bodily functions. The mechanical principles which he introduced were expanded by the work of Borelli, Baglivi, Pitcairne, and others into the Iatro-mechanical system, which regarded all bodily functions as similar to those of a machine. Sylvius (1614–72) developed the theories of the alchemists and of Van Helmont into the Iatro-chemical system, of which the adherents later did good work for medicine in the gradual discovery of the meaning of breathing by Boyle, Mayow, Priestley, and Lavoisier, and of the processes involved in digestion by De Graaf, Réaumur, Beaumont, and the modern Pavlov. A third system to explain bodily activity was introduced by Stahl in the end of the 17th century, and known as 'animism,' or later as 'vitalism.' According to this, the mind acts directly upon bodily functions, so that an intimate knowledge of anatomy or chemistry is presumed to be unnecessary to the physician; this convenient theory had but a short duration, though it has been recently revived by the Christian scientists and psycho-therapists. In the latter half of the 17th century medicine took a new turn in the work of Thomas Sydenham (1624–89), who, as a reactionary against all systems and theories, reintroduced the Hippocratic practice of careful bedside observation and simple treatment in furtherance of nature's efforts towards a cure. He is also celebrated for having given a clear description of gout, the first accounts of scarlet fever and of chorea, and for popularising the use of the recently introduced Peruvian bark against malaria.

The invention of the microscope about 1590, and its application to the structure of the body by Swammerdam, Malpighi, and Leeuwenhoek from about 1660, added greatly to scientific medicine; by these workers the capillary blood-vessels, the blood corpuscles, spermatozoa, and bacteria were discovered, and the structure and functions of the large internal organs were greatly elucidated; a still further and more important set of discoveries on the structure of hair, nerves, &c., and on the minute changes in disease, was made by Henle, Schwann, Müller, and others of the Berlin school when the microscope was still further perfected two hundred years later.

Among the great names of the 18th century the following are specially noteworthy: Hermann Boerhaave (1668–1738) was the leading practitioner of his time, and attendance at a course of his lectures in Leyden was considered for over a quarter of a century the appropriate finish for a liberal medical education. He was a celebrated consultant, visited by patients from all over Europe, though he originated little in the way of medical discovery. Among the pupils of Boerhaave two men are noteworthy as the founders of great medical schools: Gerhard van Swieten, who, as adviser to Maria Theresa, founded the Vienna school; and Alexander Monro, who, becoming professor of Anatomy in his native Edinburgh, was the chief mover in the development of its medical teaching. Albrecht von Haller (1708–77) was another pupil of Boerhaave, and became distinguished both as a physiologist and as a poet; his chief single contribution to physiology was the demonstration that 'irritability' is the special property of all living tissues; while his *Elements of Human Physiology* (1759) marks the beginning of that subject as a modern science. Another great branch of medical science, pathological anatomy, was founded by Morgagni

(1682-1771), who published the results of his life's labours, when seventy-nine years old, in the work, *On the Seats and Causes of Diseases demonstrated by Anatomy*. In this he, for the first time, in a complete and systematic way, brought together the facts of clinical observation and of post-mortem records; his work made an enormous advance in the precision of clinical medicine, and is well worth reading still. Galvani (1737-98) and Volta (1745-1827), by their discovery of electric phenomena in contracting muscles, laid the foundation for later important researches. Joseph Black (1728-99), by discovering 'fixed air' or carbonic acid (1754), and Lavoisier (1743-94), who discovered the true nature of the exchange of gases in the lungs (1775), at last succeeded in explaining the meaning of respiration; while, on the purely medical side, Auenbrugger (1722-1809), by inventing the method of percussing the chest, and Laennec (1781-1826), by describing carefully the sounds heard on auscultation with the stethoscope (1819), rendered accurate diagnosis of lung diseases possible. Cullen (1712-90) was distinguished as a teacher in the Edinburgh school, and for his *Nosology* (1769), in which he classified diseases in the same systematic way as the botanist arranges plants. Thomas Young (1773-1829) is remembered as an all-round genius, specially celebrated for his researches on the subject of optics. Edward Jenner (1749-1823) introduced the practice of vaccination in 1796, a procedure which has been associated with an enormous reduction of the incidence of smallpox, and which formed the model for the later search of Pasteur and others to find similar protection against other diseases. Distinguished practitioners who extended our knowledge of diseases in the 18th century were, in England, Heberden, Fothergill, Lettsom, Huxham, Parry, Withering, Currie, Sir Hans Sloane, Radcliffe, and Mead; in Germany, Werlhof, Stahl, Hoffmann, and Hufeland; in France, Borden; in Italy, Torti and Lancisi; in Switzerland, Tissot and Tronchin; and in America, Benjamin Rush, Shippin, Morgan, &c. These and others first described many of the diseases and symptoms which are commonplaces of to-day.

A great influence on the development of medicine was also exerted by the increasing efficiency of surgery during this century in the hands of such men as Petit, Desault, Chopart in France; Heister and Richter in Germany; Cheselden, Pott, and the brothers John and William Hunter in England. Sanitary science and state medicine may be said to have begun with the *Complete System of Medical Polity* (1777) by Johann Peter Frank (1745-1821), was developed by Sir George Baker (1722-1809), and Sir John Pringle (1707-82), and attained a high position especially in Germany during the next century. The practice of obstetrics had been considerably developed and described in the works of midwives and of Mauriceau (1637-1709) during the 17th century, and the obstetric forceps were invented by Peter Chamberlen about 1670; in the 18th century Van Deventer published (1701) the celebrated text-book which has earned for him the epithet of 'father of modern midwifery'; and in 1752 William Smellie brought out his well-known *Midwifery*; in the 19th century, with the improvements which followed the introduction of anaesthetics and antiseptics, the subject became practically a branch of surgery. Two 'systems' of the late 18th century should be mentioned. John Brown (1735-88) revived the ancient 'methodism' in the theory that all diseases are either 'asthenic,' requiring depressing treatment, or 'asthenic,' requiring stimulation, opium and alcohol being his favourite remedies; by its simplicity this system obtained for a time a great following. Hahnemann (1755-1843) introduced homeopathy

in Germany, a system depending upon the theories that diseases are curable by drugs which produce similar symptoms in the body, that the effect of drugs is increased by giving them in very minute doses, and that most chronic diseases are due to a suppressed irritation. This system has a large following still, especially in America, and it is interesting to observe that some of its tenets are virtually embodied in the modern treatment by 'vaccines.'

The first and second halves of the 19th century form two very distinct epochs in medicine, as they do also in European politics. The first half of the century saw a steady widening of the knowledge regarding disease. In France, Louis (1787-1872) introduced the statistical method into medicine, which has proved a regular and useful mode of investigation in many ways, as, for example, in Louis's hands it showed the valuelessness of indiscriminate blood-letting; French medicine was amplified later by Charcot, Trousseau, Duchenne, Rayer, and others; Laennec has been already mentioned, and his work on interpreting the physical signs of disease in the chest was extended by the French physicians Corvisart, Andral, Piorry, and the Viennese Skoda. The name of Pinel (1745-1826), of the Salpêtrière Hospital at Paris, is celebrated as that of the physician who introduced humane treatment for the insane, and his *Medico-philosophic Treatise on Mental Alienation* (1801) was followed by works on similar lines by Esquirol, Reil, Tuke, and Conolly, and by the general adoption of rational and gentle treatment for this unfortunate class of sufferer.

In Britain an important school arose for half a century at Dublin, where Graves (1796-1853), Stokes (1804-78), and Corrigan (1802-80), were distinguished followers of the French Laennec, and developed greatly the knowledge regarding diseases of the heart and vessels. In London the early years of the 19th century produced a galaxy of clinical observers; Bright (1789-1858), Addison (1793-1860), Hodgkin (1798-1866), and Parkinson (1755-1824), are commemorated in the names of the diseases which they were the first to describe. In Edinburgh, Bell, Christison, Hughes Bennett, and Laycock maintained the fame of that school. Braid, Elliotson, and Esdaile, who published his *Mesmerism in India* in 1846, investigated the phenomena of hypnotic suggestion and trance, placing what had before been a practice of charlatans upon a sound basis. In France, medicine had a strong bias towards physiology in the earlier half of the 19th century. Magendie was the pioneer of experimental physiology, and introduced the practice of trying drugs experimentally on animals (pharmacology); Flourens (1837), by discovering the centre in the medulla governing respiration, began the system of brain localisation, which has since been greatly amplified by Broca, Fritsch, Hitzig, and Ferrier; Claude Bernard (1813-78) discovered the chief functions of the liver and pancreas, and the principle that the blood-supply is regulated by a nervous mechanism, facts of the greatest importance to practical medicine. Beaumont (1825) in America had been the first to study the movements and digestive power of the stomach *in situ*, experimenting for several years on a Canadian trapper whose stomach by a unique accident had been left open through a gunshot wound; and the subject was still further amplified by the discovery of the digestive ferment by Schwann, of the acid by Prout, and of the various conditions under which secretion takes place by Pavlov and his pupils. Still more recently it has been studied through X-ray examination of opaque meals in the living person, thus affording widely increased scope for both medical

and surgical treatment in this very obscure domain. In Germany, medicine during the 19th century had maintained a much closer connection with physiology and pathology than in England, where the traditional clinical attitude of Sydenham has been followed in a greater degree. Much of German medicine has emanated from Johannes Müller (1801-58), through his pupils Schwann, Henle, Kölliker, Virchow, and Helmholtz. Virchow's theory of cellular pathology, according to which life is a property of the cell alone, and all disease is due to aberrations in its activity, caused either by intrinsic or extrinsic causes, displaced the idea of the humours as causes of disease, and dominated medicine from its publication in 1858 almost to the present day. Pasteur had in 1857, while professor of Chemistry at Lille, worked out the causes of fermentation, and later had studied the growth of bacteria (1862), their production of changes in wine (1863), and of disease in silk-worms (1865), and he later discovered the property possessed by weak organisms in producing protection against disease from more virulent varieties (vaccine treatment). Meantime Koch (1843-1910) developed the methods of cultivating and staining bacteria (1877), and subsequently discovered a large number of the bacilli which cause special diseases, including the tubercle bacillus (1882). This laid the foundation for the modern science of bacteriology, which has been still further developed by the study of the poisons or toxins which the bacteria produce, and the antitoxic powers which the body develops to resist them. From this science of 'immunity' many important tests (e.g. the Wassermann reaction in syphilis and the Widal reaction in enteric fever) have been elaborated, as well as several valuable modes of antitoxic treatment, e.g. against diphtheria, tetanus, &c.

The middle of the 19th century was remarkable for several important discoveries. The demonstration of the anæsthetic properties of ether by Morton in 1846, and the introduction of chloroform by Simpson in 1847, chiefly concern surgery, but have produced a profound influence on all branches of medicine. The same may be said of Lister's introduction of antiseptics (1865 onwards). In 1851 Helmholtz invented the ophthalmoscope, by which the deep parts of the eye were for the first time rendered visible during life, and this not only afforded a valuable diagnostic instrument for general medicine, but virtually founded ophthalmology as a special branch. The same may be said regarding the invention of the laryngoscope by Garcia in 1855, and its application to diseases of the throat. In 1851 Pravaz introduced the hypodermic syringe, which has since become indispensable in the administration of active remedies. About 1870 the importance of the thyroid gland was discovered, and from this time the various internal secretions (hormones) and ferments have been studied in relation to many diseases caused by their deficiency in the body fluids, most notably perhaps in the alleviation of diabetes by supplying 'insulin.' Thus a partial return has been made to the old idea of the humours in maintaining health and in producing disease. The action of the heart has been much elucidated by Carl Ludwig (1816-95) and his followers, by means of instruments which take tracings from the movements of the living heart and vessels, the galvanometer which registers the power and transmission of the beats, and other physical methods. The discovery of X-rays by Röntgen in 1893 and the use of these and other forms of radiation by his followers; the developments of chemistry, through which new drugs and new diagnostic methods have been introduced; and the adoption of many procedures from the natural sciences into medical

employment have been the chief distinguishing features of the early 20th century.

In the general improvement of medical treatment during recent years one must not overlook the far-reaching effects produced by the improvement in nursing the sick, which began with the training of deaconesses by the Fliedners (1833), and was extended by Florence Nightingale in England after the Crimean War. The study of tropical diseases, especially those due to lowly organised animal parasites, was a great development of medicine towards the end of the 19th century; this was carried out especially by officers of the British Colonial, Indian Medical, and American Army Services, and has led to the stamping out of malaria and yellow fever in the Panamá Canal zone, Cuba, and West Africa, and to rendering safe these and other regions formerly regarded as the white man's grave. The Great War afforded an opportunity of testing on a large scale many theories and curative methods, such, for example, as protective inoculation against typhoid fever, and had thus indirectly a considerable effect in adding to the expansion and precision of medical knowledge.

For a general review of history of medicine the following may be consulted: Garrison's *History of Medicine* (Philadelphia, 1914); Meunier's *Histoire de la Médecine* (Paris, 1911); Meyer-Steinig and Sudhoff's *Geschichte der Medizin* (Jena, 1921); or the older Baas's *Grundriss der Geschichte der Medizin*, trans. by Handerson (Cincinnati, 1889); Häser's *Grundriss der Geschichte der Medizin* (Jena, 1884); and Puschmann's *Geschichte des medicinischen Unterrichts* (Leip. 1889; trans. by Hare, London, 1891); and for the early period, Withington's *Medical History* (London, 1894). The student who wishes to pursue the history of medicine into minutest detail should consult the larger work of Häser, in 3 vols. (Jena, 1875-79); or Daremberg's *Histoire des Sciences Médicales* (2 vols. Paris, 1870); or Puschmann's *Handbuch der Geschichte der Medizin*, in 3 vols. (Berlin, 1903-5). For a key to the very numerous articles on diseases, see DISEASE, and the list appended to ANATOMY. See also SURGERY, HYGIENE, BACTERIA, GERM THEORY, and the notices of HIPPOCRATES, GALEN, and other great physicians.

Medicine Hat, a manufacturing city of Alberta, on the South Saskatchewan River and Canadian Pacific Railway, has coal-mines and gas-wells; pop. 10,000.

Medick (*Medicago*), a genus of plants of the natural order Leguminosæ, sub-order Papilionaceæ, nearly allied to Clover (q.v.), but distinguished from that and kindred genera by the sickle-shaped or, in most species, spirally-twisted legume. The species, which are very numerous, are mostly annual and perennial herbaceous plants, with leaves of three leaflets like those of clover, and are natives of temperate and warm climates. A number of them are found in Britain, and many more in the south of Europe. They generally afford good green food for cattle, and some of them are cultivated like the clovers for this use, amongst which the most important is the Purple Medick, or Lucerne (q.v., *M. sativa*). Besides this, the Black Medick, Nonsuch, or Lupuline (*M. Lupulina*), is one of the most generally cultivated. It is a common native of Britain, where it is very generally sown mixed with red clover and rye-grass, and is useful where a close turf is desired.

Medimurje, a northern corner of Yugoslavia, between the Drave and the Mur, acquired from Hungary in 1920; area, 300 sq. m.; pop. 100,000.

Medina (Medinat al-Nabi, 'City of the Prophet,' or Medinat Rasuli-llah, 'City of the Apostle of God'), because it was there that Mohammed took refuge after his Hegira or Flight from Mecca in 622, and there that he lived till his death. Formerly called Yathrib, and mentioned by Ptolemy

as Iathrippa, the holiest city of the Mohammedan world after Mecca, and the second capital of the Hejaz in western Arabia, it is situated about 250 miles N. of Mecca, and is accessible by railway (1908) from Damascus. It consists of three principal parts—a town, a fort, and suburbs separated by a wide space (the Munakka, now encroached upon by buildings and the railway). The town is kidney-shaped, within a wall, 35 to 40 feet high, flanked by thirty towers, and enclosing the castle, which renders it the chief stronghold of the Hejaz. Two of its four gates are massive buildings with double towers. The streets are narrow but partly paved. The houses are flat-roofed and double-storied, and are built of stone, brick, and palm-wood. The principal building is the Prophet's Mosque El-Haram ('the Sacred'), supposed to be erected on the spot where Mohammed died, and to enclose his tomb. It is of smaller dimensions than that of Mecca, being a parallelogram, 420 feet long and 340 feet broad, with a spacious central area, surrounded by a peristyle with numerous rows of pillars. The present building is the result of many restorations, of which the last was that of Kait Bey, the Mameluke sultan, in 1481, whose dome and pulpit still stand. The Mausoleum, or Hujra, is an irregular doorless chamber, 50 to 55 feet in extent, situated in the south-east corner of the building. It is surmounted by a large gilt crescent above the 'Green Dome,' springing from a series of globes, and hedged in with a closely-latticed brass railing, in which are small apertures for prayer. The interior is hung with costly curtains embroidered with large gold letters, stating that behind them lie the bodies of the Prophet of God and of the first two khalifs—which curtains, changed whenever worn out, cover a square edifice of black marble, in the midst of which is Mohammed's tomb. Its exact place is indicated by a long pearly rosary suspended from the curtain. The Prophet's body is believed to lie undecayed at full length on the right side, with the right palm supporting the right cheek, the face directed towards Mecca. Close behind him is placed, in the same position, Abu-bekr, and behind him Omar; and Fatima's house is represented by a modern erection hard by. There seems no reason to doubt that the Prophet was buried in the space (originally Ayesha's hut) now enclosed in the mosque; nor is it likely that the grave was ever rifled. That his coffin, said to be covered with a marble slab, and cased with silver, rests suspended in the air is of course an idle Christian fable. It is a meritorious act to perform the pilgrimage to Medina, though there is no fixed season for it. As in Mecca, a great number of ecclesiastical officials are attached in some capacity or other to the Great Mosque; and not only they, but many of the townspeople live to a great extent on the pilgrims' alms and custom. There are few other noteworthy spots in Medina, save the minor mosques of Abu-bekr, Ali, Omar, Bilal, &c. Thirty medressas, or public endowed schools, represent what learning there is left in the city, once famed for its scholars and theologians. In the 7th century Medina was the capital of Islam; it passed under the rule of emirs, sharifs, Turkish pashas, and Wahhâbis. The Turkish garrison, after two and a half years' beleaguering, surrendered to the Hejaz Arabs in 1919. The population, some 40,000 before the Great War, was reduced by deportation and disease to less than 10,000. For authorities see MECCA.

Medina Sidonia, a city of Spain, 25 miles SSE. of Cadiz, on an isolated hill overlooking a wide plain, has the ruins of a castle, the ancestral seat of the dukes of Medina Sidonia, descendants of Guzman the Good, conqueror of Tarifa (1292).

A member of this house commanded the Armada (q.v.). Pop. 14,000, who make pottery.

Medinet-el-Fayûm is the modern capital of Fayûm (q.v.). The Bahr Yûsuf flows through it, and it has bazaars and mosques, including one erected by the Mameluke Sultan Kait Bey in the 15th century, and a population (1917) of 44,400. Near it stood the ancient capital, Crocodilopolis, where the crocodile-god Sobk, or Suchus, was worshipped. Crocodilopolis was renamed Arsinoë, after the queen of Ptolemy Philadelphus, in whose reign the cultivation of the Fayûm was greatly developed. Hawara (see FAYÛM) is also near Medinet.

Meditatio Fugæ. See DEBT.

Mediterranean Sea, so named from lying in the midst between the continents of Europe, Asia, and Africa, is connected with the open ocean only by the narrow Strait of Gibraltar, 9 miles in width at the Pillars of Hercules. Since 1869, however, it has been artificially connected with the Red Sea and Indian Ocean by means of the Suez Canal (q.v.). From its great size the Mediterranean might be ranked with the oceans, but from being so completely cut off it presents distinctly local characters when compared with the great ocean-basins, and is consequently of special interest to the student of physical science. The Mediterranean, in a nearly east and west direction, is about 2200 miles in length from the Strait of Gibraltar to the Syrian coast; its width varies from 500 or 600 miles in some places to less than 100 miles between Sicily and Cape Bon, where it is divided by relatively shallow banks into two distinct hydrographic basins, the eastern one being the larger. It is connected with the Black Sea through the Dardanelles, the Sea of Marmora, and the Bosphorus. The African and Syrian coasts are comparatively even and unindented, the wide gulfs of Gabes and Sidra scarcely presenting an exception; on the other hand, the shores of Europe and Asia Minor are cut up into numerous gulfs and bays, the largest of which is the Adriatic Sea. Various parts of the Mediterranean have been known by special names, such as the Tyrrhenian and Iberian Seas in the western, and the Levant, Ægean, and Ionian Seas in the eastern basin. The principal islands in the western part are Sardinia and Corsica, the Balearic and Lipari Islands, the two latter groups being of volcanic origin. The continental islands of Sicily and Malta are situated on the banks dividing the two basins; Pantellaria, Limosa, and Graham Island (now reduced to a shoal) are, however, volcanic though situated on the same banks. In the eastern regions there are the large islands of Cyprus and Crete, with the Ionian Islands and the islands of the Archipelago. The Mediterranean is frequently subject to earthquakes, and Vesuvius, Stromboli, and Etna are among the most famous of the active volcanoes. The scenery of the shores of this great inland sea is varied, mountain-ranges and high tablelands predominating. Although there is considerable diversity between the climates of Northern Italy and the desert shores of North Africa, still the terrestrial fauna and flora are not markedly distinct in the different regions of the Mediterranean basin, many of the plants and animals being identical on the northern and southern shores, and there is abundant evidence that this similarity was much more pronounced in recent geological times. The countries bordering the Mediterranean have been the cradle of civilisation, Egypt, Crete, Phœnicia, Greece, and Italy having been the homes of knowledge and progress, and at the present time this inland sea is commercially, perhaps, the most important waterway of the world.

The area of the Mediterranean is estimated at about 900,000 sq. m., or, including the Black Sea and Sea of Azov, at 1,053,000 sq. m. The area of land draining into the Mediterranean is estimated at 2,969,350 sq. m., or nearly 3,000,000 sq. m. of the richest country on the earth's surface. The annual amount of rain that falls on this land is estimated by the writer at 1598 cubic miles, and of this amount about 226 cubic miles reach the Mediterranean through the annual discharge of rivers, the principal of which are the Rhone, Po, Danube, Dnieper, Don, and the Nile.

The basin of the Mediterranean commences about 50 miles to the west of Gibraltar, where there is a ridge with a maximum depth of about 200 fathoms. There is a similar depth on the ridge between Sicily and Africa which separates the Mediterranean into two basins: 2040 fathoms is the greatest depth recorded in the western, and 2187 fathoms the greatest in the eastern basin; the mean depth of the whole sea is 768 fathoms. The area of the sea-bottom with a less depth than 100 fathoms is estimated at about one-fourth of the whole area; the area with a depth of from 100 to 1000 fathoms is estimated at 300,000 sq. m., and with a depth of from 1000 to 2000 fathoms at 15,000 sq. m. The bulk of water is estimated at 709,800 cubic miles. The greatest depth in the Black Sea is 1070 fathoms, the average depth being 412 fathoms.

On the whole northerly winds prevail over the Mediterranean, due chiefly to the influence of the anticyclonic region of the North Atlantic, although in the eastern portions the alternate cyclonic and anticyclonic area of northern Asia has a distinct influence on the direction of the winds. The Mediterranean lies wholly between the annual isotherms of 60° F. in the north and 70° in the south. The temperature of the surface waters may occasionally reach 90°, but is usually much less, the mean of the winter months being between 53° and 57°. Generally the temperature of the sea is higher than that of the air, especially in winter, but in some of the summer months the reverse is the case. Whatever the temperature of the surface water may be, at a depth between 100 and 200 fathoms a temperature of 54° to 56° is met with, and this persists without sensible variation to the greatest depth. The temperature of the bottom water in the western basin is about 54°·5, and in the eastern basin a little warmer, 56°·0, these temperatures being fully 20° higher than the temperature of the bottom water of the Atlantic at corresponding depths. From recent observations it would appear that the deep water of the Mediterranean is subject to slight annual variations, dependent on the temperature of the previous winter. The evaporation from the surface of the Mediterranean exceeds both the precipitation and the annual discharge of the rivers flowing into it from the surrounding catchment basin, for we find the specific gravity of its waters (1·02800 to 1·0300) to be greater than that of the Atlantic on the west (1·026 to 1·027), or that of the Black Sea on the east (1·012 to 1·014). There is even an outflow of warm dense Mediterranean water into the Atlantic beneath the lighter Atlantic water which flows in at the surface through the Strait of Gibraltar. There is a similar state of things at the entrance of the Black Sea, where there is an inflow of fresh water from the Black Sea at the surface, and an outflow in the opposite direction of saltier Mediterranean water by an undercurrent. Were it not for the inflow of Atlantic water the Mediterranean would slowly become saltier, and shrink till reduced to two salt lakes like the Dead Sea. The Mediterranean is usually called a tideless sea. At Algiers there is a rise of 3½ inches at springs and half that amount at neaps; at other places the rise and fall

is about 18 inches, and in the Gulf of Gabes the range reaches 5 feet, but the solilunar tides are as a rule completely masked by the rise of level and the surface currents produced by the action of the winds. The deposits now forming in the Mediterranean in deep water are all blue muds, with a yellowish upper layer, containing usually from 10 to 30 per cent. of carbonate of lime, which principally consists of the shells of pelagic Foraminifera. The mineral particles and clayey matter are derived from the disintegration of the neighbouring land. In some of the shallower depths there are glauconitic and more calcareous deposits. The deep-sea dredgings show that life, though present, is much less abundant in deep water than at similar depths in the open ocean, in which respect the Mediterranean agrees with enclosed seas in general. There is an extensive red coral fishery and tunny fishery on some parts of the coasts. The Mediterranean region appears to have been covered by the sea from early geological times, and during Tertiary times must have had much wider communication with the open ocean.

Medium. See SPIRITUALISM.

Medjidie, an Ottoman decoration, instituted in 1852 by the Sultan Abd-ul-Medjid as a reward of merit either civil or military. It was conferred after the Crimean campaign, to a considerable extent, on British officers. The order consists of five classes, and the decoration is a silver sun of seven triple rays, with the device of the crescent and star alternating with the rays.

Medlar (*Mespilus*), a genus of rosaceous trees or shrubs, having a 5-cleft calyx with leafy segments, nearly round petals, a large honey-secreting disc, and 2-5 styles, united together in the flower, but widely separated on the fruit, the upper ends of the bony cells of which are exposed. The Common Medlar (*M.* or *Pyrus germanica*), a small tree, spiny in a wild state, spineless in cultivation, is a native of the south of Europe and of the temperate parts of Asia, but is a doubtful native of Britain, although it is to be seen in hedges and thickets in the southern parts of England. It has lanceolate, undivided leaves, solitary large white flowers at the end of small spurs, and globular or pear-shaped fruit. The medlar is much cultivated in some parts of Europe, and is common in gardens in England, but it does not generally ripen well in Scotland without a wall. It is very austere, but when *blotted*—its tough pulp soft and vinous by incipient decay—it is relished by many.

Medmenham, a village of Buckinghamshire, near the Thames, 3 miles SW. of Marlow. Here stood a Cistercian abbey (12th century); and here, soon after the middle of the 18th century, Sir Francis Dashwood, afterwards Lord le Despencer (1708-81), founded his mock brotherhood of 'Franciscans,' whose motto was the familiar inscription on Rabelais' abbey of Thelema, 'Fay ce que voudras,' and two of whose twelve members were John Wilkes and Paul Whitehead the poet. See a book by the Rev. A. H. Plaisted (1925).

Médoc, a district in the French department of Gironde, famed for the quantity and excellence of the wine it yields, some of the most famous growths of Bordeaux (q.v.), such as Château-Margaux, Château-Lafite, and Château-Latour. The district lies on the left bank of the estuary of the Gironde, being separated from the Landes by low hills, and is 40 miles long by from 5 to 10 wide.

Medulla. See BRAIN, PITH.

Medusa. See GORGON, JELLY-FISH.

Medusoid. See COELENTERATA, HYDROZOA.

Medway, a river of Kent, rising in three head-streams in Sussex and Surrey, and flowing 70 miles

north-eastward (including 12 miles of estuary), past Tunbridge, Maidstone, Rochester, Chatham, and Sheerness, until it joins the estuary of the Thames. It is tidal and navigable to Maidstone, but large vessels do not ascend above Rochester bridge. See CHATHAM.

Meeanee, or **MIANI**, a village in Sind, India, on the Indus, 6 miles N. of Hyderabad, was the scene of a battle between Sir Charles Napier with 2800 men and a Baluch army, 22,000 strong, on 17th February 1843. The latter were totally routed, and the result was the annexation of Sind.

Meerane, a town of Saxony, 35 miles S. of Leipzig. It developed rapidly through its woollen manufactures and export trade. Pop. (1849) 7345; (1900) 23,851; (1919) 21,927.

Meerkat (*Cynictis penicellata*), a South African carnivore akin to the Ichneumon (q.v.), head and body (covered with reddish fur) a foot and a half long, the bushy, grayish tail a foot. But the name is also given to the Suricate (q.v.) or zenick, to the 'Madagascar cat' or lemur, and even to the Cape ground-squirrel.

Meerscham (*Sepiolite*); a mineral existing in many parts of the world. In Europe it is found chiefly at Hrubcschitz in Moravia, and at Sebastopol and Kaffa in the Crimea; and in Asia Minor it occurs abundantly just below the soil in the alluvial beds of several districts—especially at Eski-shehr. It is also found in Spain and South Carolina. Meerscham, from its having been found on the seashore in some places, in peculiarly rounded snow-white lumps, was ignorantly imagined to be the petrified froth of the sea, which is the meaning of its German name. Its composition is silica, 60.9; magnesia, 26.1; water, 12.0. Almost all the meerscham found is made into tobacco-pipes, in which manufacture the Austrians have been for a long time pre-eminent. Vienna contains many manufactories, in which some very artistic productions are made; and pipes worth 100 guineas, from the beauty of their design, are by no means uncommon. The French pipe-makers also make use of meerscham, and have displayed great taste in their works. When first dug from the earth meerscham is quite soft and soap-like to the touch, and as it lathers with water, and removes grease, it is employed by the Turks as a substitute for soap in washing. Similarly in Algeria it is sometimes used in place of soap at the Moorish baths. The waste in cutting and turning the pipes was formerly thrown away, but it is now reduced to powder, mixed into a paste, and compressed into hard masses, which are carved into inferior pipes.

Meerut, or more correctly **MERATH**, a town, district, and division in the United Provinces of British India. The town lies 40 miles NE. of Delhi, about half-way between the Ganges and the Jumna. Its most important building is the English church, with a fine spire and an excellent organ. There are also several ruins of native edifices. Here in 1857 the great Mutiny broke out (see INDIA). Pop. (1881) 99,565; (1921) 122,609, of whom 45,000 were in the cantonment. The district has an area of 2298 sq. m., pop. 1,500,000; the division, 9181 sq. m., pop. 4,500,000.

Megaceros. See ELK.

Megalichthys (Gr., 'great fish'), a genus of extinct fishes of large size, whose remains are found in Carboniferous and Lower Permian strata both in Europe and America. The large teeth and strong scales suggest predaceous habits. They were 'fringe-finned Ganoids' in the order Crossopterygii, of which *Polypterus* and *Calamoichthys* are the only living representatives.

Megalithic Monuments. See DOLMEN, STANDING STONES, STONE CIRCLES, &c.

Megalonyx, a large fossil edentate of the United States, smaller than the *Megatherium* (q.v.).

Megalopolis, founded by Epaninondas after the battle of Leuctra (371 B.C.), and made the capital of Arcadia, stood in the valley of the Helisson. Plundered and mostly destroyed by the Spartans in 222 B.C., it was the birthplace of Philopœmen and Polybius. Excavations (1890-93) by the British School at Athens revealed a theatre, a temple of Zeus Soter, the Thersileion, or great hall of the Arcadian Assembly, &c.

Megalosaurus (Gr., 'great lizard'), a Theropod Dinosaur, fragments of which have been obtained from Jurassic and Cretaceous strata in Europe, and suggest an animal of large size—perhaps as big as an elephant. It was apparently carnivorous and partly bipedal. See REPTILES.

Megaphone, a device, invented by Edison, by which distant sounds may be heard without any intervening wires. It consists of two funnels six feet long, tapering from two feet six inches in diameter at the mouth to small openings in tubes for the ears. By its means men some miles apart have been able to converse freely.

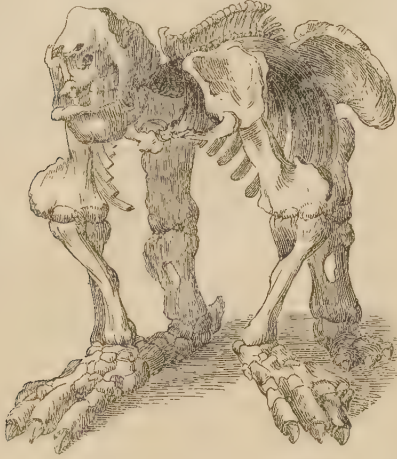
Megapodidae. See MOUND BIRDS.

Megarís, a small mountainous region of Greece, between Attica and the Isthmus of Corinth. Its people founded colonies at Byzantium (667 B.C.), Chalcedon, and Megara (Hyblæa) in Sicily. The capital was Megara.—For the Megaric school, see EUCLID of Megara; see also THEOGNIS.

Megas'thenes, a Greek ambassador stationed by Seleucus Nicator (306-298 B.C.) at the court of Sandrocottus (q.v.), or Chandra Gupta, in the valley of the Ganges. Here he gathered materials for his work *Indica*, from which Arrian, Strabo, and others borrowed. The fragments that remain have been edited by Schwanebeck (1846) and Müller (1848).

Megatherium (Gr., 'great beast'), a gigantic extinct quadruped of the order Edentata, nearly allied to the sloth, found in the Pleistocene deposits of South and North America, but more particularly in those of the South American pampas. In structure it is very near its modern representative, except that the whole skeleton is modified to suit the requirements of an immense heavy-boned and heavy-bodied animal, fully equal in bulk to the largest species of elephant. The appellation tardigrade, which Cuvier applied to the sloth, cannot be given to the *Megatherium*: its limbs were comparatively short and very strong, and the feet adapted for walking on the ground, approaching in this respect nearer to the allied ant-eaters, but with this peculiarity, that the first toe of each of the hind-feet was furnished with a large and powerful claw, which was probably used as a digger to loosen roots from the soil, and enable the creature the more easily to overturn the trees on the foliage of which it browsed. The enormous development of the bones of the pelvis, the hind-legs, and the tail, gave the animal great power when, seated on its hind-legs and tail, as on a tripod, it raised its fore-legs against the trunk, and applied its force against a tree that had already been weakened by having its roots dug up. The structure of the lower jaw seems to indicate that the snout was prolonged and more or less flexible, and it seems probable that the *Megatherium* was furnished with a prehensile tongue like that of the giraffe, with which it stripped the foliage from the trees. The remains of several allied genera of huge Edentata are associated with the *Megatherium* in the deposits on the pampas. They form the family

Megatheriidae of Owen, which includes *Myloodon*, *Megalonyx*, *Scelidotherium*, &c.—genera which are separated from *Megatherium* chiefly from peculiarities in the dentition. The modern sloth is a



Skeleton of the Megatherium.

native of South America, and the fossil remains of these immense creatures, which represented it in the newer Tertiaries, are found only in the American continent.

Meghna, the estuary of the Ganges (q.v.) and Brahmaputra (q.v.). See Map at CALCUTTA.

Megiddo, an ancient city of Palestine, the site of which is somewhat uncertain, in the plain of Esdraelon. In the battle there Josiah (q.v.) was slain in 609 B.C.

Megilp. See MAGILP.

Megrim. See HEADACHE.

Megrims and **Vertigo** are the terms usually applied when a horse at work reels, and then either stands for a minute dull and stupid, or falls to the ground, lying for a time partially insensible. These attacks come on suddenly, are often periodical, and are most frequent during hot weather and when the animal is drawing up a hill, or exposed during heavy work to the full rays of a hot sun. Liability to megrims constitutes unsoundness, and usually depends upon the circulation through the brain being temporarily disturbed by the presence of tumours, or by weakness of the heart's action. Horses subject to megrims are always dangerous.—For vertigo in the human subject, see VERTIGO.

Mehádia, a village of Transylvania, 15 miles N. of Orsova. Near it are the springs of Herkulesbad (q.v.).

Mehadia, or MAHDIAH, is a North African seaport and health-resort 115 miles SE. of Tunis; pop. 6000.

Mehemet Ali, better MOHAMMED 'ALI, Viceroy of Egypt (1805-49), was an Albanian born at Kavalla in Macedonia in 1769, and was sent to Egypt with a Turkish force in 1799. See EGYPT.

Méhul, ÉTIENNE NICOLAS, operatic composer, was born at Givet, 22d June 1763, studied in Paris, and in 1795 became professor at the Conservatoire. He died 18th October 1817. Among his best-known works are the operas *Une Folie* (1801), *Les Aveugles de Tolède* (1806), and *Joseph* (1807); and the patriotic songs *Chant du Départ*, *Chant de Victoire*, *Chanson de Roland*. See Life by Pougin (1889).

Meilhac, French playwright, born in 1832 in Paris, was trained as an artist and published his

first dramatic work in 1855. He subsequently produced a long series of light comedies—some in conjunction with Halévy. Some are well known through Offenbach's music. His *chef-d'œuvre* is *Frou-Frou* (1869). He died 6th July 1897.

Meinam. See SIAM.

Meinhold, JOHANN WILHELM (1797-1851), a native of the island of Usedom, and Lutheran pastor at Usedom, Krummin, and Rehwinkel, published poems and dramas, but is best known as author of *The Amber Witch* (trans. by Lady Duff Gordon, 1844) and *Sidonia the Sorceress* (trans. 1893).

Meiningen, a town of Thuringia, capital of the former German duchy of Saxe-Meiningen, lies in a narrow valley on the banks of the Werra, 43 miles by rail NW. of Coburg. The ducal castle (1682), the most prominent building, contains libraries, a picture-gallery, collection of coins, &c. There is a fine 'English garden' here. The town has been in great part rebuilt since 1874, when a fire destroyed the old streets. It was an appendage of the see of Würzburg from 1008 to 1542, and from 1583 to 1918 was in the hands of the Saxon ducal family. Pop. (1875) 9521; (1890) 12,029; (1919) 17,094.

Meissen, a town in the former kingdom of Saxony, lies in a beautiful district on the left bank of the Elbe, 14 miles by rail NW. of Dresden. Its chief building is the cathedral (c. 1266-1479), one of the finest Gothic churches in Germany, surmounted by an exquisite spire (263 feet) of open work, and containing many fine brasses. The castle was built in 1471-83, and in 1710 was converted into the porcelain factory over which Böttger presided (see POTTERY). In 1863, the porcelain factory having been removed in 1860 to other premises, the castle was restored, its walls being adorned with frescoes by modern painters. Other manufactures are iron, machinery, jute, and cigars. Here is the celebrated school of St Afra, where Gellert and Lessing were educated. It was founded by Duke Maurice in 1543, and until 1879 occupied the former Afra monastery (built in 1205). Meissen was founded in 928 by Henry I of Germany as a stronghold against the Slavonians, and was long the capital of the margraviate and burgraviat of Meissen, which was subsequently merged in the duchy of Saxony. The town was burned down by the Swedes under Banér in 1637. Pop. (1875) 13,002; (1885) 15,474; (1919) 37,493.

Meissonier, JEAN LOUIS ERNEST, figure-painter, was born at Lyons, 21st February 1813. When he was still a child his father established himself as a druggist in Paris; and the son, having resolved upon art as a profession, studied under Jules Potier and Léon Cogniet. His drawings were praised by Johannot, and about 1833-34 he was employed by Curmer the publisher on designs for the *Royaumont Bible* and other works. He first made a distinct mark in 1833, by his illustrations to *Paul and Virginia* and the *Chaumière Indienne*; many other volumes were enriched by his pencil, and his career as a book-illustrator closes with his spirited designs to the *Contes Rémois* of the Comte de Cheigné. Meanwhile, he had been steadily practising painting. In 1834 he began to contribute to the Salon with a water-colour and an oil-picture, the latter strongly suggestive of the work of the figure-painters of Holland, who have powerfully influenced Meissonier during his whole career. Two years later he exhibited the first of his various groups of 'Chess-players,' and here his accurate precision of draughtsmanship and quietly dramatic truth of attitude and expression first became clearly visible. It was followed by a long series of elaborate and successful genre-pictures, in which, with the most careful and finished—if sometimes

rather hard and unsympathetic—execution, and with the most perfect verisimilitude of costume and local colouring, the artist has depicted the civil and military life of the 17th and 18th centuries, passing—in such works as the ‘Napoléon I.,’ a small single-figure picture which Ruskin sold in 1882 for £6090; the ‘Campagne de France, 1814’ (1864); ‘Solferino’ (1866), now in the Luxembourg Gallery; ‘Cuirassiers or 1805’ (1871); and ‘Friedland or 1807,’ bought by M. Secrétan in 1878 for 400,000 francs—to subjects of genre or history taken from the 19th century. Among the most celebrated of his other military scenes may be named ‘La Rixe’ (1854), purchased by Queen Victoria; and not less fascinating are his simpler groups of students, artists, collectors, &c., such as ‘La Lecture chez Diderot’ (1859), ‘Les Amateurs de Peinture’ (1860), and ‘La Lecture du Manuscrit’ (1867). He also executed some striking portraits, including ‘Dumas fils’ (1877) and ‘M. Victor Lefranc’ (1883). The cartoons of his design for the decoration of the Panthéon—the apotheosis of France—were exhibited in 1889. He etched some dozen plates; and many of his pictures are familiar from engravings.

Meistersinger, or **MASTERSINGERS**, the name given to the poet-musicians of the mediæval German towns. Hans Sachs (q.v.) was the most famous of them. They were organised in guilds, and were a kind of burgher parallel to the Minnesinger (q.v.). The first guild is said to have been founded by Heinrich von Meissen in the early 14th century.

Mekhitar, Mekhitarists. See **MECHITARISTS**.

Mekhong, or **MEKONG** (also called Cambodia), the greatest river of the Siam peninsula, since 1894 mainly controlled by the French (see **SIAM**), is usually identified with the Lan-tsan, which rises in the neighbourhood of Chiamdo in Tibet—its exact sources are not known. It pursues a generally southerly direction to the China Sea, which it enters by several mouths in Cochin-China. This country indeed is formed by its deltaic deposits. The river has a total length of 2800 miles; but is not navigated higher than 14° N. lat. owing to rapids and cliffs which beset its bed in the mountainous regions.

Meklong, a town of Siam, near where the Meklong River runs into the Gulf of Siam. Among its 8000 inhabitants many are Chinese.

Mela, **POMPONIUS**, the first Latin writer who composed a strictly geographical work, was born at Tingentera in the south of Spain, and lived in the time of the Emperor Claudius; nothing else is known concerning him. His work, an unsystematic compendium, is in three books, and is entitled *De Situ Orbis*. The text is greatly corrupted. The *editio princeps* appeared at Milan in 1471; the best modern edition is that by Parthey (Berlin, 1867).

Melaleuca. See **CAJEPUT**.

Melampyrum. See **COW-WHEAT**.

Melancholia. See **INSANITY**.

Melanchthon, **PHILIP**, Luther's fellow-labourer in the Reformation, was born, 16th February 1497, at Bretten, in the Palatinate of the Rhine, now in the republic of Baden. His name was originally Schwarzerd (‘black earth’), of which Melanchthon is a Greek translation. He was educated at the university of Heidelberg, where he took the degree of Bachelor of Philosophy in 1512. In the same year he went to Tübingen, studied theology, took the degree of Doctor, and in 1514 gave lectures on the Aristotelian philosophy and the classics. About this time he published a Greek grammar. On his relative Reuchlin's recommendation he was

appointed in 1518 professor of Greek in Wittenberg. Brought into contact with Luther in that town, he at once became his fellow-worker in the great religious revolution with which Luther's name is identified. Melanchthon brought to his aid an extent of learning that made him to be regarded as another Erasmus, and a gift of lucid exposition and purity of Latin style unrivalled among his contemporaries. The natural sweetness of his temper and the habitual moderation of his views also advantageously tempered Luther's vehemence. In 1521 he published his *Loci Communes Rerum Theologicarum*, the first great Protestant work on dogmatic theology. It passed through more than fifty editions in the course of the author's life. In 1530 he made a most important contribution to the cause of Protestantism, in the Augsburg Confession (q.v.). In 1541 he went to Worms, and soon after to Ratisbon, to conduct the cause of the Protestants in the conferences there. But the influence of the papal legate counteracted all his efforts for a peaceful accommodation, and his own party were much dissatisfied on account of the concessions which he made. After Luther's death, Melanchthon lost in some measure the confidence of some of the Protestants by those concessions to the Catholics which his anxiety for peace led him to make; whilst the zealous Lutherans were no less displeased because of his approximation to the doctrine of Calvin on the Lord's Supper. His consent, conditionally given, to the introduction of the Augsburg Interim (q.v.) in Saxony, in 1549, led to painful controversies, which filled the latter years of his life with disquietude. He died at Wittenberg, 19th April 1560. By his calm wisdom and the reputation of his genius, Melanchthon did much to save the Reformation from those excesses that would have made its progress impossible. In the performance of this task he incurred much opposition from Luther himself, and still more from the enthusiasts who came to the front after Luther's death; but the subsequent religious history of Germany is conclusive proof of the wisdom of his action. By his labours as a scholar and public teacher, Melanchthon ranks with the very highest names in the history of learning and education. Alike by his temper and intellectual interests, he is to be regarded as blending in the happiest proportion the humanist and the reformer. The most complete edition of his works (which comprise a Greek and Latin Grammar, editions of and commentaries on several classics and the Septuagint, biblical commentaries, doctrinal and ethical works, official documents, declarations, dissertations, responses, and a very extensive correspondence with friends and the leading men of the age) is that by Bretschneider and Bindseil in their *Corpus Reformatorum* (28 vols. 1834-60).

See *Lives of Melanchthon* by his friend Camerarius (1566); by Cox (1815), Matthes (Altenb. 1841), Schmidt (Elberf. 1861), Meurer (2d ed. Leip. 1869), Schaff (Lond. 1887), Hartfelder (Berlin, 1889), Bailey Saunders (1897), George Wilson (1898), A. Harnack (1898), Richard (1898), and Ellinger (1902).

Melandryum. See **LYCHNIS**.

Melanesia (Gr. *melas*, ‘black’) is a name given to those Pacific islands near New Guinea which are inhabited by the Papuan race. Dr W. H. R. Rivers's *History of Melanesian Society* (1915) is a very important contribution to cultural anthropology. See **POLYNESIA**.

Melanite. See **GARNETS**.

Melaphyre. See **BASALT**.

Melastomaceæ. A large family of dicotyledonous plants, comprising annual and perennial

herbs, and shrubs and trees, often of huge size. The peculiar venation of the leaves makes, however, all of the 2700 species (171 genera, of which *Tamonea* alone accounts for 550) easily recognisable as belonging to this very natural family. It is chiefly developed in tropical and subtropical America, and tropical Africa and Asia.

Melazgerd. See MANZIKERT.

Melba, DAME NELLIE PORTER, was born at Melbourne, Australia, in 1859, the daughter of a Scottish contractor named Mitchell. Her gifts as a singer were soon evident, but it was only after her marriage to Captain Armstrong in 1882 that she undertook the study of singing under Mme. Marchesi of Paris. In Brussels in 1887 she appeared as Gilda (*Rigolette*), and the following year in London in *Lucia*. Thereafter she sang regularly at Covent Garden and in all the principal capitals of the world, the purity and flexibility of her voice making her a favourite everywhere. She was created D.B.E. in 1918. See *Life* by Hermann Klein (1925).

Melbourne, the capital of the State of Victoria, and the temporary seat of the Australian Government, is situated on the Yarra, a small stream flowing into the northern extremity of Port Phillip. Its site was first seen by a white man (unless the escaped Buckley visited it in 1804) when John Batman, a settler from Tasmania, on 8th June 1835 rowed up the Yarra to the then head of tide-water, and noted that 'this will be the place for a village.' He had two days earlier bought from the aborigines of the district a tract of land reaching from the Dividing Range to the ocean beyond Queenscliff (about 600,000 acres) for an immediate payment of blankets, flour, &c., and a rent in similar kind worth about £320 a year. The first hut, however, was put up not by Batman but on 1st September by another party of settlers under John Fawkner which arrived during Batman's temporary absence in Tasmania. Settlement was at first forbidden by the British Government; but Governor Bourke, seeing that the settlers had no intention of obeying such an order, persuaded the authorities to revoke it, and in 1837 formally laid out the township, which he named after the prime minister of the day. As was usual in those days—and much later—the spot chosen was as far up the river as small sailing-ships could go, in order to minimise the expensive land-transport; and Melbourne (like Brisbane, Rockhampton, and half-a-dozen smaller Australian seaports) has been forced into huge expenditure and numberless shifts to construct under this disadvantage harbour accommodation capable of receiving the larger trading-vessels of recent years. Its difficulties are enhanced by the general shallowness of Port Phillip, across which all vessels must approach it, and the dangers of navigating large vessels through the tide-swept and rock-obstructed passage between the Heads at its southern end. As a seaport, therefore, Melbourne naturally ranks low, and its great prosperity and actual position as the second port in Australasia are due partly to the resources of the State whose capital it is, partly to the keen and persistent enterprise of its citizens. As was the case with Sydney (q.v.), the fact that in it was concentrated the power, both official and financial, which ruled Victoria, led to the concentration on it of all traffic from the inland, and even from the coastal, districts as soon as railways became the chief means of transport. The effect of this on the State at large was not so evil as in the other case; Melbourne was, in any case, the nearest port to the gold-fields which suddenly enriched Victoria, and to the extensive agricultural areas north of the

main range, over which closer settlement first spread itself; and the ports of Geelong, Warrnambool, and Portland, which alone could be seriously injured (no others existing within the State boundaries), had at their back, until quite lately, districts almost wholly pastoral. At the same time, the consequent concentration of population in the capital (in 1921, 50 per cent. of the people of Victoria were within the metropolitan boundaries) has not benefited the State as a whole.

There is a special reason for this concentration. The huge and sudden growth of Melbourne in the fifties of last century was due to an influx of gold-diggers, mostly from the towns of Europe, who, whether they left the diggings rich or poor, made back to town-life and their old trades. The town thus became a manufacturing and financial centre at a time when other colonial capitals were mere collecting and distributing centres; at one time, indeed, Melbourne not only financed the development of inland Queensland, but supplied Sydney with energetic business experts. The establishment in Victoria of a protective fiscal policy further aggrandised its manufacturing centre. Since federation, however, and the adoption of a single fiscal policy for all Australia, the natural advantages of Sydney have re-established their influence, and Melbourne is now the second in importance of the great Australian cities. Its position as temporary federal capital benefits it but little, and will be surrendered without regret.

The city proper lies on the northern bank of the Yarra, covering two spurs of the central plateau and the long, shallow valley between them. Its area is about 7400 acres, and its population (in 1921) 103,269. It is surrounded by 23 suburban municipalities, with populations varying from 6000 to 50,000, of which the most important are, on the north and east, Essendon, Brunswick, Northcote, Collingwood, Fitzroy, Richmond, with Hawthorn across the Yarra; on the south, Prahran, Malvern, Caulfield, St Kilda, Melbourne South (formerly Emerald Hill), and Port Melbourne (formerly Sandridge). Lower down the Yarra, towards the west, lie Williamstown and Footscray. Of these, the chief manufacturing suburbs are the inner ring, Footscray, Fitzroy, Collingwood, Richmond, and South Melbourne; Port Melbourne is the shipping-centre for mail and other large oversea steamers; the outer eastern belt, from Kew to St Kilda, with another belt of less thickly populated municipalities beyond it, is residential in the main. The water-supply and sewerage of the whole area have been managed since 1891 by the Melbourne and Metropolitan Board of Works. The catchment area is in the Plenty Ranges, north and north-east of the city, supplemented by the diversion of a few northward-running streams through tunnels. The sewerage system delivers to a sewage farm at Werribee, 24 miles SW. of the city; there the sewage is filtered over an extensive area, and the resultant liquid discharged into Port Phillip. The municipalities also co-operate with the government and the insurance companies in appointing a Fire Brigades Board, which controls the district within a radius of 10 miles from the centre of Melbourne, the area being slightly enlarged on the south-east.

The glory of Melbourne is Collins Street, probably the finest street in Australasia, which traverses the city area from the main railway station on the west to the government offices on the east; in it are the principal banks, many fine office buildings, and the town-hall, the interior of which was destroyed by fire in 1925. The parliament buildings, at present occupied by the Federal Parliament, are set effectively on a hill facing down Bourke Street, which also contains the general post-office. Among

other noticeable public buildings are the Anglican cathedral in Swanston Street, close to Prince's Bridge, which connects the city with the southern suburbs; the Roman Catholic cathedral, somewhat hidden away behind Parliament House; the Flinders Street station, running along the riverbank from Prince's Bridge to Queen's Bridge; the public library, art gallery and museum, in a single block between Swanston and Exhibition Streets (the reading-room of the library, a domed amphitheatre of reinforced concrete, is a notable combination of comfort and beauty); and the law courts on the western spur.

The university (for which, as an educational institution, see VICTORIA) and its residential colleges lie north of the city, adjacent to a wide stretch of park-lands which include the zoological gardens. South of the Yarra, in an even larger park area, Government House (at present the official residence of the governor-general) stands on a conspicuous hill; near it, on a steep hillside running down to the river, are well-planned and beautiful botanical gardens. Albert Park in South Melbourne, containing a long, shallow lagoon much used for yachting, the Fitzroy and Treasury Gardens behind the government offices on the edge of the city proper, and the huge reserves along the north bank of the Yarra, in which the principal cricket-grounds are situated, also afford wide lung-space and recreation areas for the population of the metropolis. In all these park-lands, and along several of the main roads by which the city is approached, the scheme of decoration by flowerbeds and small plantations is a feature in which Melbourne rightly takes special pride. In few cities has the lack of natural beauty been so admirably compensated by well-devised adornments.

The internal traffic of Greater Melbourne is facilitated by the best suburban railway system in Australia; it was electrified in 1912-23. The tramways (with slight exceptions) were in 1920 put under control of the Metropolitan Tramway Board.

The port of Melbourne is controlled by a Harbour Trust established in 1876 and reconstituted in 1913. Under its control the river-channel has been deepened and shortened; the Victoria dock has been constructed near the city; and piers have been constructed in Hobson's Bay at Port Melbourne and Williamstown. The Williamstown piers are used mainly for export of wheat and wool. Mailsteamers usually berth alongside the Prince's pier at Port Melbourne. A pier on similar lines is under construction at Port Melbourne, a dock (the Appleton) is being excavated west of the Victoria dock, and wharfrage to supplement the existing river and dock wharves is being provided at Newport and Spottiswoode.

The situation of Melbourne renders it of very little use for naval purposes, and the naval depot, formerly established at Williamstown, has been removed to Westernport.

See works named under VICTORIA.

Melbourne, WILLIAM LAMB, VISCOUNT, statesman, was second son of Penistone Lamb, first Viscount Melbourne, and was born in London, 15th March 1779. His education he received at Eton, at Trinity College, Cambridge, and at Glasgow. He entered the House of Commons for Leominster in 1805 as a Whig, a follower of Charles James Fox. But, having become a convert to Canning's views, he accepted in 1827 the chief-secretaryship of Ireland in his government, and continued to hold the post under Lord Goderich and the Duke of Wellington. In 1828 the death of his father transferred him to the Upper House. Returning to his allegiance to the Whigs, in 1830 he took the seals of the Home Office in the government of Earl Grey, and in

July 1834 succeeded his chief as prime-minister, but only remained at the head of affairs until the following November. Peel, however, gave way to Melbourne again in 1835; and he continued in office when Victoria ascended the throne (1837). He succeeded by his uncommon tact in introducing her pleasantly to the various duties of a constitutional monarch. In 1841 he once more passed the seals of office to Sir Robert Peel, and thenceforward took little part in public affairs. He was ineffective as a speaker, but displayed aptitude for affairs and common sense in the ordering of them. His easy cheerful temper and cordial frankness of manner cheered him many friends. Sydney Smith, in his second letter to Archdeacon Singleton, has described his character with an exquisite mixture of sarcasm and compliment. Melbourne died 24th November 1848. He married (1805) a daughter of the Earl of Bessborough, who, under the title of Lady Caroline Lamb (1785-1828), attained some celebrity as a novel-writer, besides notoriety from her relations with Lord Byron. The charge brought against him by the husband in 1836 of seducing the famous Mrs Norton was thrown out by the jury without leaving the box.

See *Memoirs* by Torrens (2 vols. 1878); *Lord Melbourne's Papers*, edited by L. C. Sanders (1889); *The Grenville Memoirs* (1875-85); and *Life* by Dunkley (1890; new ed. 1906); and Queen Victoria's *Letters* (1907).

Melchites, the name given to a body of Christians in Syria, Palestine, and Egypt, who acknowledge the authority of the pope, and accept the doctrines of the Church of Rome, but use the liturgy and ceremonies of the Greek Church. They conduct divine service in Arabic, receive the Lord's Supper in both kinds, and follow the Eastern Calendar. Their priests need not be celibate, but must not marry after ordination. The body numbers perhaps 120,000, and is ruled by a Patriarch of Antioch, Alexandria, and Jerusalem, resident at Damascus (with vicars at Damascus, Alexandria, and Jerusalem), and eleven other bishops. The name Melchites (lit. Royalists, from Syriac *melcho*, 'a king') dates from the 5th century, and was given to those members of the Orthodox Eastern Church who supported the emperors against the Monophysites (q.v.) and Nestorians (see NESTORIUS).

Melchizedek ('king of righteousness'), in the story of Genesis, king of Salem and priest of 'Supreme El.' He met Abram on his return from the victorious expedition against Chedorlaomer, gave him his blessing, and received tithes from him. The ante-legal king-priest stands in Psalm cx. as a figure typical of the vicegerent of Jehovah, and in Hebrews, vii. 3, of the kingly priesthood of Jesus. The chapter in Genesis containing his story stands alone in character in the Pentateuch, and according to most scholars is one of its latest portions. Shalem may be an archaic name for Jerusalem, of whose dynasty or hierarchy Melchizedek, to judge from the Psalm, was the ideal founder. He is said to be 'without father and without mother,' an indication that he was thought to be of mysterious origin.

Melcombe Regis. See WEYMOUTH.

Melagnano, formerly MARIGNANO, a town 12 miles SE. of Milan; pop. 7000. Here Francis I. of France defeated the Swiss in 1515, and the French routed the Austrian rear-guard in 1859.

Melfi, a town of Southern Italy, 30 miles N. of Potenza. The once magnificent cathedral (1155) was ruined by earthquake in 1851. Melfi was the Norman capital of Apulia. Pop. 13,000.

Meliaceæ, a pronouncedly tropical family of dicotyledons, represented in Europe only by the

cultivated *Melia Azederach*, but distributed in 42 genera and about 660 species in the tropics, extending however, with one species to New Zealand, whilst *Toona sinensis* has been found near Peking. The family comprises chiefly trees, many of which supply useful kinds of wood, e.g. mahogany and the so-called cedar-wood for cigar-boxes. Several furnish useful oils and fats.

Melilla, a town, formerly a convict station, on the coast of Spanish Morocco, 8 miles SE. of Cape Tres Forcas, figured in the troubles with the Berbers of the Riff in 1893 and since. It has been held by Spain since 1496. Pop. 42,000.

Melilot (*Melilotus*), a genus of clover-like plants of the Leguminosæ. The Common Melilot (*M. officinalis*), a yellow-flowered annual, common in Britain, has when in flower a peculiar sweet odour like Tonka Bean, which increases in drying. The flowers and seeds are the chief ingredients in flavouring the Schabzieger cheese of the canton of Glarus; as are also those of the Blue Melilot (*Trigonella cœrulea*), a native of the north of Africa, with short racemes of blue flowers, cultivated in Switzerland, Tyrol, and elsewhere. It has the peculiar melilot odour in a high degree. The name Bokhara Clover has been given to one or more species of melilot. The melilots as fodder-crops are useful where the soil is dry or poor. They furnish also Coumarin (q.v.) and fibre.

Melinite, an explosive obtained from Picric Acid (q.v.), itself a powerful explosive, by the admixture apparently of gun-cotton and other substances in proportions not made known. It was introduced for French artillery purposes (for shells) by General Boulanger in 1886. The name, earlier applied to a yellow clay, is from Greek *melinos*, 'quince-yellow' (*mélon*, 'a quince'). Lyddite (q.v.) is similar, but safer.

Meliphagidæ. See HONEY-EATER.

Melkart. See BAAL.

Mellifont Abbey, a ruin standing 4 miles NW. of Drogheda, was the first Cistercian foundation in Ireland. It was founded by St Malachy (see MALACHY) in 1142. In 1539, when it surrendered to Henry VIII.'s commissioners, it had 140 monks. Its remains were excavated during 1884-85.

Melo, the capital of Cerro Largo in Uruguay, on the Tacuari, here crossed by a stone bridge, 'built in 1865 by a Frenchman who was murdered for collecting toll' (Mulhall); pop. 12,000.

Melodeon, an instrument of the type of the Harmonium (q.v.), superseded by the American organ. The name is also applied to the Accordion (q.v.).

Melodrama (Gr. *melos*, 'a song,' and *drama*) strictly denotes a half-musical drama, or that kind of dramatic performance in which declamation is interrupted or accompanied by instrumental music. The name, however, which was first applied to the *opera* by its inventor, Ottavio Rinuccini, has come to designate a romantic play, depending mainly on sensational incidents, thrilling situations, a dénouement in accordance with the demands of poetic justice; and there are other appeals, more or less crude, to sentiment. Great sums are spent in the staging of such pieces, and the costumes, scenery, and mechanical effects are often very striking. The expression 'transpontine drama' refers to a time when such plays were identified with houses on the Surrey side of the Thames; later homes of melodrama in London have been Drury Lane, the Adelphi, the Lyceum, &c.

Melon (*Cucumis Melo*), a plant of the same genus with the Cucumber (q.v.), much cultivated for its fruit, which is sweet, with a delicious though

peculiar flavour and smell. The melon is an annual, with trailing or climbing stems, lateral tendrils, rounded angular leaves, small, yellow, monœcious flowers, and large round or somewhat ovate fruit. It is supposed to be a native of the subtropical parts of Asia, although it has never been discovered in a wild state. Its English name was originally *Musk Melon*. The varieties in cultivation are very numerous, some of them distinguished by a thick and warty rind, some by a rind cracked in a net-like manner, some by ribs and furrows, some by a perfectly smooth and thin rind; they differ also in the colour of the *flesh* of the fruit, which is green, red, yellow, &c.; and in the size of the fruit, which varies from 3 or 4 inches to a foot or more in diameter. The melon is eaten either by itself or with sugar, and sometimes with pepper or ginger. Its cultivation in hotbeds and in specially constructed hothouses is extensively carried on in all parts of Britain, and very great care is bestowed on it. A loamy soil is best suited to it. The *setting* of the fruit by dusting the female flower with the pollen of the male flower is constantly practised by gardeners. Warmth and bright sunshine are requisite to the production of fruit of good quality.—The Water Melon or Citrul (*Citrullus vulgaris*), rarely cultivated in Britain, is highly esteemed and much cultivated in almost all warm countries. It is a native of the warm parts of the Old World. It has deeply lobed and gashed leaves, and a large round fruit with smooth dark-green spotted rind, and pink or white flesh, less sweet than the melon, but much more juicy or watery, and therefore much prized in many warm countries. In the United States it is only the water melon that is ever called simply melon; for the other the old English name is retained where 'cantaloupe' is not used. In South Carolina the water melon has reached 45 lb.—South Africa has a variety of Water Melon (var. *Caffrorum*) very valuable to the inhabitants.—The Chate (*Cucumis Melo*, var. *Chate*) is a native of Egypt and Arabia.—The Kaukoor (another variety) is a native of India, and much cultivated in some parts of that country; it has oval fruit, smooth, variegated with different shades of yellow, and about 6 inches long, with much the flavour of the melon. The fruit will keep for several months, and is much used both raw and in curries. The half-grown fruit is pickled. The seeds contain much farina and oil, and are ground into meal; the oil is also expressed, and used both for food and in lamps. The seeds of others of this genus may be used in the same way; and they are said to be useful as a diuretic medicine.

Melos (Ital. *Milo*), a Greek island, the most south-westerly of the Cyclades, 13 miles long by 8 broad, with 5000 inhabitants. The island is volcanic, and produces sulphur, salt, pumice-stone, stucco, millstones, and a little oil and wine. Amongst the ruins of the ancient city of Melos, and near its theatre, was found the priceless antique, the Venus de Milo, now one of the chiefest treasures of the Louvre (see VENUS). A Bronze Age town at Phylakopi, on the E. coast, has been excavated since 1896. See Sir Cecil Smith and others, *Phylakopi* (1904).

Melpom'ene ('the singing one'), one of the nine Muses, the representative of Tragedy.

Melrose, a pleasant little town of Roxburghshire, on the south bank of the Tweed, and at the north base of the triple Eildons (q.v.), 37 miles SSE. of Edinburgh by rail. At Old Melrose, 2½ miles further east, was founded about 635 the Columban monastery, of which St Cuthbert (q.v.) became a monk. It was burned by Kenneth MacAlpine in 839, and had been quite deserted

for upwards of fifty years, when in 1136 the great Cistercian abbey of Melrose itself was founded by David I. In the 13th century the possessions of the abbey increased, and finer buildings took the place of the early structures. A new chapter-house was erected about 1240. In 1322, and again in 1385, the abbey was plundered by English invaders, and during the 15th century it was slowly rebuilt on a scale of increased magnificence; work was still in progress upon it as late as 1505. The church was damaged and its monuments defaced by the English in 1544, while in the following year the monastery was burnt in Hertford's invasion. Neglect and the stripping of the lead from the roofs completed its destruction. In 1618 the monks' choir was re-roofed and occupied by the Reformed Church as a parish kirk. The abbey was beyond doubt the most beautiful structure of which Scotland could boast in the middle ages. What now remains is the ruined conventual church, 215 feet long by 116 across the transepts. Excavations have further revealed the foundations of the buildings surrounding the cloister: the 13th-century chapter-house, the refectory with its circular lavatory, and the cellarer's range with an enclosed courtyard on the west. The carvings and traceries, hewn in a stone of singular excellence, are scarcely surpassed by any in England. Melrose shines in Scott's pages with a splendour its published history fails to sustain. The second abbot, St Waltheof, the royal founder's stepson; Alexander II. and Johanna, his queen; the heart



Melrose Abbey.

of Robert Bruce; the good Sir James, the Knight of Liddesdale, the hero of Otterburn, and others of the Douglas line; the 'wondrous Michael Scott'; and Sir David Brewster—all these are buried here; else, the annals of Melrose have little to record. A burgh of barony since 1609, a police burgh since 1895, the town possesses a market-cross (1642), a suspension foot-bridge over the Tweed (1826), a hydropathic (1871), and half-a-dozen hotels, it being a great tourist centre, as well for its abbey as from the vicinity of Abbotsford, Dryburgh, &c. Pop. (1841) 893; (1921) 2155. At Newstead, 1 mile E., a Roman fort, Trimontium, has yielded finds of supreme importance.

The *Chronica de Mailros*, 731–1275, and the *Liber S. Marie de Melros* were printed by the Bannatyne Club, 1837; and *Selections from the Records of the Regality of Melrose*, ed. C. S. Romanes, by the Scottish History Society, 1914–17. See Scott's *Abbot and Lay of the Last Minstrel*; works by Wade (1861) and Pinches (1879); and for Trimontium, Curle's *Roman Frontier Post* (1911).

Melting-point. The following are some of the most important melting-points, which may also be regarded as the freezing-points of the corresponding liquids:

	Cent.	Fah.		Cent.	Fah.
Alcohol, pure	–130	–202	Sulphur.....	115	239
Hydrobromic acid...	–120	–184	Lithium.....	180	356
Strongest sulphuric acid.....	–116	–177	Solder.....about	180	356
Sulphuretted hydrogen....	–85	–121	Tin.....	228	442
Ammonia.....	–75	–103	Bismuth.....	267	513
Sulphurous acid.....	–75	–103	Lead.....	334	633
Chlorine.....	–75	–103	Antimony.....	430	806
Carbonic ac.....	70	94	Zinc.....	450	842
Chloroform.....	70	94	Magnesium.....about	750	1382
Mercury.....	39.38	38.88	Bronze.....	900	1652
Olive and linseed oil.	20	4	Silver.....	1000	1832
Bromine.....	7.3	19.86	Brass.....	1015	1860
Ice.....	0	32	Copper.....	1100	2012
Glacial acetic acid.....	17	62.6	Iron, white cast.....	1100	2012
Phosphorus.....	44.2	111	Iron, gray cast.....	1225	2237
Potassium.....	62.5	144.5	Gold, pure.....	1250	2282
Sodium.....	95.6	204	Steel.....	1350	2462
Iodine.....	113	235	Soft iron.....	1550	2822
			Manganese.....	1600	2912
			Platinum.....	1800	3272
			Iridium.....	1950	3542
			Osmium.....	2500	4532

Melting-points beyond about 900° or 1000° F. are merely approximate and relative.

Melton-Mowbray, a town of Leicestershire, in the centre of a great hunting district, is seated on the river Eye near its junction with the Wreak, 15 miles NE. of Leicester, and 104 NNW. of London. It has a fine cruciform church, mainly Early English, and is famous for its manufactures of pork pies and Stilton cheese, chiefly for retail in the London, Manchester, and Leeds markets. Near the town in February 1644 a severe engagement took place between parties of royalist and parliamentary troops, resulting in the defeat of the latter; and amongst its natives have been Archbishop de Melton, who lies buried in the church, and 'Orator' Henley. Pop. 9000.

Melun, the capital of the French department of Seine-et-Marne, on the Seine, near the Forest of Fontainebleau, 28 miles SE. of Paris. It has two interesting churches, and manufactures of leather, pottery, &c. Melun, the *Melodrumum* of Cæsar, fell into the hands of the English after a six months' siege in 1420, and was held by them for ten years. Pop. 15,000.

Melusine, or MELUSINA, the name of a fairy lady, who figures prominently in the celebrated mediæval French romance so called, the *motif* of which is similar to that of the legend of Eros (Cupid) and Psyche, is of far-reaching antiquity, and has many parallels and analogues in the legends and popular fictions of most countries, Asiatic as well as European. Briefly stated, Melusine consents to marry a knight called Raymondin, or Raymond, on the condition that he should never see her on a certain day every week. She bears him eight sons, the warlike exploits of seven of whom occupy the greater portion of this entertaining romance. At length Raymond is induced by his brother to break his promise, and on the usual day of Melusine's seclusion he discovers her in a bath, the lower part of her body being like a great serpent. Soon after this Raymond, enraged at the cruelty of one of his sons, upbraids the innocent Melusine as 'a false serpent,' whose offspring could never come to any permanent good. Melusine

forgives him, but her doom cannot be averted, and, after a touching scene, she takes her flight through the window in the likeness of a monstrous dragon; and in this form she afterwards appeared hovering near the castle of Lusignan—erected by her own fairy power for her beloved lord Raymond—when ever one of her descendants was about to die, thus acting the part of the Irish *Banshee*.

In the myth of Cupid and Psyche the mortal maiden is not to behold her celestial spouse; but, invited by her envious sisters, she takes a lighted lamp to look upon him one night as he lies asleep, and, in her agitation at beholding his marvellous beauty, a drop of oil from the lamp falls on him, whereupon he and the splendid palace vanish, and Psyche finds herself on a desolate heath. She is reunited to him, however, after performing a number of seemingly impossible tasks by order of her vindictive mother-in-law, Venus. This myth has deeply penetrated European folklore.

One of the oldest legends of this class is the Hindu myth of Urvashi and Pururavas, the condition which the celestial nymph imposes on her husband being that she is not to see him naked.

Such conditions occur frequently in the fairy tales of almost every people (see also LOHENGRIN); and it may be added that tales of forbidden chambers, familiar to readers of the *Arabian Nights*, of which many examples are current in Europe, are closely allied to legends of the Urvashi and Pururavas, Eros and Psyche, and Melusina cycle.

See Max-Müller's *Chips from a German Workshop*, vol. ii.; Baring-Gould's *Curious Myths of the Middle Ages*; Cox's *Mythology of the Aryan Nations* (1870); Grimm's *Teutonic Mythology* (trans. Stallybrass); Clouston's *Popular Tales and Fictions* (1887), and *Group of Eastern Romances and Stories* (1889); Baudot's *Les princesses Yolande et les ducs de Bar*, pt. i. (1900); the old English version of John of Arras's 14th-century French prose romance of *Melusine*, from a unique MS. of the 15th century (E.E.T.S. 1895, with appendix on the Cupid and Psyche and Melusina cycle of legends); and that of La Coudrette's verse romance (E.E.T.S. 1899).

Melville, the name of an island, a sound, and a peninsula in the polar regions of North America. The *island* is crossed by 75° N. lat. and 110° W. long., and is separated on the west by Fitzwilliam Strait from Prince Patrick Island. Greatest length, 200 miles; greatest breadth, 130 miles. In 1819 Parry, who gave the island its name, passed the winter here with his crews. Stefánsson found coal. The *sound*, about 250 miles long by 200 broad, extends south-east of the island, and communicates with the Arctic Ocean on the west by Banks Strait, and with Baffin Bay on the east by Barrow Strait and Lancaster Sound. The *peninsula* projects from the continent at its north-eastern corner, and has on the N. the Fury and Hecla Strait, and on the E. Fox Channel. It is 250 miles in length by about 100 in average breadth.—Another Melville Island lies across the entrance to Van Diemen Gulf off the shore of the Northern Territory of Australia. Area, 143 sq. m. It is hilly and covered with vegetation. The earliest British settlement on this coast was made here in 1824.

Melville, ANDREW, a champion of Scottish Presbyterianism, was born 1st August 1545 at Baldowie, near Montrose. He was educated at Montrose, at St Andrews, where he earned a reputation for his learning, and at Paris. In his twenty-first year he was chosen regent in the college of St Marceon, Poitiers, and in 1568, through the influence of Beza, was appointed professor of Humanity in the Academy, Geneva. On his return to Scotland (1574) he was appointed Principal of the college of Glasgow, where he did the highest service to the cause of learning. He had a very important share in drawing up that charter of the

Presbyterian polity, the Second Book of Discipline (see DISCIPLINE). In 1580 Melville was chosen Principal of St Mary's College, St Andrews. Here, 'besides giving lectures on theology, he taught the Hebrew, Chaldee, Syriac, and Rabbinical languages.' In 1582 he preached the opening sermon before the General Assembly and boldly inveighed against absolute authority. Two years later Melville was summoned before the Privy-council on account of a sermon preached at St Andrews; and to escape imprisonment he removed to London; but on the downfall of Arran (1585) he returned, and in 1586 resumed his office at St Andrews. He was repeatedly elected moderator of the General Assembly, and was made rector of St Andrews in 1590. At Cupar in 1596 Melville headed a deputation to 'remonstrate' with the king; and when James reminded the zealous remonstrant that he was *his* vassal, 'Sirrah!' retorted Melville, 'ye are God's silly vassal.' In 1606 Melville, with seven other ministers, was called to England to confer with the king. Having ridiculed the service in the Chapel Royal in a Latin epigram, he was summoned before the English Privy-council, when he broke out into a torrent of invective; thereupon he was sent to the Tower, where he remained for more than four years. In 1611 he was released through the Duke of Bouillon, who wanted his services as a professor in his university at Sedan. Melville, now in his sixty-sixth year, would fain have returned to Scotland, but James would not listen to his request. He died about 1622, but neither the date of his death nor the events of his last years are ascertained. See *Lives* by M'Crie (2 vols. 1819) and W. Morison (1899).

Melville, HERMAN, American author, was born in New York, 1st August 1819. His higher education was limited. Having farmed for a time, in 1837 he shipped before the mast to Liverpool, and returning to the United States was a school teacher from 1837 to 1840. In 1841 he sailed to the Pacific on a whaler, but at Nukahiva, in the Marquesas, he and a companion deserted on account of ill-treatment by their captain, and were held in 'indulgent captivity' by the savages of the Typee (Taipi) valley. At the end of four months Melville was rescued by an Australian whaler—his companion had earlier escaped—and after various wanderings returned in 1844 to the United States to devote himself to literature, though from 1866 to 1885 he held a post in the customs-house of New York. In 1846 he published *Typee*, his first work, a spirited narrative of his chances in the Marquesas, and in 1847 *Omoo* (Polynesian for 'rover'), a continuation of his adventures in Oceania; both these autobiographical romances enjoyed in their day a great vogue. *Mardi*, of 1849, was a much inferior work. *Redburn*, also of 1849, was based on the author's early voyage to Liverpool; while *White Jacket* (1850), an account of life on a man-of-war, helped in the abolition of flogging in the United States navy. In 1851 appeared *Moby Dick*, a tale of whaling, and Melville's best and most memorable work; here is a strange mingling of speculation and experience, and the story has been ranked among the greatest sea romances of the world. Thereafter, however, Melville's powers showed remarkable decline. *Pierre* (1852), *Israel Potter* (1855), *The Piazza Tales* (1856), *The Confidence Man* (1857), are no more than disappointments of earlier promise; while the verses to which in his later years he solely devoted himself are only rarely happy. He died at New York, 28th September 1891. There is an edition of Melville's collected works (London, 16 vols. 1922-24); and see a *Life* by Weaver (1922), and *Some Personal Letters of Herman Melville, and a bibliography* (1923) by Minnigerode.

Melville, JAMES (1556-1614), nephew of Andrew Melville, was born near Montrose. Educated at St Andrews, he became successively regent or tutor in the college of Glasgow, professor of Oriental Languages in the university of St Andrews, and minister in 1586 of Kilrenny, Fife, whence he was ejected in 1606. He is mainly remembered for his so-called *Diary*, extending from 1556 to 1601. Though Melville here sees all persons and events from his own point of view as a Presbyterian minister, his record is, nevertheless, of real interest and importance. There are editions in the Bannatyne Club (1829) and Wodrow Society (1842).

Melville, SIR JAMES, of Halhill, born in 1535, was sent as page of honour to the young Queen Mary in France, and subsequently undertook numerous missions to the court of England and of the Elector Palatine. He died 1st November 1617, leaving interesting Memoirs, of which the standard edition is that of the Bannatyne Club (1827).

Melville, VISCOUNT. See DUNDAS.

Melville, WHYTE. See WHYTE-MELVILLE.

Membrane, in Anatomy, is a term applied to designate those textures of the animal body which are arranged in the form of laminae, and cover organs, or line the interior of cavities, or take part in the formation of the walls of canals or tubes. The structure and special uses of some of the most important of the animal membranes are noticed in separate articles, such as the Mucous Membrane (see DIGESTION), Serous Membranes (q.v.), &c.; and the membranes in which the fœtus is enclosed are described in the article Placenta.

Memel, or KLAIPEDA, a Prussian seaport and fortress detached from Germany by the Treaty of Versailles (1919) along with the country north of the Niemen and its Skierwieth mouth and a portion of the Kurische Nehrung, and given conditionally to Lithuania in 1923, lies at the northern extremity of the Kurisches Haff, at its opening into the Baltic, 70 miles NNE. of Danzig. It has a large harbour, and exports timber, flax and linseed, manure, grain. The imports include the exports in transit, herrings for Lithuania, and textiles, provisions, and wine and spirits for local use. The town possesses manufactories of brandy, cellulose, soap, and chemicals, sawmills, iron-foundries, breweries, and ship-building-yards. There is a good school of navigation. Pop. 40,000. Memel was founded in 1252 by the Livonian order, who gave it to the Teutonic Knights, by whom it was fortified in 1404. It suffered severely in the Lithuanian wars (13th to 15th centuries). Here in 1807 Frederick-William III. of Prussia took refuge, and a treaty with England was signed. Having been almost wholly destroyed by fire in 1854, it was rebuilt in modern style. For the river Memel, see NIEMEN.

Memlinc, or less correctly MEMLING, HANS, Flemish painter, was born of Dutch parents at Mainz in the first half of the 15th century, and died at Bruges, where most of his life was spent, on 11th August 1494. His painting gained him a wide reputation, extending even to England and Italy. His principal works are religious, such as 'The Last Judgment' (at Danzig), 'Seven Sorrows and Seven Joys of the Virgin', 'Marriage of St Catharine', 'Adoration', several Madonnas, and the fourteen small paintings that adorn the shrine containing St Ursula's relics at Bruges; but he painted also portraits, as of Sir John Donne, of Burgomaster Moreel, and of Moreel's daughter. See Lives by Weale (1871 and 1901), Michiels (French, 1883), Kaemmerer (German, 1899).

Memmingen, an old town of Bavaria, 33 miles SSE. of Ulm, played a prominent part in the

religious wars of the 16th century. Here Moreau defeated the Austrians under Kray, 9th and 10th May 1800. Linen, cloth, &c., are manufactured. Pop. 13,000.

Memnon, a hero of Greek mythology, son of Tithonus and Eös (the Dawn), who led to Troy a host of Ethiopians to aid his step-uncle Priam after the death of Hector, slew Antilochus, Nestor's son, in single combat, and was himself slain by Achilles. Various legends are told of his supposed rule at Susa, where he was said to have built the acropolis, and of his vassalage to the Assyrian Tentamus. His corpse was removed from the battlefield by Eös, whose early tears for her son are by mortals called dewdrops, and his followers the Memnonides were turned into birds. Memnon is chiefly a post-Homeric hero, and attained his greatest celebrity in very late times, when the Greeks discovered the two famous colossal statues of Amenoph III. standing in front of his now vanished temple on the left bank of the Nile at Thebes, and regardless of history dubbed the eastern one Memnon. It is an imposing throned figure, originally about 60 feet high, carved in breccia, but broken in ancient times and repaired with sandstone blocks. Its special peculiarity, which procured it the name of the 'Vocal Memnon' and the honour of forming one of the seven wonders of the world, was the property of emitting a metallic sound, like the snapping of a chord, especially about sunrise, whence the imaginative Greeks concluded that it was the voice of Memnon hailing his newly-risen mother the Dawn. Considerable difference of opinion has prevailed as to the real cause of this phenomenon, which has been variously ascribed to the artifice of the priests, who struck the sonorous stone of which the statue is composed, to the passage of light draughts of air through the cracks, and to the sudden expansion of aqueous particles under the influence of the sun's rays. This remarkable quality of the statue is first mentioned by Strabo, who visited it in company of Ælius Gallus about 18 B.C.; and upwards of a hundred inscriptions of Greek and Roman visitors incised upon its legs record the visits of ancient travellers to hearken to Memnon when he

Softly sings beneath the Libyan hills,
Where spreading Nile parts hundred-gated Thebes,

from the ninth year of Nero, 63 A.D., to the reign of the Emperor Severus, when it became silent. Amongst visitors whose names are recorded are the Emperor Hadrian and his wife Sabina. Septimius Severus also visited the statue, and is believed to have restored it in its present shape; for Juvenal mentions it as broken in half (*dimidio magicæ resonant ubi Memnone chordæ*), and no notice of it occurs under the Pharaohs or Ptolemies (see *Edinburgh Review*, July 1886).—The name of Memnoneum was given to the sepulchral quarter of Thebes, and there were Memnonea at Abydos.—Besides the mythical Memnon two historical personages of this name are known—one a Rhodian commander of the mercenaries of Artabazus in the war against Artaxerxes-Ochus, who subsequently fled to Macedon, and afterwards entering the Persian service defended Persia against Alexander (336 B.C.), and finally died at the siege of Mitylene (333 B.C.); the other a Greek historian, who wrote a history of Heracleia Pontica in 16 books, which have been epitomised by Photius.

Memoirs. See BIOGRAPHY.

Memory. See MNEMONICS, PSYCHOLOGY.

Memory, DISEASES OF. Memory is the power of reproducing mental or sensory images. We owe to the writings of such men as Bergson and Freud our knowledge of the fact that forgetting is an active and not a passive process in ordinary mental life,

for consciousness rigidly suppresses all images that do not bear upon the actual interest of the present. Yet such images may be stored in the subconscious, and may in certain circumstances be resuscitated. Memory is affected in most kinds of mental derangement, in some forms of cerebral disease, and in certain bodily illnesses, but is in a most signal manner obliterated or enfeebled in *Dementia*. There are, however, examples of memory surviving all other faculties, and preserving a clear and extensive notion of long and complicated series of events amid general darkness and ruin of mind. There are, however, special affections of the faculty. It may be suspended while the intelligence remains intact. Periods of personal or general history may elude the grasp, and even that continuity of impressions which goes far to constitute the feeling of personal identity is broken up, and a duality or multiplicity of experiences may appear to be conjoined. The converse of this may happen, and impressions that had completely faded away may, under excitement or cerebral disease, return. There are, besides, states in which this power is partially affected, as in the instances where the numbers 5 and 7 were lost, and where a highly-educated man could not retain any conception of the letter F; secondly, where it is perverted, recalling images inappropriately and in an erroneous sequence of order or time, and different from what are desired; and thirdly, where, while the written or printed signs of ideas can be used, the oral or articulate signs are forgotten. Such examples of diseased memory are now classified as *amnesia*, simple loss of memory; *amnesic aphasia*, loss of memory of spoken words (see *APHASIA*); and *amnesic agraphia*, loss of memory of written words. Most of these special deviations from health depend upon morbid changes in limited portions of the brain. The discovery of this fact by Broca was the first of the brilliant discoveries as to the localisation of function in the brain cortex. See Ribot, *Les Maladies de la Mémoire* (1881); Bergson, *Matière et Mémoire*; Freud, *The Psychopathology of Everyday Life*.

Memphis, a celebrated Egyptian city, situated at the apex of the Delta, or Lower Egypt, the ancient capital of the country, called by the Egyptians *Men nefer*, or 'the Good Station,' by the Hebrews *Moph*, and by the Arabs *Memf*. It was founded by Menes, the first monarch of the 1st dynasty, who, according to Herodotus, changed the bed of the Nile, and made an embankment 100 stadia above Memphis to protect the new city against inundations, the remains of which still exist about 14 miles above Mitrahenny, the centre of old Memphis, and the site of the temple of Ptah. Menes fortified the city, and laid the foundations of the temple. The site was well chosen; protected alike by the Libyan and Arabian chains of mountains against the river and the incursions of the sand, defending the approach of the country from the incursions of Asiatic nomads, and communicating with the Red Sea and the Mediterranean. The city, which at one time had a circumference of 150 stadia, was composed of two portions—one built of crude bricks, the other, on which was the citadel, of calcareous stone. The palace, built by Menes, was enlarged by his son Athothis, and was always inhabited either by a monarch or by his viceroy. After the 6th dynasty the city declined in importance, and was apparently held by the Hyksos after the 13th and before the 18th (1500 B.C.). At this period Memphis was ruled by a viceroy, a prince of the blood, and still remained a religious capital. It rose again to great importance under the Saïte monarchs, about 600 B.C., who restored it; and it was conquered by Senacherib. Its temples were magnificent, and comprised the Iseum, a large temple of Isis, completed

by Amasis II. just prior to Cambyzes (525 B.C.); a temple dedicated to Proteus, in the foreign quarter; the temple of the Apis, having a peristyle and court ornamented with figures, opposite the south propyleum of the temple of Ptah, where the sacred bull resided; the Serapeum, or temple of Serapis, discovered by M. Mariette; the Nilotometer; a temple of Ra; and the shrine of the Cabiri. Here were the statues of Rameses II., one of which is known as 'the fallen colossus,' at Mitrahenny. Still more remarkable was the great necropolis of the city, in the centre of which towered the pyramids (see *PYRAMIDS*). During the attempts of the native rulers to throw off the Persian rule, Memphis was an important strategic point. Ochus inflicted severe injury on this town, having plundered the temples and thrown down the walls after he had driven out Nectanebes. Alexander the Great here worshipped the Apis, and his corpse was brought to this city by Ptolemy before it was finally transferred to Alexandria. The first Ptolemies were crowned in the Serapeum. Ptolemy VIII. destroyed the city, and it fell with the rest of Egypt under the Roman rule, and afterwards was conquered by 'Amr ibn el-Asi (640 A.D.). Its ruins, which served as quarries for later buildings, were large and important in the 13th century, when they were seen by Abd-ul-Latif; but little is now to be seen beyond deeply-buried walls. See works cited at *EGYPT*.

Memphis, a city and port of entry of Tennessee, stands on a high bluff on the east bank of the Mississippi River, 826 miles above New Orleans, and 230 miles by rail WSW. of Nashville. The river to this point is navigable for the largest sea-going vessels, and the place is important as a railway centre; the trade of Memphis is accordingly very large. It is a handsome town, with wide, regular streets, and great warehouses bordering the esplanade that extends along the bluff. The public buildings include a custom-house, cotton exchange, a large hospital, a Roman Catholic college, and numerous churches. Memphis is one of the first cotton marts in the United States, and has numerous manufactories. The city was visited by fearful epidemics of yellow fever in 1878 and 1879, and since then its drainage has been reconstructed. A great steel cantilever railway bridge across the Mississippi was opened in 1892; it has five spans, and a total length of 1886 feet. Pop. (1850) 8841; (1870) 40,226; (1880) 33,592; (1900) 102,320; (1920) 162,351.

Menado. See *CELEBES*.

Ménage, GILLES, a French writer, born at Angers in 1613, gave up the bar for the church, but chiefly spent his time in literary pursuits. He founded, in opposition to the Academy, a salon, the Mercuriales, which gained him a European reputation, and as the pedant Vadius in *Les Femmes Savantes* the ridicule of Molière. His *Dictionnaire Étymologique de la Langue Française* (1650; best ed. by Jault, 2 vols. 1750) and his *Origini della Lingua Italiana* (1669) are erudite works, but contain many fanciful etymologies. He died in 1692. See *Life* by Baret (Paris, 1859).

Menai Strait, a channel between Carnarvonshire and the island of Anglesey, running east-north-east from its southern extremity to Bangor, a distance of 14 miles, where it widens out into Beaumaris Bay. Its width varies from about 200 yards to 2 miles, whilst the scenery on both sides is very picturesque. The navigation is hazardous, but for the sake of expedition vessels under 100 tons, and occasionally some of larger size, pass through the strait. At its entrance the tides sometimes rise to a height of 30 feet; ordinary neap-tides, however, do not rise more than from 12 to

15½ feet. Since 1825 access to Anglesey has been afforded by a suspension bridge, and since 1850 by the Britannia Bridge. See **BRIDGE**.

Menam, the principal river of Siam (q.v.).

Menander, the most famous Greek poet of the New Comedy, was born at Athens in 342 B.C., and was drowned at the Piræus in 291. He was the friend, if not the pupil, of Theophrastus, and the intimate of Epicurus. He wrote over a hundred comedies, of which, however, only eight gained the prize, his work, it would seem, appealing more to cultivated than to popular audiences; but posthumously he enjoyed an enormous reputation in antiquity. He was praised by Plutarch and Quintilian, and was frequently adapted and imitated, most notably by Terence and Plautus. Many of his moral maxims have become proverbial, as 'Whom the gods love die young,' 'Évil communications corrupt good manners' (from the *Thais*, quoted in 1 Cor. xv. 33). His work survives only in fragments, mostly discovered since the end of the 19th century. In 1897 Professor Nicole published 87 lines, newly recovered, of the *Georgos* (see the English edition by Grenfell and Hunt, 1898), and in 1907 Lefebvre published seventeen fragments, comprising 1328 lines of four different plays—*The Hero*, *The Arbitration*, *The Woman with her Hair Shorn*, *The Woman of Samos*—discovered by him in 1906 at Kôm-Ishkaou in Middle Egypt (see the English version and notes by 'Unus Multorum,' 1909). From the surviving work of Menander the reason for his great reputation in ancient times is not at once apparent. A text of the principal fragments with translation by F. G. Allinson (1921) is in the Loeb series.

Ménard, LOUIS NICOLAS, chemist, poet and prose writer, philosopher, painter, historian, was born at Paris in 1822. In 1846 he discovered collodion. Always a socialist and in advance of the reform movements of his time, he found himself after the revolution of 1848 a political exile in London and in Brussels. Returning, however, in 1852 to Paris, and devoting himself to classical studies, he wrote as a Parnassian a volume of *Poèmes* (1885) containing some fine pieces, and produced among other works *Le Polythéisme hellénique* (1863), a book of high literary and philosophic value. Thereafter for some ten years he took to painting, and exhibited some not inconsiderable work. In literature *Les Réveries d'un païen mystique* (1876), an assortment of prose and verse, was his next work of note, and later he produced in history *Histoire des anciens peuples de l'Orient* (1882), *Histoire des Israélites* (1883), *Histoire des Grecs* (1884-86), &c. *Poèmes et Réveries d'un païen mystique* (1896) consisted of his collected poems and of extracts from his writings in philosophy and in literature. He died at Paris in 1901.

Mencius, the Latin form of MENG-TSE, the name of a Chinese sage, a contemporary of Plato and Aristotle, who was born in the province of Shan-tung in 372 B.C. He was brought up by his mother—the pattern of all mothers ever since in the eyes of the Chinese—and founded a school on the model of that of his great predecessor Confucius, for whom Mencius entertained a feeling of reverent admiration. When forty years of age he led out his disciples and travelled from one princely court to another during more than twenty years, seeking a ruler who would put into practice his system of social and political order. But, finding none, he again withdrew into retirement, and died in 289 B.C. After his death his disciples collected his conversations and exhortations, and published them as the *Book of Meng-tse*. The aim of Mencius's teaching was essentially practical—how men, especially the rulers of men, shall best regu-

late their conduct, both public and private. The philosophic root of his system is belief in the ethical goodness of man's nature, which quality he takes to be the essential characteristic of the humanity of men. From this root grow the cardinal virtues of benevolence, righteousness, moral wisdom, and propriety of conduct. It should be the aim of the individual to perfect himself by practising these virtues in all the relations of his social and political life. The flowering of this goodly plant which Mencius planted for the ordering of the lives of men, both individual and collective, assumed the form of a liberal and enlightened system of political economy. See books by Legge (1875; new ed. 1895) and Faber (trans. 1882).

Mendeans. See **MANDEANS**.

Mendel, GREGOR JOHANN (1822-84), renowned for his discoveries in connection with heredity. He was born at Heinzendorf bei Odrau in Austrian Silesia, the son of a small peasant proprietor. After leaving the 'Gymnasium' he entered the Augustinian cloister in Brunn, and was ordained a priest in 1847. At the expense of the cloister he studied science at the university of Vienna (1851-53), and on his return to Brunn took up teaching in the Realschule. In 1868 he was elected Abbot or Prälat of the Königskloster. It was before this, however, that he had utilised the large cloister garden for his now famous experiments on peas and hawkweeds. He also worked with bees, but there is unfortunately no record of his results. He took much interest in meteorology and sunspots, and was for a time President of the Naturforscherverein in Brunn. His fundamentally important work on heredity was entirely overlooked during his lifetime, and was not recognised at all till its rediscovery and confirmation in 1900 by De Vries, Correns, and Tschermak. During the last ten years of his life he became involved in a protracted quarrel with the government and in racial controversy. See biographical notice in Bateson's *Mendel's Principles of Heredity* (new ed. 1913); and the articles **HEREDITY**, **HYBRID**, **CELL**.

Mendeléeff, DMITRI IVANOVICH (1834-1907), chemist, was born at Tobolsk, studied at St Petersburg, and ultimately became professor of Chemistry in the university of St Petersburg in 1866. He enriched every section of chemical science, but is especially distinguished for his contributions to physical chemistry and chemical philosophy. He almost anticipated Andrews as to the critical temperature; but his great triumph was the discovery and formulation of the Periodic Law of the atomic weights (see **ATOMIC THEORY**). His *Principles of Chemistry* (1868-70) has gone through many editions, and been translated into most European languages, into English in 1891.

Mendelssohn, MOSES, was born 6th September 1729, at Dessau, the son of a poor Jewish schoolmaster called Mendel; and coming to Berlin at thirteen, he contrived, spite of severe privations, to study languages and philosophy. After years of comparative poverty he became the partner of a rich silk-manufacturer, whose children he had educated. The intimate friend of men like Lessing, Sulzer, Nicolai, he, directly and indirectly, contributed in a vast degree to the abolition of the disgraceful laws and brutal prejudices against the Jews. On the other hand, he acted in the most beneficial manner on his own co-religionists, by rousing them from the mental apathy with which they regarded in his day all that had not a distinct reference to religion, and by waging fierce war against their own religious and other prejudices. He died 4th January 1786, and Ramler wrote the following epitaph on him: 'True to the religion of

his forefathers, wise as Socrates, teaching immortality, and becoming immortal like Socrates.' He was the prototype of Lessing's *Nathan*, and was called a 'second Moses.' He was a diligent student of Locke, Shaftesbury, and Pope: a zealous defender of enlightened Monotheism, and, in spite of Lessing, strongly anti-Spinozist. His principal works are a volume on Pope as a philosopher, along with Lessing (1755), on the Sensations (1755), on Evidence in Metaphysics (1763); *Phaedon* (1767), a dialogue on the immortality of the soul in the manner of Plato; *Jerusalem* (1783), a defence of Judaism as a religion; *Morgenstunden*, essays in refutation of Pantheism and Spinozism. His works were edited in 1845 (8 vols.), and again in 1880 (2 vols.). See the *Life* by Kayserling (2d ed. 1887).

Mendelssohn-Bartholdy, FELIX, composer, was born at Hamburg on February 3, 1809. The family name was already remarkable by the fame of his grandfather, Moses Mendelssohn. Abraham, the second son of Moses Mendelssohn, had entered a banking business in Paris, but subsequently, on his marriage with Lea Salomon in 1804, settled in Hamburg. The French occupation in 1811 forced him to escape with his family to Berlin, where he founded the eminent firm of bankers known by his name. He resolved about this time to bring up his children as Protestant Christians, and added the name of Bartholdy to that of Mendelssohn in order to distinguish his own from the Jewish branch of the family.

The education he bestowed on Felix appears to have been as liberal as it was systematic. In his eighth year we find the child studying composition under Zelter and the pianoforte under Ludwig Berger, besides receiving lessons in drawing and the violin. Two years later he made his first public appearance, playing the pianoforte part in a trio at a concert in Berlin. With 1820 began that period of prolific production which lasted almost till his death. At the same time he entered upon a ceaseless round of gaiety and activity which largely determined his character. The home-life of the Mendelssohn family was eminently suited to the musical tendencies of the boy. A concert was given at the house on alternate Sunday mornings, when some of Felix's compositions generally found a place in the programme. Within the next few years he formed the acquaintance of such men as Goethe, Weber, and Moscheles, and had composed his Symphony in C minor and the B minor Quartet. A short visit to Paris with his father in March 1825 did not impress him favourably with the French musicians.

The following August saw the completion of his opera, *Camacho's Wedding*, which was destined to be the beginning of his unpleasant relations with the Berliners; and his well-known Octet for strings was finished in October. With the composition of the *Midsummer Night's Dream* overture, in August 1826, Mendelssohn may be said to have attained his musical majority, and his lessons with Zelter ceased. On April 29, 1827, the opera *Camacho's Wedding* was produced in Berlin. Though received with vehement applause it never reached a second performance, owing, among other reasons, to the illness of one of the principal singers, and the personal criticisms on the work in the press. Soon after this Mendelssohn commenced the formation of a small choir of sixteen voices, which met at his house for the purpose of studying Bach's Passion Music; and, in spite of the difficulties of the work and the determined opposition of Zelter, the scheme culminated in the famous performance by the Singakademie on March 11, 1829, the first since Bach's death. For some reason, however, his success did not improve his relations with Berlin musicians. Accordingly, being now twenty years old, he

resolved to leave home and to visit the different countries of Europe. England, afterwards the land of his most pleasant associations, was his first destination. He arrived in London on April 21, 1829, and was warmly welcomed by the Philharmonic Society. He made his first appearance at one of their concerts, when he conducted his Symphony in C minor. A tour through Scotland in the summer inspired him with the *Hebrides* overture and the Scotch Symphony.

During the next year he visited Munich and Vienna. By October he had reached Venice, and the following winter he spent in Rome. Returning to Munich he proceeded thence to Paris, paying his second visit to London in April 1832. He shortly afterwards returned to Berlin, having been absent three years. His success in conducting the Lower Rhine festival at Düsseldorf in 1833 led to his being offered the entire direction of the music for three years. But his stay at Düsseldorf was full of responsibilities and worries, and in October 1835 he left to conduct the Gewandhaus concerts at Leipzig. In 1837 he married Cecile Jeanrenaud, and at Birmingham in the same year conducted his *St Paul*, first heard at Düsseldorf in 1836. His attention was now chiefly devoted to Leipzig, but September 1840 found him again at Birmingham conducting the *Lobgesang*. About this time Mendelssohn was requisitioned by the king of Prussia to go to Berlin to assist in the foundation of an Academy of Arts; and, though loth to leave Leipzig, he removed to Berlin in May 1841, a stay not exceeding one year having been agreed on. The king's idea of reviving the ancient Greek tragedies led to the composition by Mendelssohn of the music to the *Antigone* and *Edipus*.

In 1843 he had the satisfaction of seeing his favourite scheme carried into effect by the opening of the new music-school at Leipzig, with Schumann and David among his associates. He was in London the following year to conduct the last five concerts of the Philharmonic season; and in 1846 he paid his ninth visit to England for the production of *Elijah*, which took place at Birmingham on 26th August. But his hard work was now beginning to tell on him, for, although his Berlin duties and his position as chief of the Leipzig Conservatorium entailed constant labour and anxiety, he persisted in carrying out all his engagements. He had scarcely returned from his tenth and last visit to England, in May 1847, when the news of his sister Fanny's death reached him. Periods of illness and depression rapidly followed; and on 4th November 1847 he died at Leipzig.

In stature Mendelssohn was short, and his handsome countenance was of a decidedly Jewish cast. He was eminent both as pianist and organist, especially in his rendering of the works of Bach, Mozart, and Beethoven. He moreover possessed a remarkable facility of improvisation. His gifts also included a talent for landscape-drawing; and he left behind him a whole series of sketches illustrating his different journeys. His music dwells almost exclusively on the sunny and gay side of life. Rarely, if ever, does he touch the innermost depths of passion and feeling. But he was, like Handel, one of the few composers who appealed to English audiences; his *Elijah* was long almost as popular as the *Messiah* itself.

See two collections of his Letters (1861 and 1863; trans. by Lady Wallace, 1862-63), those to the Moscheles (1888), and the selection ed. Alexander and Grove (1894); the *Lives* by Benedict (1850), Moscheles (1873), Lampadius (1886), Reissmann (1892), Rockstro (1884; new ed. 1923), Bellaigue (1907), Dahms (1919); *Reminiscences* by Devrient (1869; trans. by N. Macfarren), and Hiller (1874); *Grove's Dictionary*; and Hensel, *Die Familie Mendelssohn* (1879; trans. 1882).

Mendès, CATULLE, French poet and prose writer, was born at Bordeaux of Jewish parentage, 22d May 1841. He was one of the founders of the Parnassian school, and in 1863 (*Philomèle*) and after published various collections of poems all distinguished by their elegance. Displaying at the same time astonishing versatility and fecundity he wrote also numerous erotic novels (*Le Roi vierge*, 1880; *Méphistophéla*, 1890; *La Maison de la vielle*, 1894; *Gog*, 1897; &c.), collections of short stories, and plays (*La Part du roi*, 1872; *Justice*, 1877; *La Femme de Tabarin*, 1887; *Médée*, 1898; *La Reine Fiammette*, 1898; *Scarron*, 1905; *Glatigny*, 1906; &c.), produced several libretti (*Le Capitaine Fracasse*, 1878, music by Pessard; *Le Fils de l'étoile*, 1904, music by Erlanger; *Ariane*, 1906, music by Massenet; &c.), and in addition did valuable work in criticism, as *Richard Wagner* (1886) and *L'Art au théâtre* (3 vols. 1896-1900), a collection of journalistic work in dramatic criticism. On 9th February 1909 his dead body was found in the railway tunnel of Saint Germain. See work in French by A. Bertrand (2d ed. 1908).

Mendicancy. In spite of the stringency of the laws against vagrancy and begging, and the numerous aid societies in every town in Britain for the relief of the poor, quite an army of men, women, and children wander from place to place, and pick up a living by soliciting alms. This class is largely recruited from the lazy, idle, drunken, and vicious, though there is always a certain percentage who are really the victims of misfortune. Though the law is against begging—English statutes for the repression of mendicancy date from the 14th century—there is no law against giving to beggars. But indiscriminate charity only feeds the evil it seeks to remove. The truest charity consists in helping people to help themselves. There are innumerable societies for improving the condition of the poor. The relief given may consist in supplying immediate necessities, helping them to get into hospitals and convalescent homes, to emigrate, or to secure temporary work. Tickets are in some cases supplied to subscribers, which entitle a third person to whom they may be given to one meal. Tickets giving a right to a night's shelter can also be had, to be given instead of money. Nearly all European nations have tried to deal with mendicancy, but generally with little success. In Mohammedan countries alms-giving is a religious obligation, and mendicants abound. See POOR-LAWS, SALVATION ARMY, VAGRANTS.

Mendicant Orders, certain religious associations in the Roman Church, which, carrying out the principle of religious poverty and self-humiliation to its fullest extent, make it a part of their profession to denude themselves of all property, whether real or personal, and to subsist upon alms. In the mendicant orders alms were commonly collected by the lay-brothers—in some, by actual solicitation, in others, by the ringing of the convent bell when the stock of provisions was exhausted. See the articles DOMINICANS, FRANCISCANS, CARMELITES, AUGUSTINIANS; also FRIAR.

Mendip Hills, a range in Somersetshire extending 23 miles south-eastward from Weston-super-Mare to Shepton Mallet and 3 to 6 miles in breadth. The highest point is Black Down (1067 feet). The limestone of the Mendips is pierced by numerous caverns (see CHEDDAR), some of which have yielded prehistoric remains. Lead-mining, carried on from pre-Roman days, is now all but extinct. Calamine-mining, a later industry, is dead.

Mendoza, a western department of the Argentine Republic, with an area of 57,000 sq. m., and

a population of 333,000. The Andes occupy the western portion: Aconcagua (22,427 feet), the highest peak in America, is on the north-west frontier. The rest of the province is pampa land, fertile wherever it can be irrigated by the waters of the Mendoza and other streams, but elsewhere almost worthless. The annual rainfall is only 8 inches. Minerals, especially copper, abound, and are beginning to be worked; petroleum and coal have also been found. Vines flourish, and a large quantity of wine is exported to the other provinces. —The capital, Mendoza, 650 miles by rail W. by N. of Buenos Aires, is on a transcontinental railway, which reached this point in 1884. It is a handsome town, lying among vineyards and gardens, 2320 feet above the sea; its streets have shade-trees and streams of running water, and the alameda is the most beautiful on the continent. An active trade is carried on with Chile. An earthquake in 1861 destroyed Mendoza (founded 1559) and 13,000 of its 14,600 inhabitants; many of the ruins are still visible in the larger city which has been raised on its site. Pop. 60,000.

Mendoza, the name of an illustrious family that throughout Spanish history distinguished itself wherever distinction was to be won, in war, statesmanship, diplomacy, the church, and literature. A descent from the Cid has been claimed for it; but it was of Basque origin, and its progenitors the lords of Biscay some generations before the Cid's time. Of its more notable members the first is Iñigo Lopez de Mendoza, created Marquis of Santillana by John II. of Castile in 1445 for his services on the field of Olmedo and elsewhere. Besides being a gallant soldier, he was a wise statesman and a sturdy patriot, and in himself a proof of the truth of his own saying, that 'the lance never blunted the pen, nor the pen the lance,' for among the poets he stood next to Juan de Mena, and his exquisite little song of the 'Vaquera de la Finojosa' has secured a place for him in every Spanish anthology. He served literature, moreover, by leaving an excellent account of the Provençal, Catalan, and Valencian poets, and he has a further claim to remembrance as the first folklorists and the first collector of popular proverbs 'such as the old women repeat over the fire.' The most famous of his six sons was Pedro, Archbishop of Toledo, commonly called 'The Grand Cardinal,' who was for many years the trusted prime-minister of Ferdinand and Isabella, a man whose integrity and nobleness of character, no less than his commanding abilities, make him a prominent figure in an age by no means poor in great men.

The best known of the name is the marquis's great-grandson, DIEGO HURTADO DE MENDOZA (1503-75), the strong-handed lieutenant to whom Charles V. entrusted the conduct of his Italian policy and the representation of his views at the Council of Trent. He inherited a full measure of his great-grandfather's gifts as a statesman and as a man of letters. Almost as much as his kinsman Garcilaso de la Vega and Juan Boscan he was instrumental in grafting Italian poetry on the Spanish stem, but as a poet he was more national than either of his allies. His largest work is his *War of Granada*, a history of the revolt of the Moriscos in 1568-70 against the oppression of Philip II. It is constructed on Latin models, but a masterpiece of Spanish prose, marked throughout by rare narrative power, and by a generous spirit towards the miserable Moriscos which is rarer still. That work of genius, the first picaresque novel, *Lazarillo de Tormes*, was long ascribed to Hurtado de Mendoza, but the attribution is now commonly rejected, though there is something to be said for Mendoza's claim.

Menelaus, in ancient Greek heroic history, was king of Lacedæmon, the younger brother of Agamemnon, and husband of the famous Helen (q.v.).

Menes. See EGYPT (*Chronology and History*).

Menevian, one of the subdivisions of the Cambrian System (q.v.).

Menger, KARL, generally regarded as the founder of the Austrian school of economics, was born at Neu Sandez, in Galicia, 23d February 1840. Educated at Prague, Vienna, and Cracow, he became in 1873 professor of Economics at Vienna, where, except in 1876-78 when he was private tutor in political economy and statistics to Prince Rudolf of Austria, he continued till his retirement in 1903. In 1900 he was appointed a life member of the Austrian upper house. As an economist Menger owed much to Walras and Jevons. In contrast to the German historical school, which tended to lay stress on facts, he was attracted rather by theory and speculation, and very early became an adherent of the conception of marginal utility, which for him and his followers was fundamental. Throughout his analytical work was brilliant. His principal works are *Grundsätze der Volkswirtschaftslehre* (1871), *Der Übergang zur Goldwährung* (1882), *Die Irrtümer des Historismus* (1884), *Zur Theorie des Kapitals* (1888), *Grundsätze einer Klassifikation der Wirtschaftswissenschaften* (1889), and *Beiträge zur Währungsfrage in Oesterreich-Ungarn* (1892). His collection of works on economics was famous. He died at Vienna, 26th February 1921.

Mengs, ANTON RAPHAEL, painter and writer on art, was born at Aussig, in Bohemia, 12th March 1728. His father, Israel Mengs, was himself a painter, and from him young Raphael received his first instructions in art. At the age of thirteen he went to Rome, where he remained three years. On his return to Dresden in 1744 he was appointed court-painter to the king of Poland and Saxony, but was not prevented from living at Rome, where he became a Catholic and married. In 1754 he became director of the school of painting of the Capitol. On two occasions (1761-70 and 1773-76) he visited Spain, where he produced his most celebrated effort; it represents the Apotheosis of the Emperor Trajan, and is executed on the dome of the grand saloon in the royal palace at Madrid. He died at Rome, 29th June 1779. He was a learned and scholarly painter, but his works, though lofty in their subjects, seldom exhibit more than a correct and cultivated taste. His writings were edited in 1780 (Eng. trans. 1796).

Meng-tse. See MENCIVS.

Menhaden (*Brevoortia tyrannus*), the name, especially in Massachusetts and Rhode Island, of a species of herring or shad, abundant off the eastern coast of the United States. Other local names are Whitefish and Hardhead (in Maine), Bony Fish and Mossbunker (in New York). It is much used for bait and is very rich in oil, while the refuse furnishes valuable manure. Economically it is one of the most important North American fishes. See G. B. Goode's *Natural History of the Menhaden* (Washington, 1879).

Menhir (Breton *men hir*, long stone), a name in archaeology for Standing Stones (q.v.).

Menier, ÉMILE JUSTIN (1826-81), French manufacturer and writer, was born at Paris and died at Noisiel. He established at Noisiel a celebrated chocolate factory, with a branch in London, chemical works at St Denis, and a sugar manufactory at Roze, besides a rubber factory, and in Nicaragua a cocoa plantation. For his workers he instituted philanthropic schemes. A warm advocate of free trade, he expounded his views

in *Économie Rurale* (1875), *L'Avenir Économique* (2 vols. 1875-79), &c.

Menin, a town of Belgium, 7 miles SW. of Courtrai, on the left bank of the Lys, which separates it from France. There are textile and tobacco manufactures. Fortifications of 1685 by Vauban were razed in 1748 by the Treaty of Aix-la-Chapelle. During the Great War the town (captured by the Germans October 1914; recaptured by the British October 1918) and neighbourhood witnessed some of the fiercest fighting. Pop. 20,000.

Meningitis (Gr. *meninx*, 'a membrane') is the term employed in medicine to designate inflammation of the membranes investing the brain and spinal cord, of which in this relation the innermost—the *pia-mater*—is the most important. Far the most frequent form of meningitis in Britain is the tubercular, which for convenience is described under its old name of Hydrocephalus (q.v.); the main symptoms of other forms are similar.

Epidemic cerebro-spinal meningitis, or *Cerebro-spinal fever*.—Outbreaks have occurred from time to time in the 19th and 20th centuries in the northern hemisphere, less frequently in the British Islands than in most of the other countries where qualified observers are found, of an epidemic disease affecting chiefly the membranes of the brain and cord. It usually begins suddenly with fever and violent headache; vomiting, giddiness, stupor, delirium, and other nervous symptoms succeed, the most distinctive of which is a peculiar rigidity of the muscles of the neck and back. The disease is extremely variable in severity; sometimes it is fatal in less than twenty-four hours; sometimes so slight as only to confine the patient to bed for a few weeks. The majority of cases lie between these extremes, improvement in favourable cases beginning after a week or two. Convalescence is often very slow. The disease occurs chiefly in children and young adults. The causal organism is the *Diplococcus meningitidis*, which is believed to gain access to the interior of the head through the nose. A serum which destroys this organism has been much used in treatment of severe cases.

Simple meningitis (i.e. not traceable to tubercle or to the epidemic form) is most often caused by injury, but may result from disease of the skull, pyæmia, and other diseases, especially by infection from a suppurating middle ear. It usually begins, unlike the tubercular form, quite suddenly; and it is an extremely fatal disease; but the outlook is not quite so hopeless in simple meningitis as in the tubercular form. The essentials of treatment are rest and quiet in a darkened room, and little food of the lightest kind. It is often necessary to perform an operation for disease of the ear or other cause of the meningitis.

Meningocele. See ENCEPHALOCLE.

Menippus, a satirist who lived in the first half of the 3d century B.C., was born a Phœnician slave, and became a Cynic philosopher. His works in Greek have perished, and he is known only through the imitations of Marcus Terentius Varro (q.v.), whose own fragments bear the title of *Menippean Satires*.—The name was adopted as title for a famous French collection of political satires in prose and verse, the *Satire Ménippée*, published in 1594 against the Holy League and in favour of religious toleration.

Menispermaceæ, a family of dicotyledons. The type-genus *Menispermum* consists of *M. canadense*, from Atlantic America, popularly called 'moon-seed,' which really is the meaning of the generic name, and *M. dahuricum*, from eastern Asia. Menispermaceæ comprise sixty-three genera, many of which—e.g. *Fibraurea*, *Jatrochiza* (see CALUMBA),

Cissampelos (q.v.), Chondodendron (see PAREIRA-BRAVA), Tinospora, Coscinium, Stephania, Cocculus, Pachygone—furnish pharmaceutical products or dye-stuffs.

Mennonites, a Protestant sect combining some of the distinctive characteristics of the Baptists and the Quakers. Their principal tenet is the administration of baptism only upon confession of faith; consequently they do not baptise infants. They attach more importance to the ordering of the Christian life than to doctrinal points, ranking discipline and rectitude of life before learning and the scientific elaboration of dogmas. They refuse to take oaths, to bear arms, to fill civic and state offices, condemn every kind of revenge and divorce (except for adultery). The church is the community of the saints, which must be kept pure by strict discipline. Grace they hold to be designed for all, and their views of the Lord's Supper fall in with those of Zwingli; in its celebration the rite of feet-washing is retained in most congregations. They have bishops, preachers, and deacons. The first congregation to profess these principles was formed at Zürich in 1525 by three men, Grebel, Manz, and Blaurock. Thence the sect spread rapidly through Switzerland and the south of Germany and Austria, establishing itself in greatest strength at St Gall, Augsburg, and Strasburg. But a bitter persecution, in which 3000 perished, caused many to move into Moravia and into Holland. Contemporaneous with the Zürich congregation and its first years of propagandism was the appearance in Westphalia of the Anabaptists (q.v.), a sect professing some similar views, but guilty of most reprehensible fanatical excesses, in which the Swiss party had no share. After the suppression of the Anabaptists in Münster Menno Simons (1492-1559), who denounced the blasphemous zealots of Westphalia, organised the scattered members and congregations of the more sober-minded throughout Holland and north Germany. His influence became so paramount that his name has been used ever since to designate the sect as a religious body. Dissensions broke out amongst them at a later time both in Switzerland and Holland, chiefly as to the degree of strictness of discipline to be enforced. In 1620 the stricter Ammanite or Upland Mennonites separated from the more tolerant Lowland Mennonites in Switzerland. In Holland the first disruption occurred in 1554; the more liberal section in north Holland were called Waterlanders, though they exchanged the name of Mennonites for Baptist Communities. The advocates of greater strictness showed much want of cohesion. All the Dutch Mennonites were, however, reunited in 1801.

In 1783 Catharine of Russia introduced colonies of German Mennonites into south Russia; others joined them after 1867. But in 1871—at which time they numbered close upon 40,000—the Russian emperor decreed that they should be liable to conscription for the army and should be deprived of certain others of their privileges. This caused many of them to emigrate to the United States, where they settled principally in Minnesota and Kansas; others proceeded to Brazil. But Mennonite refugees from Alsace, the Palatinate, and Holland had already reached America as early as 1683, in which year the first Mennonite church in the United States was organised at Germantown in Pennsylvania. The sect was the first to protest against slavery. Nearly all Mennonites throughout the world are farmers; for culture, integrity, and philanthropic enlightenment they are everywhere highly regarded.

See Bloupet ten Cate, *Geschiedenis der Doopsgezinden* (5 vols. 1839-47); J. A. Starck, *Geschichte der Taufe und*

der Taufgesinnten (1789); N. Browne's *Life of Menno* (Phila. 1853); Smissen, *Kurzgefasste Geschichte der Mennoniten* (Summerfield, Illinois, 1895); Wedel, *Abriß der Geschichte der Mennoniten* (Newton, Kansas, 1900-1904); A. Brons, *Ursprung, Entwicklung, und Schicksale der Mennoniten* (Amsterdam, 1912); and Krehbiel's *Mennonites of North America* (St Louis, 1895).

Menopome (*Cryptobranchus* or *Menopoma alleghaniensis*), a large North American amphibian, in the order Urodela. It is nearly 18 inches in length, entirely aquatic, notable for its voracity and vitality, as is suggested by the popular names



Menopome or Hell-bender (*Cryptobranchus alleghaniensis*).

'hell-bender,' 'alligator,' 'water-dog.' It feeds on worms and fishes, and often takes the bait off the angler's line. It is newt-like in appearance, with one pair of gill-openings persistent. The Giant Salamander of Japan (*C. japonicus*) is an allied species.

Mensheviki. See BOLSHEVIKI.

Menshikov, ALEXANDER DANILOVICH, a Russian field-marshal and minister of state, was born at Moscow about 1660 or 1663. Lefort, the favourite of Peter the Great, saw him selling tarts in the street, took him into his own service, and introduced him to the notice of his imperial master. Rising rapidly in the tsar's favour, he distinguished himself at the siege of Azov, and afterwards accompanied Peter in his travels to Holland and England. On the death of Lefort (1699) he was made chief favourite. During the years (1702-13) of the war with Sweden he played important parts at the siege of Schlüsselburg, at the battles of Kalisch and Pultowa—on the field of Pultowa Peter made him field-marshal—at the capture of Riga, in the occupation of Courland and Pomerania, and at the taking of Stettin. At the capture of Marienburg the woman who afterwards became the wife of Peter (Catharine I.) fell into Menshikov's hands, and was through him introduced to the tsar. Towards the end of Peter's reign Menshikov lost favour owing to his extortions and suspected duplicities. But when Peter died he secured the succession of Catharine, and during her reign and that of her successor, her youthful grandson, Peter II., he governed Russia with almost absolute authority. His ambitious schemes—he was about to marry his daughter to the young tsar—and the dislike of the old nobility led to his overthrow by the Dolgoroukis, who banished him to Siberia (September 1727) and confiscated his immense estates and treasures. He died 2d November 1729.—His great-grandson, ALEXANDER SERGEEVICH, was born in 1789. He served in the campaigns of 1812-15 and rose to the rank of general. In the Turkish campaign of 1828 he took Anapa after a short siege, but before Varna received so severe a wound as to compel his retirement. After his recovery he was made head of the Russian navy, which he raised to a high state of efficiency. In March 1853 he was sent as ambassador to Con-

stantinople, where his overbearing behaviour produced a speedy rupture between the Porte and the tsar, and brought about the Crimean War. In this war he commanded at the battles of Alma and Inkermann, and displayed great energy in defending Sebastopol; but in 1855 he was recalled because of a severe attack of illness. Menshikov was till his death on 2d May 1869 one of the most prominent members of the old Russian party.

Menstruation is the term applied to the discharge of blood which issues every month from the generative organs of the human female during the period in which she is capable of procreation. The first appearance of this discharge, to which the terms *menses* and *catamenia* (each having reference to the monthly period) are indiscriminately applied, is a decided indication of the arrival of the period of commencing womanhood, and is usually accompanied by an enlargement of the mammary glands and other less conspicuous changes. Among Teutonic races menstruation usually commences between the thirteenth and the sixteenth years, and terminates between the fortieth and fiftieth years. The interval which most commonly elapses between the successive appearances of the discharge is about four weeks, although it is often shorter; and the duration of the flow is usually three or four days, but is liable to great variations. The first appearance of the discharge is usually preceded and accompanied by pain in the loins and general disturbance of the system, and in many women these symptoms invariably accompany the discharge. As a general rule there is no menstrual flow during pregnancy and lactation, and its cessation is one of the first signs that conception has taken place. Anomalies and disturbances (retention, suppression, undue copiousness, &c.) of the menstrual discharge are a frequent cause or symptom of illness.

Mensur. See DUELLING.

Mensuration, the name of that branch of the application of arithmetic to geometry which teaches, from the actual measurement of certain lines of a figure, how to find, by calculation, the length of other lines, the area of surfaces, and the volume of solids. The determination of lines is, however, generally treated of under Trigonometry (q.v.), and surfaces and solids are now understood to form the sole subjects of mensuration. To find the length of a line (except in cases where the length may be calculated from other known lines, as in trigonometry) we have to apply the unit of length (in the shape of a footrule, a yard measure, a chain), and discover by actual trial how many units the line contains. But in measuring a surface or a solid we do not require to apply an actual square board, or a cubic block, or even to divide it into such squares or blocks; we have only to measure certain of its boundary lines or *dimensions*; and from them we can calculate or infer the contents. For example, to find the area of a rectangle it is sufficient to measure two adjacent sides and find the product of these in terms of the unit of length chosen; 7 feet $\times$ 3 feet = 21 square feet.

The areas of other figures are found from this, by the aid of certain relations or properties of those figures demonstrated by pure geometry; for instance, the area of a parallelogram is the same as the area of a rectangle having the same base and altitude, and is therefore equal to the base multiplied by the height. As a triangle is half of a parallelogram, the rule for its area can be at once deduced. Irregular quadrilaterals and polygons are measured by dividing them into triangles, the area of each of which is separately calculated. For the area of the circle, see CIRCLE. The volume of a rectangular parallelepiped is found in cubic

inches by multiplying together the length, breadth, and depth in inches; and the oblique parallelepiped, prism, or cylinder, by multiplying the area of the base by the height.

Mentana, a village 12 miles NE. of Rome, where, 3d November 1867, the Garibaldians were defeated by the papal and French troops; pop. 3000.

Menteith, LAKE OF, a beautiful sheet of water in south-west Perthshire, 17 miles W. by N. of Stirling. Lying 55 feet above sea-level, it has an utmost length and breadth of $1\frac{1}{2}$ and 1 mile, and a maximum depth of 77 feet. It sends off Goodie Water 9 miles east-south-eastward to the Forth, and contains three islets—Inchmahome, Inchalla, and Dog Isle. Inchmahome has remains of an Augustinian priory (1238), the refuge in 1547-48 of the child-queen Mary Stuart before her removal to France; whilst on Inchalla is the ruined tower (1427) of the Earls of Menteith. That title was borne by a Celtic line in the 12th century, and afterwards by a Comyn, Stewarts, and Grahams (1427-1694). See Dr John Brown's *Horæ Subsecivæ* (1858), and Sir W. Fraser's *Red Book of Menteith* (2 vols. Edin. 1880).

Menthol is a camphor obtained from oil of peppermint by cooling. It has been used by the Japanese for 200 years, and is known by them as Hakka-no-Hari; indeed, native gentlemen formerly always went about with a medicine-box containing this drug. The chief source is the *Mentha arvensis purpurescens*, the oil of which yields more menthol than that of peppermint. In many nervous affections, such as neuralgia, toothache, headache, &c., menthol in the form of cones often gives instant relief. When the cone is rubbed on the skin one of two actions may result: the menthol rapidly evaporating a sensation of cold may be caused; but if evaporation be prevented it acts as a rubefacient, producing a feeling of warmth. Menthol has also antiseptic properties, and is used with success in solution in diphtheria, &c. It has an odour resembling but differing from that of oil of peppermint. It is liable to be adulterated with thymol, eucalyptol, &c., and then is often irritating to the skin.

Mentone (Fr. *Menton*), a town in the department of Alpes Maritimes, France, is pleasantly situated on the Mediterranean, $1\frac{1}{2}$ mile from the Italian frontier and 14 miles by rail NE. of Nice. Owing to its southern exposure, and the fact that spurs of the Alps shelter it on the north and west, it enjoys a beautiful climate—average for the year 61° F.—and so has become a favourite winter resort of invalids and health-seekers from England, Germany, and other countries. The town stands on a promontory that divides its bay into two portions; the native town clings to the mountain side, whilst the hotels and villas for the visitors extend along the water's edge. The harbour is protected on the south and west by a sea-wall (1889). There is trade chiefly in olive-oil, wine, lemons, and skins. Great damage was done to the place by an earthquake in February 1887. Pop. 20,000. In the 14th century it was purchased by the lords of Monaco, and, except during the period of the revolution and down to 1815 when France held it, the princes of Monaco kept possession till 1848. In that year Mentone (with Roquebrune) declared itself a free town under Sardinian protection, and in 1860 voted for annexation to France, the originally desired annexation to Sardinia not having been carried out. In the Grimaldi Caves near (in Italian territory) prehistoric human skeletons were found. See ANTHROPOLOGY.

Mentor, the son of Alcimus, and trusted friend of Ulysses, who, on setting out for Troy, left him the charge of his household. By him the young

Telemachus was educated, and Mentor's name has become a synonym for an instructor and guide, a usage due more to Fénelon's *Télémaque* than to the *Odyssey*.

Menura. See LYRE-BIRD.

Menza'leh, LAKE, a coast lagoon of Egypt extending east from the Damietta branch of the Nile, is separated from the Mediterranean by a narrow strip of land, with several openings. Its surface, 460 sq. m. in extent, is studded with islands, the most interesting of which is Tennees, the ancient Tennesus, with Roman remains of baths, tombs, &c. Its waters are full of fish, and its shores abound in wild-fowl. The Suez Canal passes through the eastern portion. The lake has an average depth of not more than 3 feet, except when the Nile, mouths of whose delta reach it, is in flood; and it is being gradually drained.

Menzel, ADOLF (1815–1905), painter, lithographer, illustrator, and engraver, was born at Breslau, and is best known for his drawings and oil-paintings illustrative of the times of Frederick the Great and the Emperor William I.—pictures characterised by historical fidelity, strong realistic conception, originality, and humour. His 'Adam and Eve,' 'Christ among the Doctors,' and 'Christ expelling the Money-changers' are also notable pictures. See *Life* by Wessely (1873) and the critical works of Jordan (1890–1905).

Menzel, WOLFGANG, an eminent German author, was the son of a medical practitioner, and was born at Waldenburg, in Silesia, 21st June 1798. He studied at Jena and Bonn, was for four years schoolmaster at Aarau in Switzerland, and in 1825 returned to Germany. He first made himself known in the literary world by his witty *Streckerse* (1823). He subsequently lived mainly in Stuttgart, where he died 23d April 1873. He edited and contributed to literary magazines, and wrote a very large number of works—poems, romances, histories, literary criticism, political polemics, and Christian theology. The most important were a history of Germany (1825; Eng. trans. 1848), of German literature (1827; Eng. trans. 1840), of German poetry (1858), of Europe (1853–57), and of the world (*Allgemeine Weltgeschichte*, 16 vols. 1862–72), on Prussia's place in Germany (1866 and 1870), mythological researches (1842), the pre-Christian doctrine of immortality (1869), and autobiographical *Denkwürdigkeiten* (1876). He was almost constantly involved in controversy, attacking with equal zeal theological rationalists and political radicals, all whose tendencies seemed 'dangerous' to the Christian religion or the German monarchies, such as 'the Young Germany party' after 1830. Börne (q.v.) retaliated in the *Franzosenfresser* ('Frenchman-eater').

Mephistopheles, the name of one of the best-known personifications of the principle of evil. The word has been very variously explained, but is probably of Hebrew origin, like most names of devils in the history of magic, confounded with, and approximated in form to, the Greek *μηφιστοφίλης*, 'one who loves not light.' Mephistopheles owes all his modern vitality to Goethe's *Faust* (q.v.).

Meppel, a town in the Netherlands province of Drenthe, 18 miles N. by E. of Zwolle, has a trade in butter, and linen manufactures. Pop. 11,000.

Me'quinez. See MIKNAS.

Meran, a town in the Trentino situated at the south side of the Alps 100 miles by rail S. by W. of Innsbruck, is a celebrated winter-resort, especially for sufferers from chest diseases, has a 15th-century castle, a 14th-century Gothic church, &c.

Pop. 11,000. The district is German-speaking, but was assigned to Italy in 1919.

Merbecke. See MARBECK.

Mercadante, SAVERIO, musical composer, was born at Altamura in Southern Italy, 26th June 1797, studied music at Naples, and began his career as a violinist and flutist. In 1818 he produced the first of some sixty operas, of which the more noteworthy are *L'Apoteosi d'Ercole* (1819), *Anacreonte* (1820), *Elisa e Claudio* (1821), *Donna Caritea* (1826), *I Briganti* (1836), *Il Giuramento* (1837), and *La Vestale* (1842). From 1827 to 1831 he was in Spain; in 1833 he was appointed musical director in the cathedral at Novara, and in 1840 of the conservatory of music at Naples. He died in that city, 17th December 1870—blind since 1861.

Mercantile Law, the branch of municipal law which is similar, and in many respects identical, in all the trading countries of the world. An understanding was earliest established in the department of maritime law, the history of which begins with such codes as the *Consolato del Mare* (see CONSULATE OF THE SEA), published at Barcelona in 1494, and includes such a series of regulations as the various British Merchant Shipping Acts, which consolidate and amend the law as to seamen and their contracts with employers, desertion, provisions, unseaworthy ships, pilotage, signals, deck cargoes, the load-line, life-saving apparatus, &c. Mercantile and maritime law is dealt with in this work under a large number of heads, as

Apprentice.	Debt.	Partnership.
Bankruptcy.	Insurance.	Plimsoil.
Bill.	International Law.	Weights and Measures.
Company.	Master and Servant.	

Mercantile System, that system in political economy which regards it as a government's chief end to secure a favourable balance of trade—to get the country to import as little as possible of the produce of other countries, and export as much as possible of its own, so that more money is received than is paid away. The policy of the Emperor Charles V. was regulated by this aim, as was that of Henry VIII. and Queen Elizabeth in England; and the Navigation Laws (q.v.) of Cromwell founded the English empire of the seas. Colbert (q.v.) was regarded as the most systematic mercantilist. Among English exponents of the system were Sir Josiah Child and Sir William Temple. See BALANCE OF TRADE, POLITICAL ECONOMY.

Mercator (the Latinised form of KREMER), a Flemish mathematician and geographer of German extraction, who lived 1512–94. See MAP.

Mercedes, (1) a city in Argentina, 61 miles by rail W. of Buenos Aires, is an important agricultural and pastoral centre, and has many fine buildings; pop. 22,000 (many Irish).—(2) A town of Argentina, 55 miles by rail ESE. of San Luis; pop. 18,000.—(3) The capital of Soriano province, in Uruguay, an agricultural and live-stock centre; pop. 23,000.

Mercenaries, or STIPENDIARIES, men who received pay for their services as soldiers, especially as distinguished from the feudal and general levies owing military service to the crown. Such men were often foreigners, and the name has come to mean only foreign auxiliaries. Hired professional soldiers appear very early in the history of military organisation (see ARMY). Foreign mercenaries appear in the armies of Alexander the Great and the Romans. They were common in all armies, but generally engaged for a single campaign only. In England, Harold had a body of Danes in his army when he defeated the Norwegian king—

the *huscarls*, a body originally established by Canute. William III. had for some time a body of Dutch troops in his pay after he became king of England; and throughout the 18th century Hessian and Hanoverian regiments were constantly in the pay of the British government. Frederick II. of Hesse hired out 30,000 of his men—of whom only 17,313 returned at the close—to fight for Great Britain in the first American war; with the £2,000,000 received he did much to promote science, literature, and art, and to adorn his capital. During the Irish rebellion, again, in 1798, many Hessian troops were employed.

On the outbreak of the Continental war in 1793 it was determined to increase the British army by the addition of a large body of foreigners; and accordingly in 1794 an act was passed for the embodiment of the 'King's German Legion,' consisting of 15,000 men. These troops, who were increased in the course of the war to nearly double that number, distinguished themselves in various engagements, and formed some of the most reliable regiments. It was common during the Peninsular War to enlist deserters and prisoners of war into the British army, but such recruits were not to be trusted when opposed to their fellow-countrymen. Corps of French *émigrés*, as the Chasseurs Britanniques, which served through the Peninsular War and in America, the York Chasseurs, in which some Turks were enrolled when at Malta, and others, were also organised. The whole of the foreign legions were disbanded in 1815, the officers being placed on half-pay.

During the Russian war in 1854 the British government again had recourse to the enlistment of foreigners. The numbers authorised were 10,000 Germans, 5000 Swiss, and 5000 Italians, with the same pay as British troops. About half were enrolled, and had become very efficient, when hostilities ceased, and they were disbanded at a great cost for gratuities, &c. Foreigners may, on the signification through a secretary of state of royal consent, enlist into the British army, but the Army Act provides that the proportion of aliens in any corps at one time shall not exceed one to every fifty British subjects, and that no alien shall be eligible to hold a commission as an officer; this notwithstanding, however, any inhabitant of any British protectorate and any negro or person of colour may freely enlist, and when serving be deemed to be entitled to all the privileges of a natural-born British subject. British-born soldiers have often served abroad. There was a famous Scots Guard (q.v.) in France from the days of Charles VI. down to 1759; many Scotsmen fought for Gustavus Adolphus; and Englishmen, Scotsmen, and Irishmen, singly and in bodies, have served during troublous times in most European countries; see GORDON (PATRICK), KEITH, HOBART PASHA. A British legion was raised in 1836 by Sir De Lacy Evans to support the queen of Spain against the Carlists (see EVANS).

The Swiss auxiliaries used to form a regular contingent in many of the armies of Europe, especially of France and Italy. Over 1,000,000 served in France from the time of Louis XI. to that of Louis XIV. (1465–1715). After the French Revolution (see SWISS GUARDS) the cantons ceased publicly to hire out their subjects; in 1859 the Confederacy forbade recruitment for service abroad. The Papal Swiss troops have shrunk to a bodyguard. See CONDOTTIERI, FOREIGN LEGION, FREE-LANCES, IRISH BRIGADE.

Mercer, JOHN (1791–1866), calico-printer and chemist, invented a method (patented in 1850) of treating ('mercerising') cotton fibre by chemical process which imparts to the fabric a silky lustre. See CELLULOSE.

Merchandise Marks. See TRADE-MARKS.

Merchant Adventurers. See COMPANY.

Merchants, STATUTE OF, an English statute of 1285 amplifying the statute of Acton Burnell (q.v.). The statute allowed a creditor to seize the goods and hold the lands of a defaulting debtor until satisfaction of the debt.

Merchant Taylors' School, a great London day-school, with 500 boys, founded and governed by the master, wardens, and company of Merchant Taylors (see LIVERY). The first school-house in Suffolk Lane (1561) was destroyed in the great fire of 1666, but it was in 1671–74 rebuilt on the same site. When the Charterhouse School was removed into the country, the Merchant Taylors bought land from the governors of the Charterhouse for £90,000, and in 1873–74 erected, at a cost of £30,000, their present school-house on the site of the old gown boys' quarters. Richard Mulcaster was the first master, and among its scholars have been Edmund Spenser, Bishop Andrewes, James Shirley, Archbishop Juxon, Titus Oates, Lord Clive, Charles Mathews, Sir Henry Ellis, and Sir Frederick Treves. See the Rev. C. J. Robinson's *Register of the Scholars admitted to Merchant Taylors', 1562–1874* (2 vols. 1882–83).

Mercia, the great Anglian kingdom of central England. The name, originally limited to the district around Tamworth and Lichfield and the Upper Trent valley, refers to a 'march' or frontier that had to be defended against hostile Welshmen. The first settlements were most probably made in the second half of the 6th century, but Mercia first rose into real importance, and indeed grew into Middle England, under the vigorous rule of Penda (626–655). His nephew, Wulfhere (659–675), pushed back the Northumbrians, and extended the boundary southward to the Thames, and Ethelbald (716–755) spread his conquests round all the neighbouring states. But the mightiest kings of Mercia were Offa (757–795) and Cenwulf (796–819), and after their time its power rapidly declined before the invasions of the Danes on the one side, and the spread of the West Saxon kingdom on the other. At length it became one of the great earldoms, and Elfgar, Leofric, Edwin, and Morcar retained at least the shadow of past power. See ENGLAND (*History*).

Mercury. See HERMES, PLANETS.

Mercury, or QUICKSILVER (sym. Hg; atomic weight = 200; sp. gr. 13·6), one of the so-called noble metals, remarkable as being the only metal that is fluid at ordinary temperatures. It is of a silvery white colour, with a striking metallic lustre. When pure it runs in small spherical drops over smooth surfaces; but when not perfectly pure the drops assume an elongated or tailed form, and often leave a gray stain on the surface of glass or porcelain. Moreover, the pure metal, when shaken with air, presents no change upon its surface; while if impure it becomes covered with a gray film. It is slightly volatile at ordinary temperatures, and at 662° F. it boils, and forms a colourless vapour of sp. gr. 6·976. Hence it is capable of being distilled; and the fact of its being somewhat volatile at ordinary temperatures helps to explain its pernicious effects upon those whose trades require them to come much in contact with it—as, for example, the makers of barometers, &c. At a temperature of –39° F. it freezes, when it contracts considerably, and becomes malleable. In consequence of the uniform rate at which it expands when heated, from considerably below 0° F. to above 300° F., it is employed in the construction of the mercurial thermometer.

All mercurial compounds are either volatilised or

decomposed by heat; and when heated with carbonate of sodium they yield metallic mercury. Native or virgin quicksilver only occurs in small quantity, usually in cavities of mercurial ores. Of these ores by far the most important is a sulphide known as Cinnabar (q.v.). There are two means of obtaining the metal from cinnabar: the ore may be burned in a furnace, in which case the sulphur is given off as sulphurous acid, and the mercury is collected in a condensing chamber; or the ore may be distilled with some substance capable of combining with the sulphur—as, for example, with slaked lime or iron filings. The mercury as imported is usually almost chemically pure. If the presence of other metals is suspected, it may be pressed through leather, redistilled, and then digested for a few days in dilute cold nitric acid, which exerts little action on the mercury if more oxidisable metals are present; or better, in a solution of mercuric nitrate, which deposits mercury and takes up the more oxidisable metals. The mercury, after being washed with water, is chemically pure.

Mercury is first spoken of by Theophrastus (3d century B.C.); the name *hydrargyros* (whence comes the symbol Hg) dates from Dioscorides. Greeks and Phœnicians procured cinnabar from Almadén in Spain. After the discovery of the New World the mercury of Peru was famous. California now produces the great bulk of the mercury of commerce, and most of it comes from the New Almadén mine.

There are two oxides of mercury, the black suboxide, Hg_2O , and the red oxide, HgO . Both of these lose all their oxygen when heated, and form salts with acids. The black suboxide, although a powerful base, is very unstable when isolated, being readily converted by gentle warmth, or even by mere exposure to light, into red oxide and the metal: $\text{Hg}_2\text{O} = \text{HgO} + \text{Hg}$. The most important of its salts is the nitrate, $\text{Hg}_2(\text{NO}_3)_2 + 2\text{Aq}$, from whose watery solution ammonia throws down a black precipitate known in pharmacy as *Mercurius solubilis Hahnemannii*, from its discoverer, and consisting essentially of the black suboxide with some ammonia and nitric acid, which are apparently in combination. Of the red oxide the most important salts are the nitrate, $\text{Hg}(\text{NO}_3)_2 + 8\text{Aq}$; the sulphate, HgSO_4 , which is employed in the manufacture of corrosive sublimate; and the basic sulphate, $\text{HgSO}_4 \cdot 2\text{HgO}$, which is of a yellow colour, and is known as *Turpeth Mineral*.

The haloid salts of mercury correspond in their composition to the oxides. Of the most important of these—the chlorides—there are the subchloride, Hg_2Cl_2 , well known as Calomel (q.v.), and the perchloride, HgCl_2 , or corrosive sublimate.

The perchloride, HgCl_2 , when crystallised from a watery solution occurs in long white glistening prisms; but when obtained by sublimation it occurs in white transparent heavy masses, which have a crystalline fracture, and chink with a peculiar metallic sound against the sides of the bottle in which they are contained. This salt melts at 509°F ., and volatilises unchanged at about 570° . It has an acrid metallic taste. It is soluble in sixteen parts of cold, and in less than three parts of boiling water, and dissolves very freely in alcohol and in ether. Corrosive sublimate enters into combination with the alkaline chlorides, forming numerous distinct compounds. (A double chloride of ammonium and mercury, represented by the formula $\text{CH}_3\text{NCl} \cdot \text{HgCl}_2 + \text{Aq}$, has been long known as *sal alembrothi*.) It combines with oxide of mercury in various proportions, forming a class of compounds of great interest in theoretical chemistry, termed *oxychlorides of mercury*. On adding a solution of corrosive sublimate to a solu-

tion of ammonia in excess, a compound, which from its physical characters is termed *white precipitate*, is thrown down, the composition of which is $\text{HgN}_2\text{H}_6\text{Cl}_2$. Perchloride of mercury coagulates albumen and combines with the albuminous tissues generally, forming sparingly soluble compounds. Hence, in cases of poisoning with the salt, the white of raw eggs is the best antidote; and for the same reason corrosive sublimate is a powerful antiseptic, and is employed to preserve anatomical preparations.

Amongst the most important tests for this substance, which is not unfrequently used as a poison, may be mentioned (1) iodide of potassium, which, when added to a crystal or to a watery solution of chloride of mercury, gives rise to the formation of a bright scarlet iodide of mercury. (2) The galvanic test, which may be applied in various ways, of which the simplest is the 'guinea and key test,' devised by Wollaston. He placed a drop of the fluid suspected to contain corrosive sublimate on a guinea, and simultaneously touched it and the surface of the guinea with an iron key; metallic mercury was deposited on the gold in a bright silvery stain. (3) Precipitation on copper, and reduction. To apply this test we acidulate the suspected fluid with a few drops of hydrochloric acid, and introduce a little fine copper gauze, which soon becomes coated with mercury. On heating the gauze in a reduction tube the mercury is obtained in well-defined globules.

With iodine and bromine mercury forms two iodides and bromides, corresponding in composition to the chlorides. Both the iodides are used in medicine; the bromides are of no practical importance. The subiodide, Hg_2I_2 , is a green powder formed by triturating 5 parts of iodine with 8 of mercury, and is of far less interest than the periodide, HgI_2 , which is most simply obtained by precipitating a solution of corrosive sublimate by a solution of iodide of potassium. The precipitate is at first salmon-coloured, but soon changes into a brilliant scarlet crystalline deposit.

Sulphur forms two compounds with mercury—viz. a subsulphide, Hg_2S , a black powder of little importance, and a sulphide, HgS , which occurs naturally as Cinnabar (q.v.). *Sulphide of mercury* is thrown down as a black precipitate by passing sulphuretted hydrogen through a solution of a persalt of mercury (corrosive sublimate, for example). When dried and sublimed in vessels from which the air is excluded, it assumes its ordinary red colour. The well-known pigment *vermilion* is sulphide of mercury, and is sometimes obtained from pure cinnabar, but is more frequently an artificial product.

Mercury unites with most metals to form Amalgams (q.v.), several of which are employed in the arts. Of the numerous organic compounds of mercury it is unnecessary to mention more than the Fulminate (q.v.) and the cyanide, HgCN , which may be prepared by dissolving the red oxide of mercury in hydrocyanic acid, and is the best source from which to obtain cyanogen.

The uses of mercury are so numerous that a very brief allusion to the most important of these must suffice. It is employed extensively in the extraction of gold and silver from their ores by the process of amalgamation. Its amalgams have been largely employed in the processes of silvering and gilding, and some (as those of copper and cadmium) are employed by the dentist for stopping teeth. It is indispensable in the construction of philosophical instruments, and in the laboratory in the form of the mercurial bath, &c. It is the source of the valuable pigment vermilion. The use of its chloride in anatomical preparations has been already noticed; it is similarly found that wood,

cordage, and canvas, if soaked in a solution of this salt (1 part to 60 or 80 of water), are better able to resist decay when exposed to the combined destructive influence of air and moisture.

MEDICINAL USES OF MERCURY AND MERCURIALS.—Metallic mercury is used in medicine in a state of very fine division in the form of gray powder, blue pill, mercurial ointment, and other preparations. It is also used as mercurous and mercuric oxides and salts. As with other metals, the mercurial preparations have a local action and an action after absorption into the blood. The intensity of the local action varies, however, with the individual preparation; the persalts being soluble in water, and hence capable of precipitating albumen at once, are very irritating, while the mercurous salts and uncombined mercury, being insoluble in water, exert an effect only in so far as they are dissolved in the secretions. These differences in local action have a very great influence in determining their applications in medicine.

Locally, the various ointments, liniments, and plasters are used as stimulants, astringents, antiseptics, and parasitocides, the persalts are used as antiseptic lotions, while the protosalts are little employed locally, except Calomel (q.v.) in powder.

Absorption of mercurial preparations from the intestinal canal or skin takes place very readily, and in an hour or less the mercury may be detected in most of the secretions. After absorption into the blood all the preparations have the same action. In minute doses they act as alteratives, improving nutrition. In larger doses, such as are ordinarily used, they also exert profound alterative effects; but care must be exercised in their administration, otherwise symptoms of chronic poisoning are apt to ensue. These consist in excessive salivation, inflammation of the mouth and gums, and dyspepsia, while in severer cases caries of bone, nervous symptoms, a watery condition of the blood, albuminuria, cachexia, and other serious complications may occur. The mercurial preparations are given internally in syphilis, in serous inflammations, and in dropsy as diuretics. Certain of them, such as gray powder, blue pill, and calomel, are used as purgatives and as intestinal antiseptics.

The doses of the different preparations vary greatly, those of the persalts being very much smaller than in the case of the other preparations. Some persons are peculiarly susceptible to the action of mercurials, and show symptoms of chronic poisoning after very small amounts.

With regard to acute mercurial poisoning, this is due to irritation of the intestinal canal, and is only seen with the soluble salts when taken in overdoses. The perchloride (corrosive sublimate) has been most frequently employed for the purpose of poisoning. The symptoms come on immediately, with a burning pain in the throat and violent pain in the abdomen, with severe vomiting and purging. There is always a good deal of collapse. Albumen, in the form of white of egg, is the best antidote.

Mercury, Dog's (Mercurialis), a genus of plants of the natural order Euphorbiaceæ. The Common Dog's Mercury (*M. perennis*) is very common in woods and shady places in Britain. It has a perfectly simple stem, about a foot high, with rough ovate leaves, and axillary loose spikes of greenish flowers. It turns a glaucous black colour in drying, and the root contains two colouring substances, one blue and the other carmine. It is very poisonous. The mercury which some old writers mention as a potherb is not this plant, but English Mercury, or Wild Spinach (*Chenopodium Bonus-Henricus*). Annual Dog's Mercury (*M. annua*) is a much rarer British plant, and less poisonous. The leaves are indeed eaten in

Germany as spinach. Pliny mentions an ancient belief (not extinct), that if a woman after conception drink the juice of the male plant (the female in the botanical sense) she will give birth to a boy, and if of the female, a girl.

Mercy, SISTERS OF. See SISTERHOODS.

Mer de Glace. See ALPS, GLACIER.

Meredith, GEORGE, novelist and poet, was born in Hampshire, 12th February 1828, and made his first appearance as a poet with 'Chillianwallah' in *Chambers's Journal* for July 1849. This was followed in 1851 by a little volume of *Poems*, and in 1855 by *The Shaving of Shagpat; an Arabian Entertainment*, a highly original tale, in burlesque imitation of the manner of the Eastern story-teller. It shows a rich and brilliant imagination, and abounds in passages of tender feeling as well as of boisterous humour, but the incidents are involved and the machinery complicated, and reading is also made difficult by tantalising suggestions of hidden meanings which constantly elude one's grasp. In 1857 appeared *Farina: a Legend of Cologne*, a short story, reflecting the influence of German romance, which it partly imitates and partly parodies. The series of Meredith's greater and more characteristic works began in 1859 with *The Ordeal of Richard Feverel: A History of a Father and a Son*, a tragic romance, dealing with the larger problems of education, especially in its ethical aspects. The novel of *Evan Harrington*, an amusing comedy of social ambitions, followed in 1861. *Modern Love*, and *Poems of the English Roadside, with Poems and Ballads*, was published in 1862, 'Modern Love' being the title of a sequence of fifty sonnet-like poems which tell their story in a somewhat fragmentary manner, but with great truth of observation and strength of pathos. *Emilia in England* (1864), since 1886 known as *Sandra Belloni*, has for its subject one of Meredith's most fascinating and original characters; it is continued in *Vittoria* (1866), the scene of which is laid in Italy at the time of the political risings of 1848. In 1865 had appeared *Rhoda Fleming*, like *Richard Feverel* a tragedy; the romantic *Adventures of Harry Richmond* followed in 1871. *Beauchamp's Career* (1875) is perhaps the most perfectly constructed of all the series. *The Egoist* (1879) is a searching and remorseless study of a single aspect of refined selfishness. *The Tragic Comedians* (1881) is a somewhat close rendering of the well-known painful story of Lassalle's tragic end, founded upon the reminiscences of the Countess Racowitza. Other novels are *Diana of the Crossways* (1885), *One of our Conquerors* (1891), *Lord Ormont and his Aminta* (1894), and *The Amazing Marriage* (1895). Meredith, who was literary reader for Chapman and Hall for over thirty years, issued a revised edition of his novels in 1896-99 (32 vols.). *Poems and Lyrics of the Joy of Earth* (1883), *Ballads and Poems of Tragic Life* (1887), *A Reading of Earth* (1888), *A Reading of Life and other Poems* (1901), contain his chief poems. After his death, 18th May 1909, his *Last Poems* and his unfinished novel *Celt and Saxon* were published, and his unfinished play *The Sentimentalists* produced.

Critics have ranked Meredith as the foremost novelist of his day, and as one of the most invigorating and stimulative thinkers of his generation; at the same time he never obtained a wide public, his work appealing more to an expert than to a popular taste. Among the elements of his power are his wide, accurate, and sympathetic observation both of nature and of life, his inventive resource, his analytic and synthetic power, and his mastery of words. His descriptions of scenery are varied, vivid, and full of poetry, his delineations of phases of feeling, and especially of tender feeling, those of a

master. Few writers have created so many characters of ideal beauty, who are at the same time so thoroughly human and marked by the strongest individuality—real, breathing, talking personalities, whom the reader feels it a joy to have known. Among the ‘defects of his qualities’ may be mentioned a certain intricacy of plot, or rather perhaps want of clearness in working it out, arising from an exaggerated reticence; also a frequent over-elaboration of style and strainedness of wit that fatigues rather than exhilarates. And, though he is never ‘sensational,’ there is often a certain disregard of probability in the situations he invents. It was a purpose of Meredith’s, deliberately expressed and consistently carried out, to bring philosophy into the domain of fiction, and much of his writing deals more or less directly, in a serious manner, with the most important problems of politics, sociology, and ethics.

There is a memorial edition of Meredith’s works (27 vols. 1909–11); vol. xxvii. is a bibliography. His letters were edited by his son (2 vols. 1912). There is a critical estimate in Brownell’s *Victorian Prose Masters* (1902); and see works by Le Gallienne (1890), Jerrold (1903), Trevelyan (1906, 1912), Henderson and Selincourt (1907), Hammerton (1909), Photiadès (1910; trans. 1913), Crees (1918, 1921), Ellis (1919), Lady Butcher (1919).

Merezhkovsky, or **MEREJKOVSKY**, **DMITRI SERGEVICH**, Russian novelist, critic, and poet, was born in 1865 at St Petersburg, the son of an official of the imperial court. He was educated at St Petersburg, where he graduated, and throughout his work the influence of the classics, especially of the Epicurean writers, and of Nietzsche is clearly to be seen. His first work was done in poetry, his earliest collections of verse (1888 and 1892) gaining him a measure of renown. About the same time as this early verse he also produced excellent translations of several Greek and Latin authors, most notably of Æschylus, of Sophocles, and of Euripides. But it was as a novelist, and in a lesser degree as a critic, that Merezhkovsky was to achieve distinction. Of his novels his trilogy (*Christ and Antichrist*), of historical and philosophical romances (*The Death of the Gods*, 1896; *The Forerunner*, 1901; *Peter and Alexis*, 1905), is to be accounted his masterpiece. Here the theme, a favourite one of Merezhkovsky’s, is the undying struggle between Greek polytheism with its emphasis on happiness and beauty and Christianity with its recognition of suffering and death. In criticism, in *Eternal Companions* (1897), Merezhkovsky has written on old and modern European and Russian authors (Cervantes, Calderon, Flaubert, Ibsen, Pushkin, Maykov, Korolenko, &c.), but most important in this kind are *The Cause of the Decadence of Modern Russian Literature* and *Tolstoi and Dostoevski* (2 vols. 1901–2), the last considered the best work in its field. Apart from his intrinsic merits as a writer, Merezhkovsky is notable as marking a departure from the traditional humanitarianism and realism of Russian literature, and with Sologub (Teternikov) he is to be considered the founder of Russian modernism. Much of his work has been done into English. See HIPPIUS.

Merganser (*Mergus*), a genus of birds of the family Anatidæ, having a long, rather slender, straight bill hooked at the tip and notched at the edges. The genus embraces six species, nearly all inhabitants of the seas and coasts, and distributed over the northern regions of the Old and New World, and in Brazil and the Auckland Islands. The Goosander (q.v.) is the largest and best-known British species. The Red-breasted Merganser (*M. serrator*) is resident in Scotland, where it breeds not only on the coasts of Ross, Sutherland, and

the Hebrides, where it is abundant, but also on inland lochs and rivers. Its migrations extend southward to the lakes of Algeria and to Egypt. It feeds chiefly on small fishes. Its flesh is unpalatable. The Hooded Merganser (*M. cucullatus*), a smaller species, is a very rare visitor of Britain. It is found in North America, from the St Lawrence to Alaska, where it migrates as far south as Mexico, Cuba, Bermuda, and the Carolinas. The Nun or Smew (*M. albellus*) is a smaller species, passing the summer in the northern parts of the Old and New World, and ranging in winter as far south as India. Another species (*M. australis*) has as yet been found only in the Auckland Islands.

Mergui, a seaport of Burma, on the Tenasserim coast, just outside the principal mouth of the Tenasserim River. It exports rice, timber, dried fish, and mother-of-pearl shell, and imports cotton goods, husked rice from Rangoon, silk, and tea. Pop. 17,000.—The district of Mergui, 200 miles long by 40 wide, is the southernmost in Burma. Area, 9789 sq. m.; pop. (1881) 56,559; (1921) 135,465.

Mergui Archipelago, a group of islands in the Bay of Bengal, lying off the southern provinces of Burma; they are mountainous, some rising to 3000 feet, of picturesque beauty, and sparsely inhabited by a race called the Selungs, who barter edible birds’-nests with the Burmese and Malays for rice and spirits. Rubber abounds. Snakes and tigers, rhinoceros, deer, &c., are plentiful.

Mérida (anc. *Augusta Emerita*), a decayed town of Spain, on the right bank of the Guadiana, 30 miles E. of Badajoz. It is remarkable for its Roman remains, which include the Arch of Santiago, 44 feet high, and a bridge originally of 81 arches (17 were destroyed in 1812 during the Peninsular War), 2575 feet long and 26 feet broad, both erected by Trajan; others are the ruins of half-a-dozen temples, of an aqueduct, a circus, a theatre, a naumachia, a castle. There is also an old Moorish palace. Mérida was built in 23 B.C., and flourished in great splendour as the capital of Lusitania. In 713 it was taken by the Moors, who lost it to the Spaniards in 1229. Pop. 16,000.

Mérida, (1) capital of the Mexican state of Yucatán, is situated on a barren plain, 25 miles S. of Progreso, its port on the Gulf of Mexico, and 95 miles N.E. of Campeachy. It occupies the site of a former native city, and was founded by the Spaniards in 1542. Mérida has an old Franciscan convent, a cathedral, government and episcopal palaces, a university, seminary, girls’ high school, and conservatory of music, an antiquarian museum, a public library, hospital, &c. It is the centre of the henequen (sisal fibre) industry. Pop. 62,000.—(2) A town of Venezuela, 5290 feet above sea-level, at the foot of the Sierra Nevada de Mérida, 70 miles S. of the lake of Maracaibo. Founded in 1558, it was almost wholly destroyed by earthquakes in 1812 and 1894. It is the seat of a bishop, has a university and several higher schools, and manufactures of carpets and woollen and cotton stuffs. Pop. 14,000.

Meriden, a city of Connecticut, 19 miles by rail N. by E. of New Haven, with a number of manufactories of metal wares, cutlery, firearms, &c. Meriden contains the state reform school. Pop. (1880) 15,540; (1920) 29,867.

Meridian (Lat. *meridies*, ‘mid-day’), the name given to the great circle of the celestial sphere which passes through both poles of the heavens, and also through the zenith and nadir of any place on the earth’s surface. Places on the earth’s surface geographically N. or S. of one another lie under the same meridian circle, or in the same meridian

plane. The meridian is divided by the polar axis into two equal portions, which stretch from pole to pole, one on each side of the earth. It is mid-day at any place on the earth's surface when the centre of the sun comes upon the meridian of that place; at the same instant it is mid-day at all places under the same half of that meridian, and midnight at all places under the opposite half. All places under the same meridian have therefore the same longitude (see LATITUDE AND LONGITUDE, where the question of the First Meridian is discussed). Stars attain their greatest altitude when they come upon the meridian; the same thing is true approximately of the sun and planets; and as at this point the effect of refraction upon these bodies is at a minimum, and their apparent motion is also more uniform, astronomers prefer to make their observations when the body is on the meridian. The instruments used for this purpose are called *meridian circles*. See MURAL CIRCLE.

Meridian Measurement.—Two stations, having nearly the same longitude, are chosen; their latitude and longitude are accurately determined (the error of a second in latitude introduces a considerable error into the result), and the direction of the meridian to be measured ascertained; then a base line is measured with the greatest accuracy, as an error here generally becomes increased at every subsequent step; and then, by the method known as triangulation, the distance between the two stations, measured along the earth's surface, is ascertained. This corresponds to the length of the arc of the meridian contained between the parallels of latitude of the two stations. As the previously found latitudes of its two extremities give the number of degrees it contains, the average length, along the earth's surface, of a degree of this arc can be at once determined. This operation of meridian measurement has been performed at different times on a great many arcs lying between 68° N. lat. and 38° S. lat., and the results show a steady though irregular increase in the length of the degree of latitude as the latitude increases. On the supposition that this law of increase holds good to the poles, the length, along the earth's surface, of every tenth degree of latitude in English feet is as follows:

Degree of Latitude.	Length of Degree in English Feet.	Degree of Latitude.	Length of Degree in English Feet.
0°	362,732	50°	364,862
10°	362,843	60°	365,454
20°	363,158	70°	365,937
30°	363,641	80°	366,252
40°	364,233	90°	366,361

This result shows that the earth is not spherical, as in that case the length of all degrees of latitude would be alike, but of spheroidal form—its curvature becomes less as we go from the extremity of its greater or equatorial diameter to the pole. See EARTH.

Meridian, capital of Lauderdale county, Mississippi, 135 miles by rail N. by W. of Mobile. It has founding and machine-making industries, and manufactures of cotton, blinds and sashes, furniture, &c. Pop. (1900) 14,050; (1920) 23,399.

Mérimée, PROSPER, a great French writer, was born at Paris, 28th September 1803, the son of a well-known painter. He was educated at the Collège Charlemagne, and tried law, but soon abandoned it. He was in Spain during the revolution of 1830, and after his return became attached to the government, and held office successively in the ministry of Marine, of Commerce, and of the Interior, becoming finally Inspector of Historical Documents, in which capacity he visited the south and west of France, Auvergne, and Corsica. He had been long an intimate friend of the Countess Montijo, mother of the Empress Eugénie, and con-

sequently enjoyed the closest intimacy with the imperial family at the Tuileries, Compiègne, and Biarritz, yet without surrendering his independence of spirit and frankness of speech. Admitted to the Academy in 1844, he became a senator in 1853, and in 1858 president of the committee for reorganising the Bibliothèque Impériale. His last years were clouded by ill-health and melancholy, and the misfortunes of his country and the downfall of the imperial house hastened on his death, at Cannes, 23d September 1870.

Mérimée began his career as a writer at twenty-two by an audacious literary *espèglerie*, entitled *Théâtre de Clara Gazul*, a collection of Spanish plays of singular maturity, represented as translated by Joseph L'Estrange, with his own portrait in female dress as frontispiece. A volume of pretended translations of Illyrian folk-songs, by an imaginary Hyacinthe Maglanovitch, followed in 1827, under the title *Guzla*. His more important works embrace novels and short stories, archaeological and historical dissertations, and travels, all of which display wide and exact learning, keen observation, strong intellectual grasp, grave irony and real humour, and withal a style that attains an exquisiteness of perfection rare even among the best French writers. Ever the refined and elegant scholar, he wrote, rather than affected to write, as a dilettante—'le gentleman auteur' as he was styled by his own countrymen. Of his more erudite works it may here be enough to name his *Histoire de Don Pèdre I., Roi de Castille* (1848; Eng. trans. 1849); *Études d'Histoire Romaine* (1844); *Les faux Démétrius* (1852); *Monuments historiques* (1843); and *Mélanges historiques et littéraires* (1855). But his greatest work is his tales, about twenty in number, some of which are among the rarest masterpieces of the story-teller's art: *Colomba*, *Mateo Falcone*, *Carmen*, *La Vénus d'Ille*, *Lokis*, *Arsène Guillot*, *La Chambre Bleue*, and *L'Abbé Aubain*. One of the most remarkable merits of some of these stories, as *La Vénus d'Ille* and *Lokis*, is the dexterous manner in which an uncanny superstition is turned to artistic use.

Mérimée's character remains somewhat of an enigma, with its outward mask of cynicism, its inward capacity for the most tender and devoted friendship, its longing for the love of little children. In his constant struggle against impulse and enthusiasm he succeeded, but, as he himself says of Saint-Clair in the *Vase Etrusque*, the victory cost him dear. Few lives have been more solitary and unhappy than Mérimée's, at once from a paralyzing distrust of himself and of others, and from the constitutional melancholy of the sceptic to whom the world is only a series of incomprehensible and fleeting images, and who mistrusts life and death alike. He was one of the few men who have drawn their unbelief from mother and father alike. No great writer has left a more remarkable monument than the famous *Lettres à une Inconnue* (1873; Eng. trans., ed. Stoddard, New York, 1874), the revelation of a heart throughout an acquaintance, first of love, then of friendship, extending over thirty years. Here we find no selfish cynic, but a man gracious, affectionate, delicate, touched with poetry despite his scepticism, faithful and loyal unto death—his last words were written but two hours before the end. The unknown lady's actual existence has been questioned, and she has been identified with the Countess Lise Przedrerska, sister of the Marquis de Noailles, and with Mademoiselle J. F. Dacquín. What professed to be the 'inconnue's' letters in reply were published in 1888, but without any explanation being offered; an English translation of these followed in two volumes in 1889. Only less interesting than the first series are the *Lettres*

à une autre Inconnue (1875), and the *Lettres à Panizzi* (1881), full of lively gossip and clever criticism.

See the Studies by Tamisier (Mars. 1875), D'Haussonville (1888); also Tournoux (1879), Filon (1894, 1898), Pinvert (1906, 1911), Trahard (1925).

Merino (Span. 'an inspector of sheep-walks'), an important breed of Sheep (q.v.). See also WOOL.

Merioneth, a triangular county of Wales, with a maximum length and breadth of 45 and 30 miles, a seaboard of 38 miles, and an area of 660 sq. m., or 422,372 acres, is bounded on the N. by the counties of Carnarvon and Denbigh, E. and S. by Montgomeryshire and the river Dovey, and W. by Cardigan Bay. Pop. (1801) 27,506; (1841) 39,332; (1881) 52,038; (1921) 45,450. Cliffs or low sands skirt the coast, which at some distance out to sea is fringed by dangerous sandbanks. Inland, the surface, although nowhere attaining such an altitude as that of Carnarvonshire, is rugged and mountainous in the extreme, interspersed in places with picturesque valleys, lakes, and waterfalls. Aran Mowddu (2970 feet), Cader Idris (q.v., 2914), and Aran Benllyn (2902) are the highest peaks; Bala the largest lake; whilst of rivers the principal are the Dee, which flows north-east, and the Dovey and Mawddach, which reach the sea after a south-west course. The soil generally is poor and large tracts are unfit for profitable cultivation. There is much permanent pasture. Great numbers of sheep are bred, and flannels and woollens to some extent manufactured, but the principal wealth of the county arises from its mineral products. Slate and limestone are largely quarried, much manganese ore is produced, and from mines in the vicinity of Dolgelley and Bala some gold is obtained. Merioneth contains no parliamentary or municipal boroughs. It sends one representative to parliament. The principal towns are Bala, Barmouth, Corwen, Dolgelley, Festiniog, Harlech, and Towyn. Among Welsh counties Merioneth is singular in retaining in English its primitive British name. Its difficulty of access precluded it from figuring in the wars of early history. See work by A. Morris (1913).

Meristem, the formative tissue of plants, is distinguished from the permanent tissues by the power its cells have of dividing and forming new cells. Meristem forms the tissue of embryo plants, and of apex of stems and roots, and also the cambium-layer by whose division stems and roots grow in thickness.

Merivale, JOHN HERMAN, an English scholar and translator, was born at Exeter in 1779, the grandson of Samuel Merivale (1715-71), a worthy Presbyterian minister at Tavistock. He was sent to St John's College, Cambridge, and was called to the bar in 1805. He contributed largely to Bland's *Collections from the Greek Anthology* (1813), and brought out a second edition himself in 1833. From 1831 to his death in 1844 he held the office of Commissioner of Bankruptcy. Works of no little merit were his *Poems, Original and Translated* (1841), and *Minor Poems of Schiller* (1844).—CHARLES, son of the preceding, was born in 1808, and educated at Harrow, Haileybury, and St John's College, Cambridge, where he took his degree in 1830, and became in due course fellow and tutor. He was successively select preacher at Cambridge (1838-40) and at Whitehall (1839-41), Hulsean lecturer (1861), and Boyle lecturer (1864-65). From 1848 to 1869 rector of Lawford in Essex, he was chaplain to the Speaker from 1863 to 1869. He was dean of Ely from 1869 till his death, 26th December 1893. His *Fall of the Roman Republic* (1853) is a brilliant sketch,

marred by its over-indulgence to imperialism, the sole fault of his admirably learned and eloquent *History of the Roman Empire* (7 vols. 1850-62). Later books are *History of Rome* (1875), *Early Church History* (1879), and *Contrast between Pagan and Christian Society* (1880). See his *Autobiography and Letters* (1899).—Another son, HERMAN, born in 1806, was educated at Harrow and Trinity College, Oxford, elected Fellow of Balliol, called to the bar in 1832, and appointed professor of Political Economy at Oxford in 1837, and, later, permanent Under-secretary of State first for the colonies, next for India. In 1839 he was made C.B. He died on February 8, 1874.—His son, HERMAN CHARLES (1839-1906), was the author of a number of successful plays, including *Forget-Me-Not*, *The Butler and The Don*, and *The Master of Ravenswood*. Besides a novel, *Faucit of Balliol* (1882; in its stage form, *The Cynic*), he published *The White Pilgrim and other Poems* (1883), and other works. His *Stage and Bar* (1902) is an entertaining autobiography.

Merle D'Aubigné. See D'AUBIGNÉ.

Merlin, the name of an ancient British prophet and magician, who is supposed to have flourished during the decline of the native British power in its contest with the Saxon invaders. The prophetic child Ambrosius first mentioned by Nennius in his *Historia Britonum* was confounded with Ambrosius Aurelianus, the conqueror of Vortigern, and the resulting Merlin Emerys or Ambrosius appears in Geoffrey's later work in the new form of Merlin Silvestris or Caledonius. It is as the subject of one of the cycle of Arthurian romances that Merlin's name has survived. The Cambrian Merlin is said by Geoffrey of Monmouth, in his *Historia Britonum* and *Vita Merlini*, to have lived in the 5th century, to have sprung from the intercourse of a demon with a Welsh princess, to have been rescued from his malignant destiny by baptism, and to have displayed the possession of miraculous powers from infancy. The adventures of Merlin were taken, with additions from Armorican and other sources, from the Latin of Geoffrey, and made popular in the French language by Robert Wace and Robert de Borron. Henry Lonelich's English verse translation is in the library of Corpus Christi College, Cambridge. The analysis of the romance of Merlin in Ellis's *Specimens of Early English Metrical Romances* was made from the MS. in Lincoln's Inn Library. There is a MS. in the Scottish National Library, and one in Bishop Percy's folio MS. (printed in 1867). The prose romance is longer and more important than the metrical one. *Merlin, Roman en Prose du XIII^e Siècle*, was published by the Société des Anciens Textes Français in 1886, and the Early English Text Society published under the editorship of H. B. Wheatley in 1865-69, and in 1899, *Merlin, or the Early History of King Arthur about 1450-60*, printed from the MS. in the Cambridge University Library. Merlin is frequently alluded to by our older poets, especially by Spenser, and his story occupies a prominent position in Tennyson's *Idylls of the King*. A collection of prophecies attributed to Merlin appeared in French (Paris, 1498), in English (Lond. 1529 and 1533), and in Latin (Venice, 1554); and their existence is traceable at least as far back as the middle of the 14th century. The Strathclyde Merlin, called Merlin the Wylt, or Merlin Caledonius, once believed to be originally a different character, was placed in the 6th century, and considered a contemporary of St Kentigern, Bishop of Glasgow. His grave is still shown at Drummelzier on the Tweed, where, in attempting to escape across the river from a band of hostile rustics, he was impaled on a hidden stake. A metrical life of him

in Latin, extending to more than 1500 lines, professedly based on Armoric materials, and incorrectly ascribed to Geoffrey of Monmouth, was published by the Roxburghe Club in 1833. His prophecies—published at Edinburgh in 1615—contain those ascribed to the Welsh Merlin.

Merlin. See FALCON.

Mermaids and Mermen, in the popular folklore of Europe, a class of beings more or less like men, living in the sea, but in some circumstances capable of social relationships with men and women. The typical mermaid has the head and body of a lovely woman to the waist, ending in the tail of a fish with fins and scales. She has long and beautiful hair, and is often seen above the surface of the water, combing it with one hand while in the other she holds a mirror. She often discloses what is about to happen, and not seldom gives supernatural knowledge and powers to a favoured mortal—a thing in perfect keeping with primitive notions of sorcery, which easily attributed exceptional powers to beautiful women, as Lilith and Circe. Again, she sometimes exercises a special guardianship over an individual, and avenges his wrongs; but her relation to man most often brings with it disaster. There are many stories of mermaids who have fallen in love with men, or been detained through the possession of the skin which they had stripped to dance on the shore, and who have been faithful wives and mothers until they found an opportunity to return to the sea. And there are examples of the converse case of a mermaid falling in love with a man and enticing him to go and live with her under the sea, as well as of a merman bewitching and carrying off a mortal maiden.

Such are the principal forms of mermaid stories found everywhere, with more or less artistic elaboration. The Danish *Hafmand* or *Maremind*, the Irish *merrow* or *merruach*, the Breton *Marie-Morgan*, the Russian *rusalka* or stream-fairy and *vodyany* or water-sprite, some forms of the Teutonic *nixies*, and the enchanting Sirens of classical mythology have all close affinities with each other in the dangers they bring to men, the beauty and joyousness of their lives, and yet the gloom of sadness that overhangs them. In their malignant aspect they touch the general doctrine of Demonology (q.v.), and may be explained on an animistic theory of its origin. To the beauty of the conception and the elaborations of which it is capable in the popular imagination we owe some of the loveliest of our folk-tales as well as such delightful artistic tales as *Undine* and many fine poems of the ages of literary culture. One of the most detailed stories of this class is that of Melusine (q.v.). The mermaid had a firm hold of the imagination of our fathers. One caught at Edam in 1403 was carried to Haarlem, learned to spin, and showed a becoming reverence for the cross. See Baring-Gould's *Popular Myths of the Middle Ages*.

Mermaid's Purse, the popular name of the egg-case of the skate or other cartilaginous fish.—*Mermaid's Gloves* is a common British sponge, *Chalina oculata*.

Meroë, capital of Ethiopia (q.v.) after the fall of Napata, stood on the east bank of the Nile near where Shendi now is. Excavations since 1902 have laid bare streets, temples, houses, an observatory, tombs, reliefs, inscriptions, pottery, bronzes, traces of extensive iron-workings, pottery kilns, and remains of wharves and landing-stages on the river, indicating vast manufacturing industry and trade. Within the city proper a royal city, a vast enclosure surrounded by a magnificent wall of cut stone, has also been revealed; in the palaces treasures of gold and of ornaments have been found, while

the royal baths admirably illustrate the character of the Meroitic arts. By the excavations at Meroë knowledge of Ethiopia has been greatly advanced. See works by Crowfoot (1911) and Garstang (1911).

Merovingians, or **MERWINGS**, the first dynasty of Frankish kings in Gaul. The name is derived from Merwig or Merovech, king of the western or Salian Franks from 448 to 457. His grandson Clovis (q.v.) established the fortunes of the dynasty, which gave way to the Carolingians (q.v.) in 752. See FRANCE, FRANKS.

Merrick, LEONARD, novelist, short story writer, and dramatist, was born in London in 1864. For a time he worked in South Africa in a diamond mine and then in a solicitor's office, and later became an actor—born Miller, he legally adopted his stage name 'Merrick' in 1898—and actor-manager. In 1889 he gave up the stage for literature, thereafter producing numerous writings as *The Actor-Manager* (novel), *Whispers about Women* (short stories), *The Man who Understood Women* (short stories), *When the Lamps are Lighted* (play). A collected edition of his works with prefatory tributes by leading novelists and dramatists appeared in 1918. Never greatly popular with the public, his literary skill is, however, much admired by other writers.

Merrimac, a river rising among the White Mountains of New Hampshire, flowing south into Massachusetts, and falling into the Atlantic Ocean near Newburyport after a course of 150 miles. It has numerous falls, affording immense water-power. The principal manufacturing towns on its banks are Manchester, Nashua, and Concord in New Hampshire, and Lowell and Lawrence in Massachusetts. It is navigable to Haverhill.

Merriman, HENRY SETON (pseudonym of Hugh Stowell Scott), English novelist, was born in 1863. For some years he was in business, but in 1892 definitely turned to literature. *The Sowers* (1896) was his first success, and outstanding among later novels were *Roden's Corner* (1898), *In Kedar's Tents* (1897), *The Isle of Unrest* (1899), *The Velvet Glove* (1901), *The Vultures* (1902), *Barlasch of the Guard* (1903), *The Last Hope* (1904). His novels are notable for construction and for excellence of plot. He died in 1903.

Merseburg, a town of Prussian Saxony, on the Saale, 8 miles S. of Halle. Its Domkirche is a four-towered pile, with Romanesque choir (1042), transept (circa 1274), and 16th-century nave—the whole restored in 1884–86. The organ (1666) has 4000 pipes; and there is a very early bronze effigy in low relief of Rudolph of Swabia, who here was defeated and slain by Henry IV. in 1080. The castle, a picturesque edifice, mostly of the 15th century, was once the bishop's palace, and afterwards (1656–1738) the residence of the dukes of Sachsen-Merseburg. Beer, iron, paper, celluloid, and machinery are manufactured. Pop. 23,000. Henry the Fowler in 934 gained his great victory over the Hungarians near Merseburg, which suffered much in the Peasants' War and in the Thirty Years' War.

Mersenne, MARIN, a constant friend of Descartes, was born in 1588, and died at Paris in 1648. He was a fellow-student of Descartes at the Jesuit college of La Flèche, and took the habit of a Minim Friar in 1611; his life thereafter was spent in study, teaching in convent-schools, and travel. He did valiant battle with numerous clerical controversialists on behalf of the orthodoxy of the philosophy of Descartes, and wrote vigorously against atheists and other unbelievers. His profound knowledge of mathematics is seen in a number of books, and in his *Harmonie Universelle*

(1636), an invaluable contribution to the science of music.

Mersey, an important river of England, separates, in its lower course, the counties of Chester and Lancaster, and has its origin in the junction of the Etherow and Goyt, on the borders of Derbyshire, east of Stockport. It flows in a west-south-west direction, and is joined on the right by the Irwell 6 miles below Manchester, from where it was made navigable to Liverpool for large vessels in the year 1720, and has had great influence on the subsequent progress of the two towns. Besides the Irwell the chief affluents are the Bollin and the Weaver from Cheshire. At its junction with the Weaver the Mersey expands into an estuary about 16 miles long and from 1 to 3 miles broad; opposite Liverpool it is a mile and a quarter in width, with a considerable depth at low-water. On its Cheshire side is the entrance to the Manchester Ship-canal. The estuary is much obstructed by sandbanks, but the excellent system of pilotage in practice, combined with the skilful and admirable construction of the sea-walls, renders the navigation comparatively secure. A railway tunnel connecting Liverpool and Birkenhead has been in successful operation since 1886. A road tunnel is projected. The alluvial meadows on the banks of the Mersey are famous for their fertility, and many thousands of acres of the most valuable land in the two counties have been reclaimed. The basin of the Mersey extends over an area of 1706 sq. m., which includes the larger portion of Lancashire and Cheshire; length including estuary 70 miles.

Merthyr-Tydfil or **Tydfil** (so called from the martyrdom here of a Welsh princess of that name), a parliamentary and county borough of South Wales, on the confines of the counties of Glamorgan and Brecknock, 24 miles N. by W. of Cardiff, its port, and 178 W. of London. Pop. (1801) 7705; (1921) 80,116. Surrounded by lofty and bleak hills, the town stands on the banks of the river Taff, and is partly built on slag foundations, the refuse of mines in the vicinity. Its streets are for the most part narrow and irregularly built, and the public buildings of little architectural interest, but since the formation of a local board of health in 1850 great improvements have been effected in the widening of thoroughfares, water-supply, and sewage-works: previously epidemics of great severity were frequent. The board of health became an urban district council in 1894. The town, with Dowlais, Penydarren, and other outlying districts, was made a county borough in 1908. The sole industries, upon which the whole population is more or less directly dependent, arise from the numerous collieries and iron and steel works in the vicinity; Merthyr being the centre of the Glamorganshire coalfield, and as such having excellent railway communication with all parts. With Aberdare it is noted for the excellence of its steam coal, and the quantity of iron and steel annually turned out from the great works of Dowlais, Cyfarthfa, and Plymouth is enormous. In 1816, and again in 1831, the town was the scene of severe riots, on the latter occasion the disturbance not being quelled by the military without a loss of twenty-three lives. The parliamentary borough comprises two divisions, Merthyr-Tydfil, which is coterminous with the borough, and Aberdare, comprising the parishes of Aberdare and Llanwono, each having one member.

Merton and Morden, an urban district of Surrey, 10 miles SW. of London, on the Wandle, has several factories. Only fragments remain of the Augustinian priory (1115) in which the parliament met which passed, in 1235, the Statute of

Merton (see **LEGITIMATION**). Here were educated Thomas Becket and Walter de Merton, Bishop of Rochester and Chancellor, who in 1264 founded Merton College, at Oxford. The church is mainly of the same date as the priory. Pop. 17,500.

Meru, in Hindu Mythology, a fabulous mountain in the centre of the world, 80,000 leagues high. It is the most sacred of all mythical mountains, and the abode of Vishnu.

Meru, LAKE. See **MOERO**.

Merv, a oasis of Turkestan (Turkoman Republic) between Bokhara and the north-eastern corner of Persia, 512 miles by rail (1886) from the Caspian, and 118 from the Oxus. Sixty miles long by 40 broad, it is watered by the Murghab; grows wheat, sugar, grass, cotton, and silk; has a hot, dry climate; and is inhabited by about 150,000 Tekke Turkomans. The site of Old Merv at Bairam-Ali is covered with ruins far and wide. Thirteen miles off, across the Murghab, a small Russian town has grown up. The men are clever workers in silver, and breed horses, camels, and sheep; the women weave silk and make carpets. Merv or Mouru is mentioned in the *Zend Avesta*. There Alexander the Great built a town. The oasis was held successively by the Parthians and the Arabs, who made the city of Merv capital of Khorassan. It was the seat of a Nestorian archbishop in the 5th century, and of a Greek archbishop in the 14th; and in the 8th it was the headquarters of Mokanna (q.v.), the 'Veiled Prophet of Khorassan.' Under the Seljuk Turks Merv enjoyed its period of greatest splendour, especially under Sultan Alp Arslan. It began to fall into ruin after being taken and sacked by the Mongols in 1221. From the Uzbeks it passed in 1510 to the Persians, who lost it in 1787 to the emir of Bokhara. In 1856 the Turkomans made themselves masters of the oasis; but they in turn submitted to the Russians in 1883. The great dam for irrigation purposes at Sultanbend, destroyed in 1784, was restored in 1909. Merv occupies an important strategic position at the intersection of the routes Bokhara-Meshhed and Khiva-Herat. A railway from Merv runs up the Murghab valley to Kushk (200 m.) near the Afghan frontier. See **TURKESTAN, ASIA (CENTRAL)**.

Méryon, CHARLES, etcher, was born at Paris, the son of an English physician, in 1821. Leaving the navy, he devoted himself to art, but despite undoubted genius and great technical skill, he found little appreciation in his own day, and died insane at Charenton Asylum, 13th February 1868. His sombre and imaginative etchings of streets and buildings in Paris are now very highly esteemed. See books by Wedmore (1879) and Bouvenne (1883), Burty's monograph (trans. 1879) and Stokes's (1905).

Mesa. See **NEW MEXICO**.

Mescal, a Mexican intoxicant prepared from Agave (q.v.), opens a paradise of colour, leaving the judgment clear.

Mesdag, HENDRIK WILLEM (1831-1915), 'the painter of the North Sea,' born at Groningen, was one of the best of marine painters. Specially famous were his 'Sunrise on the Shores of Holland' and 'The Return of the Fishing Boat.' See monograph by Zilcken (trans. 1896).

Mesembriaceæ, **FICOIDEÆ**, or **AIZOACEÆ**, an order of archichlamydeous dicotyledons, comprising succulent shrubs, herbaceous perennials and annuals with opposite leaves, often of fantastic shape; in the 18 genera are over 400 species, mainly belonging to Mesembrianthemum. They are inhabitants of warm regions chiefly, especially the Cape and the South Sea Islands. The typical genus is also the most important in regard to utility and beauty. It furnishes the Ice Plant (q.v.) of our

gardens, and many other beautiful and curious species are to be met with in our greenhouses. *M. nodiflorum* is employed in the manufacture of Morocco leather, and furnishes abundance of alkali. The Kou of the Hottentots is *M. anatomicum*, the roots, stems, and leaves of which they collect and beat and twist together, and then ferment, for the purpose of chewing to allay thirst. If chewed immediately after fermentation it is narcotic and intoxicating. It is the Canna Root of the South Africans. The Hottentot's Fig (*M. edule*) is abundant on the sandy plains of the Cape of Good Hope, and the fruit and leaves are eaten. The fruit of *M. equilateratum* is named Pigs'-faces in Australia, and is eaten by the natives; that of *M. geniculiflorum* is ground into flour in Africa and made into bread, as is that of the Ice Plant. The Flower of Crete is the seed-vessel of *M. Tripolium*, which in the rainy season expands in the form of a star, allowing the seeds to escape. The name should be spelled Mesembriaceæ, as it is from the Greek *mesēmbria*, 'mid-day,' because the flowers bloom usually at mid-day. See MIMICRY.

Mesentery (Gr. *meson*, 'middle;' *enteron*, 'intestine') is the broad fold of peritoneum (the great serous membrane of the abdomen) which attaches the intestines (strictly the small intestine; for special names have been given to the corresponding structure in connection with the different parts of the large intestine) posteriorly to the vertebral column. It serves to retain the intestines in their place, while it at the same time allows the necessary amount of movement, and it contains between its layers the blood-vessels and nerves which pass to them, the lacteal vessels, and mesenteric glands. These glands are 100 to 150 in number, and are about the size of an almond or smaller. The only disease of any importance affecting these glands is Tubercle (q.v.), which, when extensively developed in them, is sometimes called *tabes mesenterica*. See also ANEMONE (SEA).

Meshhed ('the place of martyrdom,' also spelt *Meshed* and *Mashhad*), the principal city of north-eastern Persia, the capital of Khorasan, and the centre of important trade routes. The city stands on a tributary of the Hari-Rud, 460 miles E. by N. from Teheran, 230 N.W. of Herat, and has a beautiful appearance when seen from a distance. Above the walls, which are of great circuit, shine the gilded dome and minarets of one of the most splendid mosques of the East, that built above the tomb of Imâm Riza, a follower of Ali, and the eighth imâm of the Shiite sect. Meshhed is the sacred city of the Shiites, and is held in as much veneration by them as Mecca is by the Sunnite Moslems; it is visited every year by over 50,000 pilgrims. The city is bisected by a wide tree-shaded street, down the middle of which flows a muddy current between low stone walls. It has another handsome mosque, and several colleges and caravanserais. The people make excellent felt-rugs, carpets, swords, turquoise jewellery, velvet, and cotton and silk goods. Cotton, wool, opium, dried fruits, turquoises are exported to Russia, India (*via* Nushki), and Afghanistan. The Transcaspian Railway gives Russia the predominance in trade with Meshhed. The transit trade has declined. The fixed population is about 80,000. Owing to its elevated situation (3055 feet) the city has a cold winter; the summer temperature ranges from 76° to 106° F. Fourteen miles NNW. are the ruins of Tus, the old capital of Khorasan, where Firdausi and Haroun-al-Raschid were buried.

Meskoutin, or HAMMAM MESKOUTIN ('the Accursed Baths'), a place in Algeria, 48 miles (77 by rail) E. by N. of Constantine, with remarkable hot baths (203° F.), known to the Romans as *Aquæ Tibilitinae*. They and the adjoining ferruginous and sulphureous springs (170°) are still used medicinally. The incrustations of carbonate of lime and clouds of steam, &c. give the region a very singular appearance.

Mesmer, FRIEDRICH ANTON or FRANZ (1734-1815), the founder of the doctrine of Animal Magnetism (q.v.), was born near Constance. He was bred for the priesthood at Dillingen and Ingolstadt, but took up the study of medicine at Vienna, and took his doctor's degree in 1766 with a treatise *De planetarum influxu*. About 1772 he began with a Jesuit, Hell, to investigate the curative powers of the magnet, and was led to adopt the opinion that there exists a power, similar to magnetism, which exercises an extraordinary influence on the human body. This he called animal magnetism, and published an account of his discovery, and of its medicinal value, in 1775. In 1778 he went to Paris, where he created a great sensation. His system obtained the support of members of the medical profession, as well as of others; but he refused an offer of an annual pension of 20,000 livres (about £800) to reveal his secret; and this, combined with other circumstances, gave rise to suspicion, and induced the government in 1785 to appoint a commission, composed of physicians and scientists (Bailly, Franklin, Lavoisier, &c.), whose report was unfavourable to him. He now fell into disrepute, and, after a visit to England, retired to Meersburg, in Switzerland, where he spent the rest of his life in complete obscurity.

See Lives by Kerner (1859) and P. A. Graham (1890); Podmore's *Mesmerism and Christian Science* (1909); and HYPNOTISM.

Mesoderm. See EMBRYOLOGY.

Mesolonghi. See MISSOLOGHI.

Mesopotamia ('between the rivers'), the district between the Tigris and Euphrates, from the foot of the Armenian mountains to near Bagdad. The name (loosely applied to the old vilayets of Mosul, Bagdad, and Basra) is the Greek equivalent of the old Aramaic (Syrian) Aram-Naharaim, and became current after Alexander's Asiatic conquests; the Arabs call the district El-Jezira ('the island'). Mesopotamia proper (55,000 sq. m.) is level, and falls from an altitude of 1100 feet in the north-west to 160 feet in the south-east, where the alluvial region of Babylonia begins. The soil is sandy, but when well watered or, as it was in ancient times, well irrigated, it develops extraordinary fertility. Yet after the Turks (Seljuks) made themselves masters of the region (1515) it fell more and more a prey to barrenness and neglect. Having been in the possession successively of the Assyrians, Babylonians, Persians, Greeks, Romans, Arabs, Turks, and British, and many a time and oft the battle-ground between the armies of these mighty empires, its records are full of stirring events and great changes and vicissitudes. See ASSYRIA, BABYLONIA, IRAQ, EUPHRATES, and TIGRIS, and articles on the various ancient cities.

Mesozoa, a term applied by Van Beneden to a few very simple organisms which he regarded as intermediate between Protozoa (unicellulars) and Metazoa (multicellular animals). This may well be, but it is probable that some are simplified as the result of parasitism. There are various types—e.g. Dicyemids, parasitic in cuttle-fishes; and Orthonectids, parasitic in Turbellarians, in Brittle-stars, and in Nemerteans.

Mesozoic (Gr., 'middle-life'), a term introduced

by Professor Phillips to designate the group of geological systems, the fossil remains of which differ equally from those of the Palæozoic ('ancient-life') and Cainozoic ('newer-life') eras. It is synonymous with the term Secondary, and includes the Triassic, Jurassic, and Cretaceous systems.

Mesquite. See MEZQUITE.

Mess (Fr. *metts*, Old Fr. *mes*, Ital. *messò*, 'a dish,' from Lat. *missum*, 'sent,' or 'served up') originally signified a dish or portion of food. In the British army and navy the men are divided into 'messes' of whatever number is most convenient for taking their meals together. In the army each man, unless married, or for other reasons allowed to live out of mess, pays a daily rate to his mess for the provision of extras above the Government Ration (q.v.), which is managed by a non-commissioned officer under the supervision of an officer. *Sergeants' Messes* are run like a club, managed by one of themselves under a committee of sergeants supervised by an officer, the adjutant if possible. *Officers' Messes* are very similar, but on a larger scale. All officers also pay a monthly subscription towards keeping up the mess establishment, such as furniture, liveries, wages of servants, table-linen, &c. The affairs of the mess are managed by a committee of officers presided over by the senior member.

In the British navy there are on the large ships various messes. The 'ward-room,' which includes all officers from sub-lieutenant to captain (who messes by himself); the 'gun-room, the junior rank of officers; and the warrant-officers' mess. On small ships ward-room and gun-room are joined.

Messenger, ANDRÉ CHARLES PROSPER, born at Montluçon in 1853, was a pupil of Saint-Saëns, and had produced two operettas and a ballet when his comic opera *La Basoche* (1890) made him popular in London as well as at home; followed by *Madame Chrysanthème*, *Mirette*, *Les Petites Michus*, and *Véronique* (1898).

Messala, or MESSALLA, a cognomen adopted from the relief of Messana (Messina) in the Roman war with the Carthaginians in Sicily in 263 B.C. by the consul Marcus Valerius Maximus Corvinus. The most famous of the family was Marcus Valerius Maximus Corvinus Messala, who fought on the republican side at Philippi in B.C. 42, but, pardoned by the triumvirs, became one of the generals and friends of the Emperor Augustus. He was intimate with Horace and Tibullus, encouraged Ovid, and was a conspicuous patron of literature and art. He was an accomplished (if affected) orator, and wrote historical works as well as poems in Latin and in Greek; but none of his works have been preserved.

Messalina, VALERIA, the daughter of Marcus Valerius Messala Barbatus, and wife of the Roman emperor Claudius (q.v.), a woman infamous for her avarice, her lust, and her atrocious cruelty. Taking advantage of the weakness and stupidity of the emperor, she played the harlot without restraint, and murdered all who murmured at her gilded shame. The best blood of Rome flowed at her pleasure; among her victims were the daughters of Germanicus and Drusus, Justus Catonius, M. Vinicius, Valerius Asiaticus, and her confederate Polybius. During a temporary absence of the emperor she went so far in open shamelessness as publicly to marry C. Silius, one of her favourites. The blinded emperor's eyes were at last opened by his freedman Narcissus, and he was persuaded to give orders for her execution. She was put to death by Euodus, a tribune of the guards, in the gardens of Lucullus, 48 A.D.

Messapians, an ancient race inhabiting the

heel of Italy, possibly identical with the Iapygians; Calabria being also called in ancient times Messapia and Iapygia. The Messapians were of the Indo-European stock, possibly originally from Illyria (see ITALY, in the section on Ethnology); of their language some fifty brief inscriptions only remain.

Messenger-at-Arms, in Scots Law, an officer appointed by and under the control of the Lyon-King-of-Arms (see HERALD), employed to execute summonses civil and criminal, in connection with the Court of Session and the Court of Justiciary.

Messengers, KING'S, in the home service carry letters and despatch-boxes from and to the palace, or between various officials. On a much higher footing stand the Foreign Service Messengers, who convey despatches to and from his Majesty's embassies and legations abroad and the Foreign Office. They are usually of good social standing, and are nominated by the Secretary of State for Foreign Affairs only after passing a qualifying examination in modern languages, arithmetic, horsemanship, and other relevant accomplishments.

Messenia, in ancient Greece, the western of the three peninsulas that project southwards from the Peloponnesus, bounded on the E. by Laconia, and on the N. by Arcadia and Elis. Composed chiefly of fertile plains, separated by mountain-chains and watered by the Pamisus and other streams, it yielded abundant corn and wine. The original Pelasgic inhabitants were conquered by the Dorians, but soon absorbed their conquerors and rose to great prosperity. This excited the envy of the Spartans, who waged two long wars (743-724 and 685-668) against the brave Messenians. Most of those who survived the second war emigrated to Sicily, where they took possession of Zancle, and changed its name to Messana, the present Messina. Those who submitted to Sparta were made helots; but they revolted and waged a third war of ten years' duration (from 464). The survivors settled in Naupaktos. After the battle of Leuctra (370) Epaminondas invited the descendants of the Messenians back to Greece, and they joyfully responded to his invitation; for them he founded the new capital, Messene. Their independence continued till the Roman conquest in 146 B.C. Messenia is the name of a nomarchy of the modern kingdom of Greece, producing currants, figs, oil, and wine.

Messiah (Heb. *Mashia'h*, equivalent to the Greek *Christos*, 'Anointed'), in the Old Testament, the great Deliverer and Saviour, whom the Jews expected to be sent by God, not only to restore their country to the power and splendour of the days of David, but even, by compelling the Gentiles to acknowledge the supremacy of the theocratic people, to raise it to the summit of universal dominion. See CHRIST, JESUS, JEWS, BAR-COCHBA, SABBATAI ZEVI, ANSARS, ISMAÏLIS, and MAHDI; and the articles in *Hastings's Dictionary of the Bible* and *Dictionary of Christ and the Gospels*, and in the *Jewish Encyclopædia*.

Messina, the second city of Sicily, stands on the western shore of the strait of the same name, 110 miles E. by N. of Palermo, and 195 SSE. of Naples. The city occupies a narrow strip of coast between the harbour and the hills behind; the opposite or eastern side of the harbour is formed by a sickle-shaped tongue of rock, that only leaves a narrow entrance on the north. Although a very ancient city, Messina possesses few antique buildings or remains. The destructive hands of enemies, and the still more destructive agency of earthquakes, are responsible for this. The greater part of the city was laid out, regularly, with handsome houses after the earthquake of 1783. The cathedral was begun by Count Roger the Norman in 1098, but had been almost wholly rebuilt when it

was destroyed in 1908. It had a gorgeous high-altar and *baldachino*, and a venerated treasure in a reputed letter of the Virgin to the townsmen; and, like the churches of St Gregory and St Nicholas, was adorned with magnificent mosaics. The citadel was built by Charles II. of Spain in 1680, the Gonzaga Castle in 1540, and another castle in 1547-57. The city was destroyed, along with Reggio and other towns in Calabria and Sicily, by the great earthquake of the 28th December 1908, by which, according to an official estimate, over 77,000 lives were lost. Messina is an archbishop's see. Industry is confined chiefly to muslin, linen, and silk goods, the working of coral, and the preparation of fruit essences. Messina is among the principal Italian ports. The exports embrace principally fruits and their manufactured products, such as wine, essences, citrate of lime, olive-oil, seeds. Pop. (1921) 176,405.

Founded in 732 B.C. by the people of Cumæ, the place was first called *Zancle* (i.e. a sickle), and through the commercial enterprise of its people rapidly grew in prosperity. In 495 Anaxilas of Rhegium seized the town and changed its name to *Messana* (Messene). The Carthaginians conquered it and destroyed it in 396, and in 288 it fell into the hands of the Mamertines, who again changed its name to *Mamertina*. The intestinal quarrels of these people gave occasion to the outbreak of the Punic war between Carthage and Rome, on the conclusion of which (241 B.C.) the city became Roman, and in 535 A.D. passed to the Eastern Empire. The Saracens took the city in the 9th century, and were only expelled in the 11th century by the Normans. Here the Sicilian Vespers' massacre raged in 1282, and from that year down to 1713 Messina belonged to Spain. The people revolted in 1671 and were backed up by France, but were reduced to submission in 1678, and at the same time deprived of their privileges of self-government. Then in 1743 the plague, and forty years later an earthquake, came to complete the ruin of the city. It was, moreover, bombarded by the Neapolitans in 1848, and in 1861 it was the last place in Sicily to yield to the Sardinian (Italian) troops. The province of Messina has an area of 1254 sq. m., and a pop. (1921) of 582,064.

Messina, STRAIT OF (Lat. *Mamertinum fretum*, or *Fretum Siculum*), separates Italy from Sicily, is 24 miles in length, and varies from 2½ to 14 miles in breadth. Since 1879 a scheme for making a railway tunnel under the strait has been under discussion. See SCYLLA AND CHARYBDIS.

Meštrović, IVAN, Croat sculptor, born in 1883 in northern Dalmatia, a peasant's son, kept sheep as a boy, was taught wood-carving by his father, was apprenticed to a marble-cutter at Spalato, and studied sculpture at Vienna. He designed the Serb national temple for Korsovo. Always direct and simple, he works in many mediums, and in all of them shows consummate mastery. His statuary is architectural, and springs from the crude heart of Slavonia.

Metabolism, a general term for the chemical changes of living matter. See FUNCTION, PHYSIOLOGY (VEGETABLE), PROTOPLASM.

Metacentre. See HYDROSTATICS.

Metallography is an important branch of metallurgy, dealing with the microscopic examination of the structure of metals and alloys. Dr Sorby of Sheffield, the founder of the science of petrology, applied his methods to the study of iron, and developed the technique of the preparation of microscopic sections in 1864. A few years later Martens, working independently, examined many specimens of cast iron and steel. Little progress

was thereafter made until Osmond, between 1883 and 1894, published his researches on carbon steels, which stimulated interest in the subject to such an extent that microscopic examination is now as indispensable as chemical analysis in every metallurgical laboratory.

A convenient size for a metallic microsection is about ½ inch in diameter by ¼ inch in thickness. It is first filed or ground to a smooth surface, then rubbed upon emery-paper of three or four grades of increasing fineness. The final polish is given on a rotating disc covered with polishing cloth, which is damped and well rubbed with a finely divided abrasive, such as alumina or rouge. After this treatment the specimen should show a mirror-like surface, without any trace of scratches. The structure must then be developed by treatment with liquid etching reagents. These are generally of an acid character, chosen on account of their selective chemical action on the separate micrographic constituents. Hydrochloric acid is used for white metals, nitric and picric acids for iron and steel, acid ferric chloride for bronzes, ammonia for brasses. As metals are opaque even in very thin slices, it is necessary to examine the specimen by reflected light. A beam of light is introduced into the microscope tube above the objective, and falls upon a thin microscopic cover-glass set at an angle of 45° to the optical axis. Part of the light is reflected downwards through the objective, falls upon the specimen, and is reflected back through the objective and cover-glass to the eye-piece. The structural constituents which have been attacked by the etchant then appear darker or coloured, while the remainder of the surface is unaffected. The structure and properties of an alloy vary with its composition, heat treatment, and mechanical treatment. Composition only can be determined by chemical analysis. The microscope decides as to the structural suitability of an alloy for its destined commercial use, and in investigating causes of breakage or failure it is indispensable to the modern metallurgist.

See Desch, *Metallography*; Guillet and Portevin, *Metallography and Macrography*.

Metallurgy is a word of Greek derivation, and signifies 'metal working.'

(1) ANCIENT METALLURGY.—As the advance of civilisation in every age may be measured by the progress of metallurgy, the subject is of extreme interest from the ethnological point of view.

The first metals used by man were gold, silver, and copper, as these are found in nature in the metallic state. The earliest metal users were probably the ancient Egyptians, who were extremely expert in fashioning delicate gold jewellery and gold and silver vessels of various kinds. Gold ornaments found in Egyptian tombs have been ascribed to a period 7000 B.C. In the time of Rameses II. (1330 B.C.) the mines of Nubia are said to have yielded gold to the value of £125,000,000 per annum, and we find it stated in the Old Testament that 'silver was not any thing accounted of in the days of Solomon' (1000 B.C.).

In western Asia archaeologists have unearthed vases, goblets, jugs, and ornaments of silver of beautiful workmanship belonging to a period 3000-2000 B.C., the analyses of which indicate that the process of cupellation was then known.

For the manufacture of tools and weapons copper was, in most cases, probably the first metal employed, as copper is harder than the precious metals, and can be made much harder by hammering. In Egypt and Mesopotamia pure copper preceded bronze; copper may have been used in Egypt as early as 8000 B.C. The oldest copper mine known was in the Sinai peninsula, where copper was produced

during the 1st Dynasty (5600–5300 B.C.). After that mine was exhausted copper is said to have been brought from Cyprus, from which the metal derives its name. In Egyptian tombs, copper axes and chisels of this period are frequent, while harpoons, fish-hooks, needles, and other objects have been found of a much earlier date. Similar objects of later origin have been discovered in Mesopotamia.

The earliest Egyptian implements were hammered into shape, casting being unknown. This was also the case in the Lake Superior district, where numerous knives, axe-heads, and ornaments of copper bearing the marks of hammers, show that the North Americans were unacquainted with the process of melting and casting. Casting probably began in Egypt about 5600 B.C. During the period of the 2d Dynasty (5300–5000 B.C.) beautiful vessels were cast in copper and bronze, the metal of which is not more than $\frac{1}{8}$ inch thick.

Bronze is an alloy of copper and tin, and would have been discovered by smelting an ore containing both of these metals. This must have been the case in Britain, where native copper was not found. Copper and tin ores were smelted in Cornwall, and in Roman and earlier times large quantities of tin were exported to the continent of Europe for bronze-making, hence the Bronze Age in Britain (2000 B.C.) was not preceded by a copper age. The results of researches in lake-dwellings indicate that in Europe copper was used for a short period before bronze. In the European Bronze Age gold is seldom met with. Metallurgical appliances, such as large anvils, moulds, and crucibles, show that casting was well known, and slag scoriae and furnace refuse furnish evidences of the practice of smelting.

The smelting process was undoubtedly discovered by a primitive man who built up his wood fire with lumps of ore instead of stone. Among the ashes he found a piece of reduced metal, which had the property of malleability, and could be fashioned into any shape by hammering. From this the first metallurgical furnace was evolved, consisting merely of a hole in the ground in which ore and fuel were heated together. If an iron ore, such as hematite, were used, malleable iron would have been obtained, which could be easily forged at a red heat. Iron-making is still carried on in almost as primitive a fashion in Africa and India, and in the Catalan forge of the Pyrenees.

The earliest record of iron in Egypt is the discovery of some iron beads dating from 6000 B.C., but these were in all likelihood made from meteoric iron, as iron appears to have been first used for making weapons about 4000 B.C. It is not known definitely when and where iron smelting originated, but it was certainly practised in Africa and India in very early times, and was introduced into Europe from the East about 1300–1000 B.C. In prehistoric and early historic times there was an important trade in Indian steel between India and the coasts of Arabia and the Red Sea; the steel smiths of Persia were also celebrated for the manufacture of swords.

If the translations from the Hebrew words in the Old Testament are correct, the Jews were acquainted with six metals—gold, silver, copper, iron, lead, and tin. In the book of Job we find one of the first metallurgical references: 'Surely there is a vein (a mine) for the silver, and a place for gold where they fine it. Iron is taken out of the earth, and brass is molten out of the stone.'

In Greek and Roman times considerable progress was made in metallurgy, especially in the production of iron. The Romans were familiar with the smelting of lead, and used the metal for making, among other things, baths, water-pipes, and writing tablets. Soldering with lead, or a lead-tin alloy,

was also well known, as well as the purifying of silver and gold by fusion with lead. Large quantities were taken from Britain, where many pigs of lead have been discovered bearing the names of various Roman emperors. Tin and mercury were also prepared in quantity and used for many industrial purposes.

The first descriptions of metallurgical processes are found in the *Naturalis Historia* of Pliny the Elder, who collected at the beginning of the Christian era all the information available at that time about metals.

During the next 1500 years metallurgical progress was slow; iron mines were worked in Asia Minor, Spain, Gaul, and Britain, and in the 7th century in Bohemia and Saxony. In 1530 a general treatise, *De Re Metallica*, was written in Venice by Agricola, which marks the beginning of a new period of systematic metallurgy. He has been called 'the father of metallurgy,' and some of his processes have undergone little material change up to the present day. Between the 16th and 18th centuries zinc, antimony (though Flinders Petrie says this metal was known to the ancient Egyptians), bismuth, arsenic, manganese, platinum, nickel, and cobalt were discovered; the remaining metals are products of the 19th century.

See Gowland in *Journal of Royal Anthropological Institute*, xlii. p. 235–287; Flinders Petrie, *Tools and Weapons*, and articles in *Ancient Egypt*; Lavard's researches in Mesopotamia; Munro's *Lake-dwellings of Europe*.

(2) MODERN METALLURGY.—The term metallurgy, in its modern sense, includes the extraction of metals from their ores, the further refining and treatment required to fit them for their commercial uses, the mixing of metals to produce alloys, and the study of the structures of metals and alloys as revealed by the microscope and the X-rays (see METALLOGRAPHY). A few of the noble metals, such as platinum, gold, silver, and occasionally copper and mercury, are found in the metallic state. Other metals occur in nature, mainly in combination with oxygen as oxides, with sulphur as sulphides, with oxygen and carbon dioxide as carbonates, and with oxygen and silica as silicates. These metallic compounds are generally associated with a quantity of useless earthy material or gangue, the mixture being known as an ore. The first step in the extraction of a metal is to get rid of as much as possible of this worthless gangue, which would tend to choke up furnaces, and by absorbing heat cause a waste of fuel. For this purpose concentration methods are employed, which generally depend on the difference in specific gravity between the metal and the gangue. The usual modern methods are in this order—hand-picking, magnetic separation, jigs, shaking tables, froth flotation. See ORE-DRESSING. After concentration, sulphide ores are roasted to drive off sulphur either partially or completely; in the latter case the metallic oxide is left, and the ore is said to be dead roasted. The sulphur dioxide produced may be used for the manufacture of sulphuric acid. Carbonate ores are also calcined to get rid of carbon dioxide. If the smelting furnaces are at a considerable distance, calcination is preferably carried out at the mine, as the ore loses weight in the process, and thus freight costs are reduced. The roasting furnace is usually of the reverberatory type. It may be 6 feet long, 16 feet broad, and 3 feet high between bed and roof. At one end is the fire grate, the flame from which sweeps over the hearth, drawn by the chimney draught at the other end. Multiple hearth and muffle furnaces are also frequently used. Generally speaking, the product obtained from the roasters consists of impure metallic oxide. Copper and nickel

sulphides are not dead roasted, and the roasted ores contain both oxide and sulphide. The next step is the reduction of the oxide to metal in the smelting furnace. This may be of the vertical shaft type, like the iron blast-furnace, or it may be of similar design to the reverberatory roasting furnace. The latter is coming more into favour in modern practice, as the universally used concentration processes produce a large quantity of *finer*, which would choke up a shaft furnace and render it unworkable. The charge of a smelter consists of ore, fuel, and flux. The fuel, which may be either coal or coke, serves two purposes. By its combustion it provides the heat necessary to promote the chemical reactions, and it supplies the reducing agents required to abstract oxygen from the metallic oxide and set free the metal. Carbon at high temperatures readily unites with oxygen, the first stage of its combustion producing carbon monoxide. This compound has still a strong affinity for oxygen, and owing to its gaseous state can come into more intimate contact with the ore particles than the solid carbon. Carbon monoxide is thus the chief reducing agent in the smelting process. Although the ore has probably been concentrated it still contains gangue, and to remove this a flux is required. For metallurgical purposes we may divide oxides into two classes, basic oxides and acidic oxides. An acidic oxide can unite with a basic oxide, but combination does not generally take place between oxides of the same class. If, then, the gangue is mainly of a siliceous nature containing the acid oxide silica, a basic flux like limestone is required. If the gangue is basic, an acid or siliceous flux is needed. At the high temperature of the furnace the flux forms a molten compound with the gangue known as slag. The molten metal trickles down the furnace, forming a pool at the base, and on top of it floats the lighter slag, protecting it from oxidation. The smelting process, of course, varies considerably in detail with the kind of ore under treatment. The metal may be obtained in the liquid state and poured into moulds, or, as in the case of zinc and mercury, as a metallic vapour, which is then condensed. Cinnabar or mercuric sulphide simply requires the application of heat to set the metal free. From some sulphide ores, for example, galena or lead sulphide and cinnabar, the metal may be liberated by smelting with a flux containing iron, which combines with the sulphur, forming sulphide of iron. The product obtained by smelting copper and nickel sulphide ores is not pure copper or nickel, but a compound known as matte. The further treatment of matte is carried out in a Bessemer converter, and consists in blowing air through the molten metal to oxidise the impurities, which are then eliminated either in the gaseous state or in the slag. The Bessemer converter is also used in producing steel from pig-iron. See IRON AND STEEL.

The foregoing are a few typical examples of what may be called pyrometallurgical processes, but in addition to these hydrometallurgical processes are in common use.

These depend on the solubility of the metallic part of an ore in liquids such as water, sulphuric acid, solutions of chlorine and potassium cyanide. The ore is finely crushed and leached with the solvent with continuous agitation. From the solution thus obtained the metal may be recovered by electrolysis, or precipitated by the addition of some cheaper metal which can displace it. For example, gold is precipitated from cyanide solutions by metallic zinc, copper and silver from their solutions by iron. Metallic solvents are also used. Silver ores are treated with molten lead or smelted with lead ore; the silver dissolves in the lead, and

can be recovered by suitable methods. Mercury is employed in the extraction of gold and silver on account of its power of dissolving these metals, forming alloys known as amalgams.

An important modern development in metallurgy is the great extension of the use of electro-metallurgical methods. The electric arc furnace is used for smelting and refining, and contains carbon electrodes suspended either vertically or obliquely over the bath. The current forms an arc between the electrode and the charge, passes through the ore or metal, and either forms another arc with a second suspended electrode or goes to an electrode in the base of the furnace. A temperature of over 3000° C. can be attained. In steel-making the arc furnace can produce a pure metal of easily controlled composition from impure materials. Electrolytic processes have also a wide application. The production of the useful metal aluminium has been made a commercial possibility only by the use of the electric current. The metals magnesium, calcium, potassium, and sodium are exclusively prepared by electrolysis of their fused salts, and many metals, such as copper and zinc, can be obtained by electrolytic methods in a state of purity not attained by other means. The commercial success of this branch of metallurgy depends, of course, upon the cost of current, so that electro-metallurgical processes tend to concentrate in places like Norway, Niagara, and Kinlochleven and Foyers in Scotland, where water-power is available.

The progress of metallurgy in late years has been, perhaps, as much along the lines of improving and cheapening established processes as discovering new methods. Great attention has been paid to the scientific designing of furnaces, to more efficient methods of firing, and to heat conservation. Firing by oil and by powdered coal are coming increasingly into use. Fuel oil is vaporised or atomised, mixed with air, and sprayed into the hot furnace; coal is pulverised to pass a 200-mesh sieve, carried upon an air-blast into the furnace and burnt. These methods of firing are clean, smokeless, and easily regulated; they give perfect combustion, develop the full heating-power of the fuel, and reduce labour costs. Some types of metallurgical furnaces are heated by producer-gas, the regenerative system being employed. By this method the hot gases which are the products of combustion pre-heat the incoming gas and air, the result being a considerable saving of fuel.

See Gowland, *Metallurgy of Non-ferrous Metals*; Hofman, *General Metallurgy*; Schnabel and Louis, *Metallurgy*; Turner, *Metallurgy of Iron*.

Metal Mountains. See ERZGEBIRGE.

Metals.—The chemical elements are frequently divided into metals and non-metals, but it is impossible to make a sharp distinction between the two classes.

A metal may be defined chemically as an element which can replace hydrogen in acids to form a series of salts. Metals unite with oxygen to form basic and sometimes acidic oxides, functioning in the former as metals, and in the latter as non-metals. There are also amphoteric oxides, which may be either basic or acidic, and in these the same element plays a metallic or a non-metallic part according to circumstances.

There are certain physical properties, however, which are generally associated with the term 'metal,' such as 'metallic lustre,' high specific gravity, high melting-point, malleability, ductility, and conductivity, though these properties are also shared by some of the non-metallic elements. All metals when freshly cut or polished show a characteristic lustre, and are good reflectors of light. In many cases

the bright surface becomes quickly dulled by the formation of a film of oxide. The brilliancy of a newly cut piece of lead, for example, soon tarnishes on exposure to air, and silver, though it does not oxidise, becomes blackened by the sulphuretted hydrogen found as an impurity in the atmosphere. Those metals which have little attraction for oxygen, and retain their brightness in pure air, are sometimes called the 'noble' metals. Iridium, rhodium, platinum, gold, silver, mercury, and a few others belong to this class, and are found in nature in the metallic state. Polished metals have, in most cases, a silvery appearance, some have a slight bluish tinge, gold is yellow in colour, copper is reddish-yellow, and bismuth is faintly pink. When viewed in thin films by transmitted light, however, gold appears green, or, if the film be very thin, blue; silver also appears blue. A suspension of minute particles of gold in water or in glass—a colloidal solution—appears of a ruby colour by transmitted light. Many metals again which can take a brilliant polish are dull or black when finely powdered, owing to almost complete absorption of light and consequent loss of reflecting power. High specific gravity is also a characteristic of the more commonly used metals; it ranges from 6·8 for antimony to 21·4 for platinum. A notable exception is aluminium, sp. gr. 2·7. Lithium, sodium, and potassium, the uses of which on account of their softness and liability to oxidation, are mainly chemical, are the lightest metals, and float upon water. These and other metals which have a density not exceeding 4 are sometimes known as the 'light metals,' those above 4 being classified as the 'heavy metals.' Mercury and gallium are the only metals which are liquid at ordinary temperatures; the melting-point of mercury is -39°C . Tungsten has the highest known melting-point, variously estimated at about 3000°C . The most useful physical properties of the metals are perhaps those of malleability and ductility, which permit of their being rolled or forged to the required size or shape, beaten into leaf, or drawn into wires. Gold possesses these properties in the highest degree; gold leaf can be obtained $\frac{1}{100000}$ of an inch in thickness, and a single grain can be extended to a wire 500 feet long. Other metals again, such as bismuth and antimony, are non-malleable, and are so brittle that they can be powdered in a mortar.

Metals required for engineering purposes are subjected to mechanical tests; the chief of which are measurements of tensile strength and hardness. The former is measured by pulling asunder a test-piece of standard size in a testing machine; the greatest stress it can bear up to the point of rupture is stated in pounds or tons per square inch of its cross-section. The tensile strength of antimony is only 1000 lb., of aluminium 20,000 lb., of copper from 30,000 to 60,000 lb.; nickel-chrome alloy engineering steel can be made to bear a stress of 100 tons, and steel piano wire may stand up to 200 tons per square inch. Metallic hardness is generally measured by Brinell's method. A hardened steel ball is forced into the surface of the metal to be tested, and the depth of the indentation measured. Some comparative numbers are: lead 1·0, tin 2·5, zinc 7·5, copper 12, soft iron 14·5, mild steel 24, hardened steel 93.

The metals excel the non-metals in another useful property, namely electrical conductivity. Silver is the best conductor, and is used as a standard; but copper, on account of its comparative cheapness and non-corrosive properties, is universally employed for commercial purposes. Aluminium, although its weight for the same conductivity is half that of copper, has certain practical disadvantages, such as difficulty of making

joints and liability to corrosion, which hinder its usefulness. Metals used as conductors must be pure, as the addition of a small quantity of another metal frequently increases the resistance considerably. As little as one part in a thousand of bismuth destroys the usefulness of copper for electrical purposes.

The structure of metals is crystalline in character. When a solution of a crystalline substance, such as sugar or salt, is evaporated slowly, well-formed crystals may often be obtained of a definite geometrical shape which depends on the crystalline habit of the substance. During the solidification of a molten metal crystallisation begins at the surface and at points within the liquid, but the individual crystals are not free to assume their characteristic form, as their growth is hindered by the pressure of their neighbours. The air surfaces of ingots of lead, tin, aluminium, and antimony show beautiful fern or star-like patterns, and the 'spangled' appearance of galvanised iron is due to the large crystal grains of the zinc coating. Most of the metals may be assigned to three crystalline systems, the cubic, the hexagonal, and the tetragonal. Magnesium, cadmium, zinc, antimony, and bismuth belong to the hexagonal, and tin to the tetragonal system. The individual crystal grains are again built up of atoms, which have no definite orientation as long as the metal is in a state of fusion, but at the moment of crystallisation the atoms arrange themselves in a regular geometrical pattern known as a space-lattice. See CRYSTALLOGRAPHY.

By means of the X-rays the internal structure of metals has been carefully investigated, and the metals belonging to the cubic system have been found to form two kinds of cubic space-lattice. In one variety, the 'centred' cubic space-lattice, there is an atom at each corner, and one in the centre of the cube. In the other, the 'face-centred' cubic space-lattice, there is an atom at each corner, and one in the centre of each face. This space-lattice is continuous. The metals lithium, sodium, chromium, iron, molybdenum, and tungsten form a 'centred' cubic space-lattice. Aluminium, copper, silver, gold, platinum, cobalt, and nickel have their atoms arranged in a 'face-centred' cubic space-lattice.

Metal-work. Sculpture (q.v.) being separately treated, the present article deals with other kinds of artistic metal-work. Since man gained the power of working metals he has produced more or less artistic examples of work in this medium. In Assyria, Egypt, Greece, &c., many pieces remain to show the excellence of the taste and the power of craftsmanship of the ancient peoples. Of mediæval gold and silver work one of the most renowned objects is the altar in the church of St Ambrose at Milan. It was executed by Wolvinus (9th century), and contains figures in relief of Christ and the Apostles with ornamental borders in enamel. Another very fine work in gold and enamel is the *Pala d'Oro* (altar front) of St Mark's, Venice, by Byzantine artists of the 10th or 11th century. The shrine of the Magi in Cologne Cathedral is a magnificent reliquary of the 12th century, in which the figures are of gold and the architectural decorations covered with enamels and precious stones. Many specimens of ecclesiastical gold and silver work of the 13th century remain. Of 14th-century examples the splendid silver reliquary in the church of Orvieto, by Ugolino of Siena, is very remarkable. Two very fine examples of middle-age work are the altars of St James, Pistoia, and of the Baptistery of St John at Florence, both in silver; begun in the 14th century, their execution occupied 150 years. Some of the greatest artists in Italy in the 14th and 15th

centuries practised the goldsmith's art, including Lucca della Robbia, Ghiberti, Brunelleschi, Donatello, and Jacopo della Quercia. In the 16th century Cellini's is the greatest name. There are some very artistic productions in pewter by the French artist François Briot (16th cent.).

Many fine works have been executed in bronze; Stanracius of Constantinople cast in the 11th century the bronze gates of St Paul's-without-the-Walls at Rome, destroyed in 1823, but of which drawings exist. A century later Barisanus made the fine bronze door of the cathedral of Monreale in Sicily. There is a great 13th-century candelabrum in Milan Cathedral, 15 feet high. The east door of the Baptistery at Florence, upon which Ghiberti was engaged from 1425 to 1452, is considered a marvellous work of art. Another door in this building, by A. Pisano, completed in 1430, after being in progress for twenty years, is also an admirable production. P. Vischer's shrine of St Sebald at Nuremberg is a beautiful monument which, though quite different in form from the objects named above, resembles them in the design being an intimate combination of small works in sculpture and architectural ornament. A fountain in the Maximilian-strasse, Augsburg, executed by H. Gerhard in 1593, has been much admired. For want of space we can only name two more bronzists—B. Morel, who did the great candelabrum in Seville Cathedral, and L. Bernini, who in the 17th century executed many clever works in Italy.

There is perhaps no class of metal objects in which artistic skill is more marvellously displayed than in some of the rich suits of armour made in the end of the 15th, but chiefly in the 16th century. These are for the most part of iron or steel, with ornament in *repoussé* or engraved; sometimes with both combined, and occasionally with damascening in gold and silver. Among those who practised the armourer's art in Italy the most famous names are Michelagnolo, Filippo Negrolo, Romero, and some members of the Piccinini family. In Germany Kollman of Augsburg, and in France Antoine Jacquard stood high. Some of the finest suits of armour made at this period are in the Museum of Arms at Dresden, and in the Louvre and Musée d'Artillerie, Paris.

Wrought-iron work, rude but effective, appears on the wooden doors of some Romanesque churches of the 12th century. In the 13th and 14th centuries the work in this metal became more refined, and among admirable examples of the latter period may be mentioned the screens round the tombs of the Scala family at Verona, and a screen in the church of Santa Croce, Florence. Screens, grilles, and other objects with open wrought-iron ornament, beautifully designed, and ranging over a period from the 13th to the 16th century, but especially those made during the 15th and 16th, are found in many churches in Germany, Spain, France, and England. In the latter country the early grille over Queen Eleanor's tomb, Westminster, and the later screen to Edward IV.'s at Windsor are fine examples; so also are the still later (18th century) railing-panels made for Hampton Court Palace by Huntington Shaw. The canopy of a draw-well at Antwerp by Quentin Matsys is one of the best works of its kind in hammered iron. Many of the elaborately chiselled iron locks and hinges made at Nuremberg and Augsburg in the 15th and 16th centuries are wonderfully beautiful. The National Museum at Munich is especially rich in specimens of these.

With these examples of work produced in Europe must also be remembered certain work from the East. From early times Persian and Damascus (see DAMASCENE) metal work has reached

a high standard, more especially in pierced and gilt brass. The inlay of the class where black enamel is let into silver is famous. Indian metal work is more ornate, and in large was especially connected with religion, though much of the hammered work is of undoubted merit. It is to Japan, and more especially China, however, that one must go for work which for artistic genius stands unrivalled in the world. Incense burners, bowls, boxes, and metal work of all descriptions have been produced in many metals, more especially in bronze, in the working of which alloy the Chinese craftsman excelled. In conjunction with enamels they produced the famous *cloisonné* work, where delicate bronze or gold metal work is overlaid and inlaid with the enamel. Modern metal work has been sadly commercialised, but many schools have sprung up over the world where good art work is being produced.

See Digby-Wyatt, *Metal-work* (1852); the South Kensington Museum *Catalogue of Bronzes*, by Fortnum, and of *Gold and Silversmith's Work*, by J. H. Pollen; Hefner-Alteneck, *Serrurerie* (1870); Plon's *Cellini* (1883); French works by Garnier (1859) and Codron (1901); German by Raschdorff (1878) and Haas (1902); English by Jackson (1903), Miller (1903), Woodworth (1903), Twopenny (1904), Pearson (1904), and Hasluck (1904).

Metamorphosis, a term applied in ancient mythology to the frequent transformation of human beings into beasts, stones, trees, and even into fire, water, or the like, which are essential parts of popular folklore everywhere. These metamorphoses afforded a subject to Greek poets and writers of the Alexandrine period, and to Ovid among the Romans. See BEAST-FABLES and FOLKLORE.—In Zoology the term Metamorphosis is applied to such marked changes as those from caterpillar to insect, or from tadpole to frog, where the young form or larva is strikingly different from the adult. See the articles on Amphibia, Caterpillar, Crustacea, Echinoderms, Frog, Insects, &c.; and for Metamorphosis in Botany, see MORPHOLOGY and FLOWER.—In Geology the term *metamorphism* is applied to the alteration undergone by rocks under heat, pressure, and other influences, so that they assume a crystalline or semi-crystalline structure. See GEOLOGY, GNEISS, PETROGRAPHY, SCHIST.

Metaphor (Gr. *metaphora*, 'a transference'), a figure of speech by means of which one thing is put for another which it only resembles. Thus, the Psalmist speaks of God's law as being 'a light to his feet and a lamp to his path.' The metaphor is therefore a kind of comparison implied but not formally expressed, in which the speaker or writer, casting aside the circumlocution of the ordinary similitude, seeks to attain his end at once, by boldly identifying his illustration with the thing illustrated. It is thus of necessity, when well conceived and expressed, graphic and striking in the highest degree, and has been a favourite figure with poets and orators, and the makers of proverbs, in all ages. Even in ordinary language the meanings of words are in great part metaphors; as when we speak of an *acute* intellect, or a *bold* promontory. The metaphor is false if the simile involved cannot be intelligibly evolved from it; and, to avoid what are often called *mixed* metaphors, it is well that the implicit simile should be conceived objectively, as in a picture. Such cases of confusion as Motley's 'The crozier went hand-in-hand with the battle-axe' are obvious enough, but most often the *mixed* metaphor is wrapped up in a cloud of rhetoric, as in De Quincey's sentence: 'The very recognition of these or any of them by the jurisprudence of a nation is a *mortal wound* to the very *keystone* upon which the whole vast arch of morality reposes.' Ruskin in his *Præterita*, describing Rogers's cold

reception of him as a boy, says: 'The cultivation of *germinating* genius was never held by Mr Rogers to be an industry altogether delectable to genius in its zenith.'

Metaphysical Poets, a term applied by Dr Johnson in his life of Cowley to the group of which Donne is the most outstanding example. They were men of learning, and to show their learning was their whole endeavour; they neither copied nature nor life, hence their thoughts are often new but seldom natural; the most heterogeneous ideas are yoked by violence together, nature and art being ransacked for illustrations, comparisons, and allusions; they failed, as might have been expected, in moving the affections or attaining the sublime, but what they wanted they endeavoured to supply by hyperbole—their amplifications had no limits, they left not only reason but fancy behind them, and produced combinations of confused magnificence that not only could not be credited but could not be imagined. Yet, if they frequently threw away their wit upon false conceits, they likewise sometimes struck out unexpected truth: if their conceits were far-fetched, they were often worth the carriage. Such is Johnson's explanation of the phrase and its meaning, and it must be admitted that the name is to a certain extent appropriate enough, for the philosophising and analytic spirit pervades the works of the whole school, and intellect rather than emotion is ever the stuff out of which their phantasies are framed. Their constant weakness is the tendency towards conceits and similes that are merely fantastic and ingenious, which mars a modern reader's pleasure in almost every poem of Donne and Cowley.

Metaphysics, a word first applied to a certain group of the philosophical dissertations of Aristotle, containing what Aristotle (q.v.) called 'first philosophy,' and Plato 'dialectics.' The phrase *meta ta physika* means probably 'the books after the physics,' but has been interpreted 'the matters above or beyond physics.' The branch of philosophy so called is the highest department, and deals with speculative questions as to the nature and limit of human consciousness and the possibility of establishing truths beyond empirical consciousness. The term has been sometimes used, as by Mansel, to comprise Psychology along with metaphysics proper or Ontology. See PHILOSOPHY.

Metaphyta, many-celled plants, in contrast to the single-celled Protophytes.

Metastasio, the Greek form of the surname of PIETRO TRAPASSI, an Italian poet, who was born of humble parents at Rome, on 6th January 1698. A precocious boy, he improvised verses and recited them to crowds on the street. This gift gained him a patron in his ninth year, one Gravina, a celebrated Roman lawyer, who educated him, and on his death (1718) left him his fortune. In 1722 Metastasio wrote his first libretto at Naples, which so charmed the great Roman singer Bulgarini, called La Romanina, that she took him into her house, and launched him on his successful career as a writer of opera-libretti—libretti which possess some real poetic qualities. These dramas, all with classical subjects, were set to music by some of the greatest composers then living, as Pergolese, Scarlatti, Durante, Hasse, Paisiello, Marcello, and others, and sung by some of the greatest singers who have ever lived, Farinelli and Caffariello. In 1729 Metastasio was appointed court-poet to the theatre at Vienna, for which he wrote several of his best pieces. His reputation spread rapidly and stood high throughout Europe, but from 1825 to 1865 his name was anathema in Italy. He died in Vienna on 12th April 1782, having for nearly forty years suffered from 'mental and moral ennui.'

His Letters were edited by Carducci (Bol. 1883). See Vernon Lee's *Studies of 18th Century in Italy* (1907), and Lives by Burney (1796) and Mussafia (1882).

Metaurus, a river of Central Italy, emptying into the Adriatic, on whose banks the Romans defeated the Carthaginians in 207 B.C.

Metayer System. See LAND LAWS.

Metazoa, many-celled animals, in contrast to the single-celled Protozoa (q.v.).

Metcalf, JOHN (1717–1810), 'Blind Jack of Knareborough,' lost his eyesight at six, but, tall and vigorous, fought at Falkirk and Culloden, smuggled, drove a stage-coach, and from 1765 took to road-making with great success.

Metcalfe, CHARLES THEOPHILUS, LORD (1785–1846), Indian and colonial administrator, born at Calcutta, was made a peer in 1845. See Life by Kaye (new ed. 1858).

Metchnikoff, ELIAS (1845–1916), Russian naturalist, born in Kharkoff govt., became professor at Odessa, and assisted and succeeded Pasteur at his Institute in Paris. His epoch-making memoir on the intracellular digestion of invertebrates (1884) led to his theory that wandering amoeboid cells attack and ingest or absorb useless or septic parts of the body, and that inflammation in vertebrates is the struggle between those microbe-eaters or phagocytes—the white or amoeboid blood corpuscles—and the disease-germs. He wrote a notable book on immunity (1903). See Life by his widow (trans. 1921).

Metellus, a plebeian family which rose to front rank in the Roman nobility. One member of it, Quintus Cæcilius Metellus Numidicus, twice defeated Jugurtha (109 B.C.); another, Quintus Cæcilius Metellus Creticus, conquered Crete (97 B.C.).

Metemmelh, or MATAMMA, a small town on the Nile opposite Shendy.

Metempsychosis. See TRANSMIGRATION.

Meteora, a group of four monasteries (formerly fourteen) planted on the summits of lofty rock-pinnacles on the northern side of the Peneus valley in Thessaly, 20 miles N.E. of Trikala. At a height of from 100 to 300 feet, they are accessible by breakneck ladders or by nets hauled up by windlasses.

Meteorology (Gr. *meteōra*, 'meteors, or atmospheric phenomena') was originally applied to the consideration of all appearances in the sky, both astronomical and atmospheric; but the term is now confined to that department of physics which treats of the phenomena of the atmosphere as regards weather and climate. Owing to the complexity of the phenomena, meteorology is the most difficult and involved of the sciences, and may seem, at first sight, almost incapable of being reduced to a science at all. On this account, the only procedure admissible in the first place is a faithful recording of facts by long and patient observation.

From the nature of the subjects which make up the science, it may be inferred that they occupied men's minds from a remote antiquity. From the time spent in the open air in the early ages, and from the imperfect protection afforded against the inclemency of the seasons, those appearances which experience proved to precede a change of weather would be eagerly recorded and handed down. In this way many valuable facts were ascertained and passed current from hand to hand; and perhaps there is no science of which more of the leading facts and inferences have been from so early a period incorporated into popular language. Aristotle was the first who collected, in his work *On Meteors*, the current prognostics of the weather. Some of these were derived from the Egyptians,

while a considerable number were the result of his own observation. Theophrastus, one of Aristotle's pupils, classified the opinions commonly received regarding the weather under four heads—viz. the prognostics of rain, of wind, of storm, and of fine weather. The subject was discussed only in its popular and practical bearings, and no attempt was made to explain phenomena whose occurrence appeared so irregular and capricious; but still the treatise of Theophrastus contains about all that was known down to comparatively recent times. No real progress was made till instruments were invented for making observations with regard to the temperature, the pressure, the humidity, the purity, and the electricity of the air. The discovery of the weight or pressure of the atmosphere made by Torricelli in 1643 was undoubtedly the first step in the progress of meteorology to the rank of a science. As this memorable discovery discloses what passes in the more elevated regions of the atmosphere, it follows that the elevations and depressions of the barometric column largely extend our knowledge of the subject. Indeed, nearly all of the more important of the discoveries of modern meteorology have been made through the barometric observations.

The invention and gradual perfecting of the thermometer in the same century formed another capital advance; as without it nothing beyond vague impressions could be obtained regarding temperature, the most important of all the elements of climate. Fahrenheit constructed small and portable thermometers, which, being carried by medical men and travellers over every part of the world, furnished observations of the most valuable description. By such observations alone the comparative temperature of different countries became known, and the exaggerated accounts of travellers with regard to extreme heat and cold were reduced to their proper significance. Scarcely less important was the introduction of the hygrometer, first systematically used by De Saussure (died 1799), and subsequently improved by Dalton, Daniell, August, and Regnault. From the period of the invention of these instruments the number of meteorological observers greatly increased, and a large body of well-authenticated facts of real value was collected. The climates of particular parts of the earth were approximately determined, and the science made great and rapid advances by the investigations into the laws which regulate the changes of atmospheric phenomena.

The theory of the trade-winds was first propounded by George Hadley in the *Philosophical Transactions* for 1735; and it may be mentioned as a remarkable fact that for about half a century it remained unnoticed, and then was independently arrived at by Dalton. The publication of Dalton's *Meteorological Essays*, in 1793, marks an epoch in meteorology. It is the first instance of the principles of science being brought to bear on the explanation of the intricate phenomena of the atmosphere. The idea that vapour is an independent elastic fluid, and that all elastic fluids, whether alone or mixed, exist independently; the great principles of motion of the atmosphere; the theory of winds, their effect on the barometer, and their relation to temperature and rain; observations on the height of clouds, on thunder, and on meteors; and the relations of magnetism and the aurora borealis—these are some of the important questions discussed in these remarkable essays, with singular acuteness, fullness, and breadth of view.

One of the most interesting and fruitful subjects of inquiry that engaged the attention of meteorologists was dew. The observations on this subject were first collected and reduced by Dr Wells, and the theory he advanced, supplemented by the later

researches of Dr John Aitken, gives a complete explanation of the phenomenon (see DEW).

In 1823 Daniell published his *Meteorological Essays and Observations*, which, while adding largely to our knowledge in almost every department of the subject, are chiefly valuable as bearing on the hygrometry of the atmosphere. Though the practical advantages which he anticipated to flow from it have not been realised, yet this difficult department of meteorology still stands indebted to him perhaps more than to any other physicist. The law of the diffusion of vapour through the air, its influence on the barometric pressure, and its relations to the other constituents of the atmosphere are among the least satisfactorily determined questions in meteorology.

It was until the 20th century assumed that the temperature of the air diminished with height up to the highest regions of the Atmosphere (q.v.), but in 1901 Teisserenc de Bort, with the sounding-balloons sent up from his observatory at Trappes near Paris, made the discovery that above a height of 6 miles the temperature remained constant with elevation, and in some cases rose with altitude. This upper region has been called the *stratosphere*; the lower region, where temperature diminishes with altitude, the *troposphere*. The lower surface of the stratosphere varies in the British Isles from 5 to 7 miles above sea-level. In equatorial regions it lies at a height of from 9 to 10 miles, and in the polar regions over the Arctic Ocean in lat. 75° N. descends to 4½ miles. Study of the thermal structure of the atmosphere owes much to Mr W. H. Dines and Sir Napier Shaw. While the causes of cyclones and anticyclones, important in their bearings on the weather, continue undetermined, a definite relationship between stratosphere and troposphere has been shown to exist under cyclonic and anticyclonic conditions. Of knowledge of the upper air generally the measure has been greatly increased as an almost necessary outcome of the development of aviation.

Electrical observations have been, of all meteorological observations, perhaps the least productive of results advancing the science, partly owing to their scantiness, and from the expense and trouble attending them.

Humboldt's treatise on *Isothermal Lines* (1817) constitutes a notable epoch in practical meteorology. Dové and, after him, Dr Buchan continued the investigation, and charts were given of the world, showing the temperature for each month and for the year. In 1868 another series of important charts was published by Dr Buchan, showing, by isobaric lines, the distribution of the mass of the earth's atmosphere, and by arrows the prevailing winds over the globe for the months and the year. These charts, later revised by him, and published in one of the *Challenger* reports, show the movements of the atmosphere and their immediate cause. It is thus seen that the prevailing winds are the simple result of the relative distribution of the mass of the earth's atmosphere; or that the direction and force of the prevailing winds are simply the flow of the air from a region of higher towards a region of lower pressure, or from where there is surplus to where there is a deficiency of air. On this broad and vital principle meteorology rests, and it is of universal application throughout the science in explanation not only of prevailing winds, but of all winds, and of weather and weather changes generally. Further, it supplies the key to the climatologies of the globe; for climate is determined by the temperature and moisture of the air, and these in their turn by the prevailing winds. In 1882 Loomis and in 1901 Herbertson published maps showing the rainfall of the globe. These maps and others that

have been constructed for separate countries show that the rainfall is everywhere determined by the prevailing winds, considered with respect to the regions from which they have immediately come, and the physical configuration and temperature of the part of the earth's surface over which they blow. The highest rainfalls are precipitated by winds which, having traversed a large breadth of ocean, come up against and blow over a high ridge lying across their path; and the amount is still further increased if the winds pass at the same time into regions the temperature of which constantly becomes colder. Of this the winter rains of north-western Europe and the summer rains of Japan are good examples. On the other hand, the rainfall is very small, or *nil*, where the prevailing winds have not previously traversed some extent of ocean, but have crossed a high ridge and now advance into lower latitudes, or into regions the temperature of which is markedly higher. Good examples of this are the summer rains of California and adjoining regions, and those of the Indus valley.

The establishment of meteorological societies during the last half of the 19th century must also be commemorated as contributing in a high degree to the solid advancement of the science which, more than any other, must depend on extensive and carefully conducted observation. A special object of meteorological societies is to ascertain the degrees of temperature and moisture in various localities, and the usual periods of their occurrence, together with their effects on the health of the people and upon the different agricultural products; so that, by a knowledge of the laws by which the growth of such products is regulated, it may be ascertained with some degree of certainty whether any given article can be profitably cultivated. But perhaps none of the arts have benefited to so large an extent by the results arrived at by meteorologists as navigation. The knowledge thus acquired of the prevailing winds over the different parts of the earth during the different seasons of the year, the regions of storms and calms, and the laws of storms has both saved innumerable lives, and, by pointing out the most expeditious routes to be followed, shortened voyages to a remarkable degree. In this department the name of Maury (q.v.) deserves special commendation.

Another fruit of the multiplication of meteorological stations is the prediction of storms and 'forecasts' of weather, first suggested in the United States about the middle of the 19th century. As regards the British Islands these 'forecasts' are based on information received every morning from the Atlantic, and from a network of selected stations in Great Britain and Ireland, and on the Continent, which give the exact state of the barometer, thermometer, hygrometer, and rain-gauge, with the direction and force of the wind, and appearance of the sky, at each of these stations at eight in the morning. In the event of there being any storm or other atmospheric disturbance at one or more of these places, a full and accurate description of it is thus conveyed to London; and it is the duty of the officials there to consider the direction in which the storm is moving and is likely to move, so as to enable them to give warning of its approach at different ports by special signals. But in addition to warnings of storms, daily 'forecasts' of the weather likely to occur in the different districts of Great Britain for the following two days are also issued. Long-range forecasts—some for a period of a month have been given—must in the present state of knowledge be considered as no more than guesswork. As regards storms the problem to be practically worked out is this: Given information showing the exact

meteorological conditions prevailing over the area embraced by the stations, with indications of a storm approaching in a certain direction, to determine, not the probable area over which the tempest will sweep, but the precise localities which will altogether escape, the places where the storm will rage, its continuance, its violence, and the particular directions from which the wind will blow at places visited by the storm. Weather-registers extending over long periods give no countenance to the notion that there are regularly recurring cycles of weather on which prediction sufficiently precise and particular to be of service to agriculture and navigation may be based. The manner in which good and bad seasons occur in different places with respect to each other shows clearly that they have little *direct immediate* dependence on any of the heavenly bodies, but that they depend directly on terrestrial causes. Owing to its proximity to the Atlantic, Great Britain is not so favourably situated for the issue of warnings as the countries of Europe to the eastward; but now the extension of the telegraph cable to the Faeroe Islands and Iceland, and wireless reports from vessels in the Atlantic, and also from Spitsbergen, have contributed to improve markedly the accuracy of weather forecasts. While this improvement is of general application, it is shown more particularly in the ability of the forecaster to predict the advent of storms, which formerly, coming without warning from the Arctic Ocean down the North Sea, not infrequently caused great fishing disasters on our northern and eastern coasts.

The study of meteorology has benefited largely by the establishment of high-level meteorological stations in the United States, Europe, India, Australia, and many other countries. The nine arctic expeditions in 1882-83, and antarctic expeditions of later years, devoted themselves largely to meteorological observations. In the Antarctic Scott's expedition (1910-13) yielded valuable results (see a publication in the meteorological work of the expedition by G. C. Simpson, 1919). Many first-class meteorological observatories are now established at which hourly observations are made.

On the diurnal phenomena the more important principles of the science are based. Of the sun's rays which arrive at the earth's surface, those which fall on the land are wholly absorbed by the thin surface layer, the temperature of which consequently rises. A wave of heat is thence propagated downward through the soil, the intensity of which rapidly lessens with the depth at a rate depending on the conductivity of the soil, till at a depth of about 4 feet it ceases to be measurable. Part of the heat of this surface layer is conveyed upwards into the atmosphere by convection currents. But as regards the surface of the ocean the case is totally different. Here comparatively little of the heat is arrested at the surface, but it penetrates, as shown by the observations of the *Challenger* expedition, to a depth of about 500 feet. Hence in deep waters the temperature of the surface is but little heated by the direct rays of the sun, though in shallow waters, owing to the heating of the bottom, the water has a considerable daily range of temperature. Thus, in mid-ocean, from 30° N. lat. to 30° S. lat., the temperature of the surface of the sea does not vary during the day quite so much as one degree Fahrenheit. Off the coast of Scotland the daily variation is only 0·3°, and in higher latitudes still less. On the other hand, the daily variation of the upper layer of the surface of the land is frequently 50°, and in many cases very much greater. Hence the enormously different results which large masses of land and sea respectively exercise on climate. The temperature of the air over the ocean is about three times greater than

that of the surface of the open sea over which it lies; but on nearing land it is nearly five times greater. The least daily variation on land is in insular situations, being at Rothesay about 5° ; and the greatest in the Sahara regions of tropical and subtropical countries, where it is in many places 30° , rising on occasions to 40° and upwards. The daily minimum temperature occurs some time before dawn; and as regards the maximum, it occurs from 1 to 4 P.M., according to season and geographical situation, the earlier hour obtaining in arid climates and at true high-level observatories, and the later in climates characteristically humid.

The *absolute humidity* of the air, or, as it is usually termed, the elastic force of vapour, is seen in its simplest form on the open sea, as disclosed by the *Challenger* observations. The minimum occurs at 4 A.M. and the maximum at 2 P.M., thus approximating closely to the diurnal march of the temperature; and on nearing land a secondary minimum prevails from 10 A.M. to 4 P.M., due doubtless to the drier descending aerial currents which take the place of the currents that ascend from the heated surfaces of the land. The *relative humidity* is widely different from the vapour pressure, and presents features of the simplest character. The maximum occurs from midnight to 4 A.M.; or when the temperature is lowest the air is nearest to saturation. On the other hand, the minimum is about 2 P.M.; or when temperature is highest the air is furthest from saturation. This feature of the humidity characterises all climates. When the air is by terrestrial radiation cooled below the dew-point dew is deposited, and when the temperature is below 32° hoar-frost is the result.

The *diurnal oscillations of the barometer* show two maxima and minima—the maxima occurring about 9 to 10 A.M. and 9 to 10 P.M., and the minima from 3 to 4 A.M. and 3 to 4 P.M. Since the temperature of the surface of the sea does not vary quite one degree during the day, and since these oscillations occur equally over the open sea as on land, it conclusively follows that they are independent of the temperature of the part of the surface of the globe on which the air rests. Generally speaking, the amount of the oscillations decreases with latitude. Taking latitude with latitude, the amounts are greatest over land surfaces which are greatly heated during the day and cooled during the night, and least over the anticyclonic regions of the great oceans lying to the westward of the continents from about 20° to 40° N. and S. lat. The characteristics of these anticyclonic regions is a vast descending current down their central spaces. This air necessarily increases in temperature with its descent, and consequently is further removed from saturation; and it is probably due to this circumstance that the amount of the barometric oscillation is here reduced to the minimum for the latitude over all anticyclonic regions.

It has been further shown from the *Challenger* observations that the force of the winds on the open sea is subject to no distinct and uniform diurnal variation, but that on nearing land the force of the wind gives a curve as pronouncedly marked as the ordinary curve of temperature; the minimum occurring from 2 to 4 A.M. and the maximum from noon to 4 P.M. Each of the five great oceans gives the same result—the differences between the hours of least and greatest force being Southern Ocean, $6\frac{1}{2}$ miles; South Pacific, $4\frac{1}{2}$ miles; South Atlantic, $3\frac{1}{2}$ miles; and North Atlantic and North Pacific, 3 miles. This diurnal peculiarity of the wind's force is even still more pronounced over all tolerably open and extended surfaces of the land. But at true high-level observatories, situated on peaks, the reverse everywhere holds, so that the daily

minimum velocity occurs during the warmest hours of the day, and the maximum at night during the coldest hours.

Thunderstorms have well-marked periods of diurnal variation over land and over the open sea respectively. In climates where rain falls equally at all seasons they are of most frequent occurrence during the hottest portions of the day and of the year, so far as concerns the land surfaces of the globe. Taking Ekaterinburg in the Urals as representing inland climates, observations show that there, during the twelve hours from 9 A.M. to 9 P.M. when temperature is above the daily mean, 717 occurred, but only 139 during the other twelve hours when temperature is under the mean. Thus the great majority occur during the time of the day when the ascensional movement of the air from the heated ground takes place, and attain the absolute maximum when the temperature and this upward movement are also at the maximum. On the other hand, the *Challenger* observations on the open sea show that the maximum occurrence is from 10 P.M. to 8 A.M., 22 having been observed during these ten hours and only 10 during the other fourteen hours of the day. This remarkable result suggests that over the ocean terrestrial radiation is more powerful than solar radiation in causing those vertical disturbances in the equilibrium of the atmosphere which give the thunderstorm.

Atmospheric vapour and ascending currents, and the descending currents which necessarily accompany them, play an important part in the development, course, and termination of thunderstorms. Where the climate is dry and rainless, like that of Jerusalem in summer, thunder is altogether unknown; and where an anticyclone with its descending currents rests over a region, as happens over the centre of the Europeo-Asiatic continent in winter, thunder is equally unknown during that season. The diurnal periods of *hail*, *whirlwinds*, *waterspouts*, *dust-storms*, and *tornados* have their origin in substantially the same atmospheric conditions as the thunderstorm, and occur approximately at the same hours of the day.

See works on Meteorology by Archibald (1901), Drew, Herschel, Buchan, Loomis, R. H. Scott, Sir N. Shaw, Davis (1894), Russell (1895), Moore (1910; 2d ed. 1918), Milham (1912), Cleveland Abbe (1873-1900), Chapman (1919), Waldo (1920), Lempfert (1920), Geddes (1921), Dickson (1923); Hann's *Lehrbuch der Meteorologie* (1914); Buchan's *Atmospheric Circulation*; Bartholomew and Herbertson's *Physical Atlas of Meteorology* (1899); Brook's *The Evolution of Climate* (1922); Shaw, *The Air and its Ways* (1923); popular expositions by Abercromby (1907) and Horner (1919); the publications of the Meteorological Office; as also the articles:

Atmosphere.	Dust.	Hail.	Rain.
Aurora.	Earth.	Halos.	Snow.
Barometer.	Electricity.	Hygrometer.	Storms.
Climate.	Evaporation.	Lightning.	Temperature.
Clouds.	Fog.	Magnetism.	Thermometer.
Dew.	Frost.	Observatory.	Wind.

Meteors are small bodies travelling in vast numbers, and in various directions, through space. Our earth continually encounters them in its orbital path, and they are then revealed to our observation as *aërolites*, *fireballs*, and *shooting or falling stars*. Every night, if the sky be clear, some may be observed, on the average five to seven every hour, while on certain occasions they are so numerous as to present the spectacle of a perfect rain of fire. Besides those visible to the eye, there are numbers unseen, some of which are occasionally noted in the course of telescopic observation. The total number encountered by the earth in one day has been estimated by Professor Newton, of Yale University, United States, at 7,500,000. Their total mass, however, he estimates at only 100 tons, so that individually they must in

general be exceedingly minute. They dissipate, however, a quantity of dust in the upper regions of the air, which in its slow descent and fall upon the earth is easily detected by proper means. Our air in this case acts as a shield, so that, instead of frequent showers of stones descending with deadly force, we have this quiet falling of impalpable dust. Our conclusions regarding meteors are reached by a proper interpretation of various phenomena, long considered as having no mutual connection, but now grouped coherently under one simple explanation. In order to appreciate the reasoning which has led to this result, it will be convenient to consider first the observed facts regarding (1) *aërolites*, (2) fireballs, and (3) shooting-stars.

The first group, *aërolites*, includes all stony or metallic masses actually falling to the earth from the sky. They have been classed as (1) *aërosiderites*, or *siderites*, chiefly consisting of meteoric iron; (2) *aërosiderolites*, or *siderolites*, conglomerates of stone and iron; (3) *aërolites*, almost entirely consisting of stone. The common title *aërolites* embraces, however, all kinds. The descent of such bodies, though rare, has occurred with greater frequency than would be imagined. The British Museum alone has specimens of more than three hundred, of which nearly two hundred were seen to fall. Some sacred stones, as the black stone worshipped at Emesa in Syria, the holy Kaaba of Mecca, and the great stone of the pyramid of Cholula in Mexico, owed their sanctity to a report, probably true, that they had fallen from heaven. It has been suggested that the earliest image of Diana of the Ephesians, which 'fell down from Jupiter,' had taken the place of an actual meteorite. Livy mentions the falling of a shower of stones on the Alban Mount near Rome, about 654 B.C. A Chinese catalogue records the fall of an *aërolite* on January 14, 616 B.C., which broke several chariots and killed ten men. Plutarch and Pliny mention a great stone, as large as a wagon, the latter says, and of a burnt colour, the fall of which, at *Ægospotamos* on the Hellespont about 467 B.C., is recorded in the *Parian Chronicle*. In 1492 A.D., 'on Wednesday, November 7,' a stone weighing 260 lb. was seen to fall near *Ensisheim* in Alsace: part of it is still preserved in the village church there. In 1510 about 1200 stones, one weighing 120 lb., another 60 lb., fell near Padua in Italy. We are told that the Emperor *Jehangir* caused a sword to be forged from a mass of meteoric iron which fell at *Jullunder* in the Punjab in 1620. On November 27, 1627, the astronomer *Gassendi* witnessed the fall of a stone weighing 59 lb. at *Mount Vasier* in Provence. At *Wold Cottage*, Yorkshire, December 13, 1795, a ploughman saw a stone of 56 lb. weight fall near him in a field. But the most interesting of such modern observations was made on April 26, 1803, near *L'Aigle*, in Normandy. About 1 P.M. a brilliant fireball was seen traversing the air at great speed. A violent explosion followed, apparently proceeding from a small and lofty cloud, followed by a shower of thousands of stones, one 8 lb. in weight. A large meteorite exploded with prodigious noise over *Madrid* on 10th February 1896. On April 20, 1876, a mass of meteoric iron more than 7 lb. weight fell at *Rowton* in Shropshire, accompanied also by an explosion. On September 4, 1887, a large *aërolite* fell at *Krasnoslobodsk*, in the government of *Penza*. It was accompanied by a loud explosion, and in it (as in some others) were found crystals having all the chemical properties of the diamond. In nearly every one of these and other cases are noticed the following features—(1) a noise, often an explosion; (2) cloud or smoke; (3) partial fusion of the mass or masses, especially on the surface. These indicate that the *aërolite* by

some means is brought to a very high temperature, at least above the melting-point of iron, which often causes it to burst into fragments. A theory has been advanced that *aërolites* are ejected from active volcanoes, as this would account for their high temperature. This is not borne out by observation, and, moreover, fails to account for their high velocities. The high temperature on the surface is satisfactorily explained by the friction of the earth's atmosphere, provided the velocity is sufficiently great. A sufficient velocity is at once guaranteed when we consider *aërolites* as simply *fireballs* whose mass and course are such as to bring them entirely through our atmosphere into contact with the earth. It has therefore been concluded that fireballs are bodies which have their origin outside the earth, and have fallen upon it. Meteoric iron is also alloyed with nickel, cobalt, manganese, magnesium, copper, carbon, and tin, in a manner in which it is not yet found alloyed in terrestrial minerals; and this also points to its cosmical origin. Altogether twenty-four of the terrestrial chemical elements have been found in *aërolites*—viz. oxygen, hydrogen, chlorine, sulphur, phosphorus, carbon, silicon, iron, nickel, cobalt, magnesium, chromium, manganese, copper, tin, antimony, aluminium, calcium, potassium, sodium, lithium, titanium, arsenic, and vanadium. No new element not found on earth has been found in them.

The second class of meteors form *fireballs*, which appear as brilliantly luminous bodies, traversing the sky, often with noise, and always with great velocity. *Aërolites* before their fall have often been seen as fireballs, and the substantial unity of the two classes is now universally accepted. Fireballs, then, are regarded as *aërolites* whose mass and course are such that they escape actual contact with the earth. They are much more numerous than *aërolites*, and are of great variety in velocity, size, and brilliance. On August 18, 1783, one of great size traversed the air over Europe, from *Shetland* to *Rome*, at a height of 50 miles and with a speed of 30 miles per second, giving off a greater light than the full moon. More recently, on November 17, 1887, a splendid specimen, seen first over the *Irish Sea*, crossed westwards over *Ireland*, at a height of probably about 20 miles, and disappeared above the *Atlantic*. Many hundreds of such, though usually less brilliant, have been observed. *Arago* enumerates 813. More are constantly being seen. Their height is obtained by comparison of observations at stations widely separated, and from it and their observed speed the actual velocity is computed. From a careful comparison of many observations made by a committee of the *British Association* it appears that in general they appear at a height of between 20 and 130 miles, and have a velocity of between 17 and 80 miles per second, with an average of 34·4 miles per second. Their actual size has been enormously overestimated, at 12,000 to 100 feet in diameter. The effects of irradiation and the luminous gases discharged during their course no doubt give them an apparent diameter enormously greater than the real one, which is probably between that of a marble and a pin-head. They generally leave behind them in their track a luminous train or 'tail' which sometimes disappears at once, and at other times persists for some minutes after the fireball itself disappears. These 'tails' are variously coloured, according probably to the different chemical constitution of the 'heads.'

These bodies reach the earth from interplanetary space. Various other suppositions have been made, such as volcanic explosions, condensation in the atmosphere, and ejection from the moon, but no

observational evidence in favour of any of these suppositions has been adduced. The high average velocities of fireballs, 35 miles per second, compared with the velocity of the earth in its orbit, 18 miles per second, and with planetary and cometary velocities in general, requires for its explanation an extra-terrestrial origin for these bodies. Further, fireballs, by insensible graduations, merge into shooting-stars, and there is ample evidence that there are small bodies circulating like planets round the sun, which have become luminous after entering the earth's atmosphere.

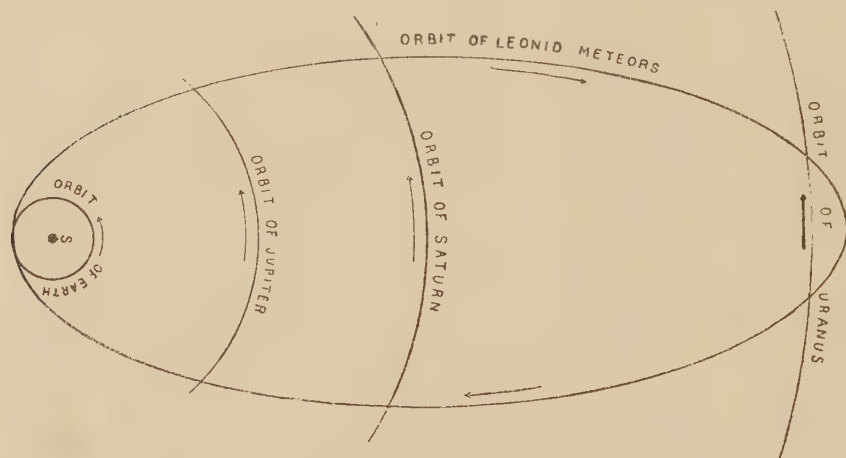
We are thus led to the consideration of *shooting-stars*, which are the most numerous class of meteors. By a peculiarity in their movements, rendered evident by their numbers, a satisfactory explanation of the nature of all classes of meteors has been reached. On any fine night a watcher who is careful and patient for a sufficient time will see a few shooting-stars. Sometimes they are very numerous, and all appear to originate in one part of the sky. From their point of origin they appear to radiate, and if it be overhead and the meteors very numerous the appearance is like an 'umbrella of fire' above the earth. But this point may not

therefore, be passing through a crowd of small bodies, themselves in motion, meeting or passing it on a *definite track*. We have then to ask, what is the form of the meteor track, whence come and whither go the meteors we encounter in such numbers? Usually there is a tolerably definite time, recurring annually, during which a radiant is active. This was the first broad fact impressed upon observers. Although at such yearly periods the number of meteors may be very large or very small, there are at least a *few* almost always seen. From this it was early seen that certain parts of space, through which the earth passed every year, were occupied at the date of such passage by meteors travelling past with planetary velocities.

This leads to the conclusion, drawn by Professor Olmsted of Yale in 1834, that the *Leonid* meteors are bodies revolving about the sun, in an ellipse which meets the earth's elliptic orbit at the point where the earth is on November 14. The meteors are gathered into a cloud or swarm at one particular part of the orbit, but a number of them are scattered along the whole extent of the track. Sometimes, as in 1833, the great swarm is near the point of intersection with the earth's orbit on

November 14, and a grand display is seen. In most years, however, only stragglers along the meteor track are encountered, and a comparatively small number of shooting-stars are to be observed.

In 1864 Professor H. A. Newton of Yale made a careful examination of historical records of showers of *Leonid* meteors. He found records of brilliant displays of meteors in November,



Orbit of the Leonid Meteors.

be overhead. It may even be below the horizon. In the latter case the meteors appear to come up over the horizon like rockets, and ascend into the sky. This *radiant*, as it is technically called, remains fixed among the stars, so that, if at the beginning of an observation it be overhead, it will be perhaps below the horizon by the end of the night's watch. It is either named after the *constellation* in which it is placed, or indicated by its right ascension and declination. For several nights in succession stars may be seen to radiate from nearly the same point of the heavens. *Leonids*—i.e. the meteors whose radiant is in *Leo*—or the famous November meteors, are bright and swift, leaving very durable tracks of light. The *Taurids* (from the constellation Taurus) give many fireballs, and other radiants give meteors of special characteristics, so that each radiant is evidently the source of a family of meteors.

Such a radiating motion is explained by supposing all the meteors to be actually moving in tracks parallel to the line joining the radiant point to the eye of the observer. For, being wholly unconscious of the distance of the meteors, the observer only sees the projection of their paths on the sphere which the eye naturally assumes as the background of all the celestial appearances.

On the occasion of a meteoric shower the earth,

which he identified with the Leonids, on twelve occasions between 902 A.D. and 1833. These were separated by intervals of 33 years or multiples of that number, or more exactly 33.25 years—i.e. three intervals of 33 years and one of 34 in every 133 years. He was so fully convinced of this periodicity that he predicted a grand display on November 13-14, 1866, and the event proved him right.

Prof. Newton then endeavoured to find the period of revolution of the meteors themselves round the sun; 180 days, 185.4, 354.6, 376.6 days, and 33.25 years were found to be possible solutions. Any of these periods is consistent with an ordinary display each November, and a specially fine one at intervals of 33 years. Newton's researches showed that the day of the month on which the great displays of meteors had been seen was becoming later at the rate of one day every 70 years—it was on October 12 (old style) in 902 A.D. and November 13 in 1866. This showed that the point at which the orbit of the meteors intersected that of the earth was slowly changing. Such a change would be brought about by the attractions of the planets on the swarm of meteors, and Adams of Cambridge found, by mathematical calculations, that a change of this exact amount would occur if the period were $33\frac{1}{4}$ years, but not more than $\frac{1}{4}$ ths of the amount with any of

the shorter periods. Knowing the period, Adams easily calculated that the meteors move in a long ellipse, whose nearest point to the sun is just inside that of the earth's orbit, and greatest distance 19.7 times the earth's distance from the sun, or farther than Uranus. The orbit is inclined at an angle of $16^{\circ} 46'$ to the ecliptic—i.e. earth's orbit. No brilliant display occurred in 1899. The explanation given by Stoney and Downing is that the attraction of the planets has diverted the path of the meteors, so that instead of intersecting the earth's orbit it now cuts the ecliptic at a point one million miles nearer the sun.

The study of meteors was also taken up by Schiaparelli in 1866. He assumed that the orbits of the meteors must be long ellipses, and computed a parabolic orbit as a preliminary step for the Perseid meteors which occur August 9-11. His orbit agreed closely with that of Tuttle's comet (1863 iii.). The orbit of the November meteors (Leonids) agrees with Temple's comet (1866 i.): of the Lyrids (April 20) with the first comet of 1861; and the Andromedid meteors (November 28) with Biela's comet. (See COMETS.) Thus a close connection is established between comets and meteors. The head of a comet is regarded as a cluster of meteorites. In the continual passage of the comet round the sun the cluster is gradually spread out over the orbit by the action of gravity. The Perseids (August 9-11) appear to be distributed with some uniformity in their orbit, while the Leonids are clustered in a swarm. Thus the Leonid swarm has been subjected to the disintegrating effect of the sun and planets a shorter time than the Perseids. Leverrier found that in 126 A.D. the path of the Leonid meteors passed very close to the planet Uranus, and suggested that the swarm might have been 'captured' by Uranus. Professor Sampson has shown (*Monthly Notices of the Royal Astronomical Society*, 1914), that in 885 and 1053 the swarm passed equally near to Uranus. As the meteors had been seen before 1053, it is clear that they cannot have been 'captured' in that year. There is no observational evidence earlier than 885, and the 'capture' to the present more restricted orbit may have occurred in that year. This is, however, by no means certain.

The existence of meteorites moving in space has been utilised by Sir N. Lockyer to frame a 'meteoritic' hypothesis in preference to the 'nebular' hypothesis of Laplace. For this reference should be made to his book, *The Meteoritic Hypothesis* (1890).

Some hundreds of 'radiants' are now known, of which the following are the most active: (1) the *Lyrids*, April 19-20; (2) the *Pegasids*, August 10; (3) the *Perseids*, August 9-11; (4) the *Aurigids*, September and October; (5) the *Orionids*, October and November; (6) the *Taurids*, November 1-15; (7) the *Leonids*, November 13-14.

See the manuals cited at ASTRONOMY; Bonney's *Story of our Planet* (1893); the British Association Report on Meteors; Fletcher's *British Museum Handbook*; and Tassin's *U.S. Museum Collection of Meteorites* (1902).

Meter. See GAS.

Methane, or MARSH-GAS. See CARBURETTED HYDROGEN, GAS (LIGHTING), METHYL.

Methodism. Wesley says: 'The first rise of Methodism (so called) was in November 1729, when four of us met together at Oxford. The second was at Savannah in April 1736, when twenty or thirty persons met at my house; the last was at London on this day (May 1, 1738), when forty or fifty of us agreed to meet together every Wednesday evening, in order to a free conversation, begun and ended with singing and prayer' (*Eccles. Hist.* iv. 175).

METHODISM IN OXFORD.—About May 1729 a gentleman of Christ Church, who watched the regular

attendance of Charles Wesley and a student who lived next door to him at the weekly communion, gave them the name of Methodists 'for the regularity of their lives, as well as studies.' Wesley says the name was 'fixed upon them by way of reproach, without their approbation or consent.' He was himself in Lincolnshire at the time serving as his father's curate, but before he left Oxford he had spoken to Charles about personal religion, and at the beginning of 1729 Charles wrote to consult him about keeping a diary, adding: 'It is through your means, I firmly believe, that God will establish what He hath begun in me.' Wesley came to Oxford in June for two months, when the two brothers, with William Morgan and Robert Kirkham, met together almost every evening. Wesley came into residence at Lincoln College in November 1729, and became the leader of the Holy Club which met every evening for prayer and study. In August 1730 the friends began to visit the prisoners at the Castle, and then busied themselves in caring for the sick and promoting the education and religious training of the children of the poor. Oxford thus gave Methodism a name, and taught a band of young scholars to combine personal piety with good works. It was a delightful blend of scholarship, devotion, and charity. Wesley had already learnt that religion meant Christian fellowship; or, as a wise counsellor put it, 'The Bible knows nothing of solitary religion.' Oxford Methodism has been set in a new light by the standard edition of Wesley's *Journal* (1909-15).

METHODISM IN SAVANNAH.—The mission to Georgia transferred the headquarters of Methodism to Savannah, where Wesley laboured with apostolic zeal from February 1736 to December 1737. He wished to work among the Indians, but that door was closed. Wesley therefore gave himself wholly to his parish. 'Every Sunday and holiday' he administered the Lord's Supper. On weekdays he read prayers, and expounded the second lesson at five in the morning and seven in the evening. He formed a little society of the serious part of the congregation, who met 'once or twice a week, in order to instruct, exhort, and reprove one another. And out of these I selected a smaller number, for a more intimate union with each other; in order to which I met them together at my house every Sunday in the forenoon.' Wesley's High Church practices were unpopular, and his exercise of discipline in the case of Mrs Williamson led to his abrupt return to England. Charles Wesley had returned in 1736 after six months of privation and danger. Wesley's labours at Savannah might be regarded as the first attempt to introduce Methodism into parish life. It had left its university moorings, and was at work among the people. Wesley did great good here, but he himself had still much to learn about the way of faith. Intercourse with the Moravians had opened his eyes to the deeper meaning of religion, and on his return to London light came which transformed himself and his message.

METHODISM IN ENGLAND.—Wesley's date for the 'last' rise of Methodism is 1st May 1738. It was not till the 24th of the month that he found rest in Christ, but Peter Böhler, a Moravian just ordained by Zinzendorf for work in Carolina, had already shown him the nature and fruits of faith. The Wesleys preached in all churches that were open to them in London, and addressed meetings of the Religious Societies. After the introduction of field-preaching in April 1739 converts multiplied. Towards the end of that year eight or ten persons in London asked Wesley to spend some time with them in prayer and spiritual counsel. Next day two or three more made the same request. Wesley had just taken a lease of the Foundery in Upper Moorfields, and there he met this society on Thursdays. This date is considered

to mark the beginning of Methodism, and its centenary was kept in 1839. Wesley was already uneasy about some developments at Fetter Lane, and in July 1740 he separated from the society there. About fifty women and twenty-five men left with him and joined his society at the Foundery.

The Society and the Class Meeting.—Similar societies had been formed in Bristol, and met at Wesley's Room in the Horse Fair. A debt on this building led Captain Foy to suggest that every member should contribute a penny per week. It was urged that some could not afford this; but the captain replied, 'Then put eleven of the poorest with me; and if they can give anything, well, I will call on them weekly; and if they can give nothing, I will give for them as well as myself. And each of you call on eleven of your neighbours weekly; receive what they give, and make up what is wanting.' These visitors were called leaders. They had sometimes to report that a member was not living a Christian life. Wesley saw at once that here was the very provision he had long needed for the oversight of the societies. He at once instructed the leaders to make special inquiry into the character of their members, and thus Methodism was provided with a set of lay pastors. At first they visited the members in their own homes; then all met together. 'Advice or reproof was given as need required, quarrels made up, misunderstandings removed; and after an hour or two spent in this labour of love, they concluded with prayer and thanksgiving.' In this way Methodism gained its organisation and its financial basis. The quarterly visitation of the classes began in London in 1742, when a society ticket was prepared with a verse of Scripture upon it. Improper persons could thus be kept out of the meetings. Rules were drawn up for the society by Wesley in 1743. They state: 'There is only one condition previously required in those who desire admission into these societies—viz. a desire to flee from the wrath to come, to be saved from their sins. But wherever this is really fixed in the soul it will be shown by its fruits. It is therefore expected of all who continue therein that they should continue to evidence their desire of salvation, first, by doing no harm, by avoiding evil in every kind; secondly, by doing good, by being in every kind merciful after their power; as they have opportunity, doing good of every possible sort, and, as far as possible, to all men; thirdly, by attending upon all the ordinances of God.'

Polity.—Wesley appointed stewards to look after the weekly and quarterly contributions made in the classes, spending what was necessary in repairs, &c., and sending relief to the poor. It is now the custom for each society to have two stewards who receive contributions from the classes and collections, and pay them over to the proper funds. The poor-stewards prepare for the sacraments and take charge of the contributions for the poor. The leaders' meeting now consists of these stewards, with all class-leaders, one assistant class-leader for any class, junior-society class-leaders who have reached the age of twenty-one, representatives (one for every fifty members up to 400) chosen by the members, any circuit stewards who are members of that society, the chief Sunday school superintendent, if a church member of that society, any Wesley deaconess working there, and the circuit ministers. This meeting has oversight of the society, with disciplinary functions. A circuit is made up of one or more local societies in town and village. Its quarterly meeting invites ministers, manages circuit finance, approves all candidates for the ministry sent forward to the synods, and considers all schemes for building and extension within the circuit. The June meeting has a right to send memo-

rials to Conference. The preacher whose name stands first in the appointment for any circuit is the superintendent, and is responsible for the conduct of affairs. After the death of Wesley the circuits were grouped into districts for closer supervision. The term district synod was adopted in 1892. All the ministers of a district are members. The synods meet in May, and on Wednesday circuit stewards and representatives of the circuits meet with the ministers for the transaction of business. Questions of ministerial character, the examination of candidates for the ministry, &c. are dealt with by the ministers. There is also a September financial synod, composed of ministers and lay members. The synods report to Conference, which is the supreme legislative and disciplinary body. Wesley held his first Conference in 1744. His Deed Poll, executed in 1784, named 100 preachers who were to become the legal Conference after his death. They were to meet once a year, fill up vacancies in their number, appoint a president and secretary, station the preachers, admit proper persons into the ministry, and take general oversight of the societies. The itinerancy of the preachers was secured by a provision that no one must be appointed to any chapel for more than three years except an ordained minister of the Church of England. This is still the law, but means have been found for the extension of the term in special cases. The Conference of 1791 decided that every privilege of the deed of declaration should be shared by all the preachers in full connexion. In 1878 laymen were admitted to the Conference. The Representative Session, consisting of 300 ministers and 300 laymen, now meets first; then the Pastoral Session, for which are reserved questions of ministerial character, appointments to circuits, acceptance of candidates for the ministry, and cases of appeal. The chapels are settled on a model deed. The trustees appoint two chapel stewards to manage the property.

Doctrine.—The deed on which Methodist chapels are settled fixed Wesley's first four volumes of sermons (Nos. 1-44) and his Notes on the New Testament as the doctrinal standards for the preachers. There is no doctrinal test for members or officers. Wesley says: 'Methodism, so called, is the old religion, the religion of the Bible, the religion of the Primitive Church, the religion of the Church of England.' Wesley taught that salvation was free for every man. On this universality of redemption he parted company with Whitefield, who adopted Calvinistic views, in 1739. Wesley held that all who believed in Christ might enjoy the knowledge of their acceptance. He described the witness of the Spirit as 'an inward impression on the soul, whereby the Spirit of God directly witnesses to my spirit that I am a child of God.' Entire sanctification was set forth as the privilege and duty of every believer. Christians were not free from ignorance, mistake, infirmity, or temptation, though they might be free from outward sin, evil thoughts, and evil tempers. Christian perfection he described as 'the humble, gentle, patient love of God and our neighbour, ruling our tempers, words, and actions.'

Services.—In some of Wesley's chief chapels the morning prayers of the Church of England were read by himself or a clergyman who assisted him; in others extempore prayer was used. In 1784 Wesley prepared a revised *Sunday Service* for the use of the Methodists in the United States, and this was also used in England. In 1881 *The Book of Public Prayers and Services* was issued. Some churches adopt this revised liturgy; others have hymns, chants, extempore prayer. Revised forms of the baptismal, sacramental, and marriage services of the Church of England are used. There is a special

service for the public recognition of new members; and on the first Sunday of the New Year a form of covenant first adopted in 1755, modified in 1897, and reshaped in 1924, is used. The Watch-night on the last night of the year is an old Methodist institution which dates back to 1740. The Love-feast which Wesley had kept with his Moravian friends in Georgia was introduced as the representative of the age of the Primitive Church.

History.—For four years after his evangelical conversion Wesley's labours were confined chiefly to London and Bristol. During this time his societies were divided into classes under the care of leaders; and the earliest of the noble band of lay preachers were enlisted, without whose help Methodism must have been limited to a few centres. In 1742 Wesley found his way to the West Riding of Yorkshire and to Newcastle-on-Tyne, where Methodism took deep root. The next year Charles Wesley introduced it to Cornwall, which soon became one of its chief strongholds. Methodism now spread rapidly over all parts of England. In 1747 Wesley paid the first of his forty-two visits to Ireland, to which he gave about six years of his life; in 1751 he went to Scotland, which he visited twenty-two times. Pierce struggles with the mob marked these years of progress. Wesley showed rare courage and tact in these encounters, and won many a notable victory over opposers. By about 1756 the mob had been tamed and Wesley's work firmly rooted. Charles Wesley was married, and confined his labours chiefly to Bristol and London. From 1756 to 1784 may be described as the period of consolidation. City Road Chapel, London, was opened in 1778; the deed of declaration was executed in 1784. Wesley took every precaution for the continuance of his work. When he died in 1791 there were 71,668 members in Great Britain and Ireland, with 294 preachers; in the United States there were 43,265 members and 198 preachers; the mission stations had 5300 members, under the care of 19 missionaries.

After Wesley's death the relation of his societies to the Church of England and the provision for the administration of the sacraments caused much anxious debate. In 1795 the plan of pacification was adopted. The celebration of the Lord's Supper, baptism, burial of the dead by the preachers, and service in church hours were not to be permitted unless a majority of the trustees, stewards, and leaders of that place desired it, and assured the Conference that no separation was likely to result. Where the Lord's Supper had already been peaceably administered it was to be continued. Methodism now grew rapidly. In 1834 a theological college was opened at Hoxton. Wesleyan Methodism now has five ministerial colleges; Didsbury (opened 1842), Richmond, Surrey (1843), Headingley (1868), Handsworth (1881), Wesley House, Cambridge (1921). Cliff College for training lay preachers was opened in 1904. £5000 was set apart from the Centenary Fund for Methodist day-schools, and a great work was done. Many of the schools are now transferred to local authorities. Training colleges for day-school teachers are Westminster, for men, opened in 1851, and Battersea, for women, in 1872. The National Children's Home was founded by Dr Stephenson in 1869. The Wesley Deaconess Institute at Ilkley was opened in 1902. Kingswood School for ministers' sons was founded by Wesley, and Trinity Hall, Southport, is for ministers' daughters. Excellent secondary schools for boys and girls are provided. The Leys School, Cambridge, for boys, was opened, with Dr W. F. Moulton as headmaster, in 1874; Farrington's, Chislehurst, for girls, in 1911. The Centenary Fund (1839) reached £221,939; the Missionary Jubilee (1863-68), £179,000; the Thanksgiving Fund (1878), £297,500; the Twen-

tieth Century Fund (1900), with which the name of Sir Robert W. Perks, Bart., will always be associated, £1,073,782. The Central Hall at Westminster, erected in connexion with this fund, was opened in 1912. Wesley had a Book-room at the Foundery in 1739, of which the Methodist Publishing House is the successor. The Primitive Methodists and United Methodist Church have also prosperous Book-rooms. Wesley taught Methodism to use the press, and began the *Arminian* (Methodist) *Magazine* in 1778, which still appears every month. Besides books, tracts, magazines, the *London Quarterly Review*, the *Holborn Review*, and four important newspapers are issued by English Methodists.

The first secession in Methodism was led by Alexander Kilham, one of the preachers who was expelled in 1796. He wanted to secure a more liberal constitution with larger rights for the laity. Three other preachers joined him, and formed the New Connexion in 1797. In 1827 the introduction of an organ into Brunswick Chapel, Leeds, led to the secession of the Protestant Methodists, who united with the Wesleyan Methodist Association. This sprang out of Dr Warren's agitation in 1836, and was connected with the foundation of the Theological Institution for the training of ministers. A more serious agitation in 1850-52 robbed Wesleyan Methodism of 100,000 members. Those who then separated amalgamated in 1857 with the reformers of 1827 and 1836, forming the Methodist Free Churches. The Bible Christian Connexion owed its origin in 1816 to William O'Bryan, a Cornish local preacher, but was not a secession from Methodism. In 1907 the New Connexion, the Bible Christians, and the Methodist Free Churches formed themselves into the United Methodist Church. The uniting Conference was held in Wesley's Chapel, London. The Conference is composed of equal numbers of ministers and laymen. The ministerial term is four years, subject to annual appointment. It can be extended to seven years if two-thirds of the circuit meeting wish; still further extension may be granted by a special vote of Conference. The Primitive Methodist Church owes its origin to Hugh Bourne and William Clowes, who held camp-meetings on the American plan in the Potteries. The Conference was afraid of this movement, and Hugh Bourne's name was removed from the local preachers' plan and the class-book. The little society formed in 1810 has now grown into a great church, which has exerted a powerful influence over the working-classes. It has a very successful college for the training of ministers in Manchester, and raised more than £300,000 as a Centenary Fund for the extension and consolidation of its work. The Conference is composed of about 68 ministerial and 136 lay representatives. The Welsh Calvinistic Methodists were the fruit of the labours of Whitefield and Howel Harris. In 1910 they formed the Presbyterian Church of Wales, with 190,000 communicants.

Methodism found its widest sphere in the New World. Immigrants from Ireland introduced it into New York and Maryland in 1766. Wesley sent out two preachers in 1769, and two years later Francis Asbury found his way there to become a true apostle. After the War of Independence, Wesley set apart in 1784 Dr Coke as superintendent for America, and instructed him to ordain Asbury as his colleague. They were to ordain certain of the preachers to administer the sacraments. Asbury lived till 1816. He rode 270,000 miles, preached 16,500 sermons, ordained more than 4000 preachers. Methodism advanced by leaps and bounds. The first General Conference of this Methodist Episcopal Church was held in 1790; and in 1808 it was

made a delegated body with power to legislate for the whole church, subject to certain restrictions. In 1830 the Methodist Protestant Church was formed. It had no bishops, and laymen took part in all legislation. In 1844 the General Conference of the Methodist Episcopal Church passed a resolution virtually setting aside one of the bishops who held slaves through marriage, &c. This led to the formation of the Methodist Episcopal Church (South) in 1845, with about 400,000 members. These are the two most powerful churches of the United States. They have flourishing book concerns at New York, Cincinnati, Chicago, and Nashville. Two important reviews, many magazines and newspapers, are issued. The educational work is very extensive, and large European and foreign missions are carried on. Canadian Methodism is growing stronger every year. It has a prosperous book concern in Toronto. All branches of Methodism were united into the Canadian Methodist Church in 1883. A broader union with Presbyterians and Congregationalists was effected in 1925. Its title is The United Church of Canada. Large schemes for reunion are under discussion both in the United States and in Great Britain. The Methodist Churches in Australasia were united in 1902. The number of Methodist members and adherents is estimated at 35,000,000.

See, besides the Works and the Lives of the Wesleys and of Whitefield, George Smith's *History of Methodism* (1862); Abel Stevens's *History of the Religious Movement called Methodism* (New York, 1861); Daniel's *Short History of the Methodists* (1882). A *New History of Methodism*, edited by W. J. Townsend, H. B. Workman, and G. Eays; A *History of Methodism*, by J. R. Gregory; *Annotated Popular History of Methodism*, by John Telford; *Methodism* (1912), by H. B. Workman; *John Wesley and the Religious Societies* (1921), *John Wesley and the Methodist Societies* (1923), *John Wesley and the Advance of Methodism* (1925), by Dr Simon; *Proceedings of the Wesley Historical Society*; and works on the polity, constitution, and economy of Methodism by Peirce, Rigg, Waller, and Simon. For Methodist missions, see MISSIONS. For general statistics, see *Minutes of Wesleyan Methodist Conference*.

Methodius. See CYRIL.—Another METHIDIUS, bishop of Olympus in Lycia, and perhaps afterwards of Tyre, wrote the *Banquet* and other dialogues, and was martyred about 311.

Methuen Treaty, a commercial treaty negotiated in 1703 by Paul Methuen, the English ambassador in Portugal, with that country, to admit Portuguese wines to England at a duty one-third less than that on French wines, the Portuguese undertaking in return to admit English wool, imposing on it, however, the old duty of 23 per cent. *ad valorem*. It was annulled in 1835.

Methyl is an organic radical homologous with Ethyl (q.v.). Its formula is CH_3 , but, as it cannot exist in the free state, two such groups of atoms unite together to form ethane, $\text{CH}_3\text{—CH}_3$. As in the case of ethyl, methyl is the centre of a whole group of substances known as the methyl-group. Thus, the hydride of methyl, CH_3H , known as light carburetted hydrogen, marsh-gas, or fire-damp, is well known as the cause of explosions in coal-mines. It is a light, inodorous gas, half as heavy as air; non-poisonous and very inflammable, forming an explosive mixture with seven volumes of air. Methyl alcohol, CH_3OH , is obtained as a by-product in the manufacture of beet-root sugar, and also by the dry distillation of wood. It is a colourless, mobile liquid, resembling ordinary alcohol in many of its properties. Methyl oxide or methyl ether, $(\text{CH}_3)_2\text{O}$, corresponding to ethyl ether or common ether, is a gas at ordinary temperatures, very soluble in water and alcohol, and capable of being condensed to a liquid by pressure and cold.

It is largely prepared for use in freezing-machines, owing to the intense cold which results when the liquefied gas is allowed to evaporate. It is prepared by the action of sulphuric acid on wood spirit.

Besides the above, methyl enters into the constitution of many ethereal salts and amines, such as methyl chloride, acetate, and salicylate, as well as methyl amine, dimethyl amine, &c. (see AMINES). The salicylate, $\text{CH}_3\text{C}_7\text{H}_5\text{O}_3$, is interesting as being the ethereal oil of *Gaultheria procumbens*, from which pure methyl alcohol and pure salicylic acid can both be made. For Methyl Violet, see DYEING; and for Methylene, see ANÆSTHESIA. —**METHYLATED SPIRIT.** There are two kinds of methylated spirit allowed by the excise. The one sold to the general public consists of 97·5 alcohol, wood-naphtha 2, mineral naphtha 0·5, and a small quantity of pyridine and methyl violet dye. Another form known as 'industrial' is allowed to be used by manufacturers under licence only, and contains no mineral naphtha or methyl violet.

Metonic Cycle. See CHRONOLOGY, GOLDEN NUMBER.

Metope. See ENTABLATURE.

Metre is that kind of rhythm in language which seems to fall into the regular repetition of a pattern or sequence of patterns.

The distinction between poetry and prose is commonly assumed to be equivalent to the distinction between metrical and non-metrical rhythm. The theoretical difficulties and practical inconveniences of this assumption have, since Aristotle noticed them, often been pointed out. There is a good deal of prose or non-metrical composition to which the title of poetry cannot reasonably be refused; we need only refer to Plato's *Dialogues*, the Old Testament, Traherne's *Meditations*, or Baudelaire's prose-poems. On the other hand, the mere presence of metrical rhythm is notoriously insufficient to provide the quality of poetry. Yet the fact that poetry and metrical rhythm are, however incorrectly, so commonly taken to imply each other, suggests that there is, at the least, some strong natural connection between them; and this is confirmed when we notice how ludicrously obtrusive metrical rhythm becomes when unsupported by poetic intention or some poetic quality in the language. It is, moreover, well known that primitive or early poetry is almost always metrical; and attempts to account for this as a mnemonic device, or as the unconscious answer to the rhythmic urgencies of respiration or the pulsation of the blood, may be ignored as irrelevant to the real problem, since they fail to explain how it is that the invention of writing (to say nothing of printing), and the development of instinctive utterance into consciously elaborated technique, have left the connection between poetry and metre as strong as it ever was in barbarous times. The real problem is, What is the nature of this persistent association of poetry and metre? Why does the art of poetry not indeed absolutely require, but at least strongly recommend, the use of metrical rhythm? Without attempting to determine here the inner nature of poetry—the quality of intention or impulse necessary to it—it will be safe to say that, whenever we find poetry, we recognise some unusual degree of instant, subtle, and complex expressiveness in the language. We may therefore suppose that metre is used in poetry because it specialises into some unusual degree of expressiveness the rhythmical energy of language. But before discussing the function of metre it will be advisable to consider the general nature and the chief forms of metre.

Nature of Metre.—There is nothing abstruse in the idea that in metre rhythm falls into the regular repetition of patterns; and this idea

The varied position of the sense-pause in the line, as well as the accommodation of variable rhythm to a constant pattern, will be noticed.

Scansion thus exercised, with due regard for both aspects of metre—the constancy of its base and the variation of its actual rhythm—forms a useful instrument for precisely criticising the technique of individual versification, and for discriminating the different species of metre. But rhythm, and consequently metre, is not always established by the same means; and scansion, before it can begin its work, must first of all be clear as to the form of metre which is being investigated. This will depend on the rhythmical structure of the language in which the metre is composed. Rhythm may be established by (a) *Stress*, the force with which syllables are enunciated; (b) *Quantity*, the duration of syllables; and, more doubtfully (c) *Tone*, the pitch at which syllables are enunciated. These may operate singly or in combination. The combined incidence of stress and raised tone on a syllable may be called its *Accent*.

There are three main forms of metre: (1) The *Alliterative* metre of Anglo-Saxon and other Northern languages, in which stress joins with quantity to give the rhythm; the base here consists simply of the *number* (usually two) of stressed syllables on either side of a sense-pause in the line, without any definite disposition of these stressed syllables among the unstressed syllables, but with alliteration (or repetition of initial sounds) binding together in each line the sequence of stressed syllables.

(2) The *Quantitative* metres of Persian, Greek, and Latin, in which quantity independent of stress gives the rhythm; the base here consists of long syllables definitely disposed among short syllables, the variation of speech-rhythm being allowed for by means of a system of arithmetical equivalence between long and short syllables; and the stress, though no doubt powerless to alter the rhythm, yet qualifying it by its changing incidence.

(3) The *Accentual* metres of most modern European languages, in which stress (usually involving also tone) gives the rhythm independent of quantity; the base here consists of accented syllables definitely disposed among unaccented syllables, the speech-rhythm varying this disposition without obliterating its pattern. As a rule, this kind of metre uses rime to bind its lines together in the interests of larger periodic rhythms; though, as in blank verse, it can dispense with rime.

Function of Metre.—All rhythm, and especially the rhythm that assumes the insistent formality of metre, exhibits not merely continuity, but also a power of continually generating larger and more inclusive rhythms; just as the rhythmical elements or feet combine to form the rhythm of the line, so the line-rhythms combine to form inclusive masses of rhythm, whether in prescribed stanzas by means of the structural combinations of rime or in paragraphs without rime. In either case, an important function of metre is to give, or at least, in very long poems, to suggest, that formal unity of impression without which no work of art can effectively exist. Akin to this purely æsthetic effect of metre is its emotional effect. The excitement and exaltation accompanying the conception of a poem, with its sense of an unusual significance in things, must be expressed if the poet is to convey the whole of his experience; and no means of expression of this can compare with the proper iteration of insistent rhythm. Metre, with its apparent repetition of marked rhythmical patterns, can provoke the required general heightening of mental tone so long as it does not neutralise this by the tedium of an artificial limitation of natural speech-rhythm. At the same time, the *momentary* emotional expressiveness of rhythm is measured by its variability;

and in metre the expressive variations of rhythm are strongly enforced and made peculiarly noticeable by the fact that they always take place against an accepted constancy of rhythm. So that, both by its constancy and by its variation, metre is the one form of rhythm capable of satisfying every demand which poetry can make of this aspect of its medium, both for momentary and for total expressiveness.

Metre, the basis of the 'metrical' or modern French system of weights and measures, and the unit of length. The first suggestion of a change on the previous system dates as far back as the time of Philip the Fair; but up till 1790 no important change had been effected. On the 8th May 1790 proposals were made by the French government to the British, for the meeting of an equal number of members from the Academy of Sciences and the Royal Society of London, to determine the length of the simple pendulum vibrating seconds in N. lat. 45° at the level of the sea, with the view of making this the unit of a new system of measures. The British government, however, did not give this proposal a favourable reception, and it fell to the ground. The French government, impatient to effect a reform, obtained the appointment by the Academy of Sciences of a commission composed of Borda, Lagrange, Laplace, Monge, and Condorcet, to choose from the following three, the length of the pendulum, the fourth part of the equator, and the fourth part of the meridian, the one best fitted for their purpose. The commission decided in favour of the last—resolving that the $\frac{1}{4}$ of a quadrant of the Meridian (q.v.) be taken for the basis of the new system, and be called a 'mètre.' Delambre and Mechain were immediately charged with the measurement of the meridian between Dunkerque and Barcelona; and the result of their labours was referred to a committee of twenty members, nine of whom were French, the rest having been deputed by the governments of Holland, Savoy, Denmark, Spain, Tuscany, and the Roman, Cisalpine, Ligurian, and Helvetic republics. By this committee the length of the metre was found to be 443·296 Parisian lines, or 39·3707904 English inches; and standards of it and of the kilogramme (see GRAMME) were constructed, and deposited among the archives of France, where they still remain. It is now known that the earth's quadrant is not 10,000,000, but 10,000,880 standard metres, so that after all the standard metre is an arbitrary unit of length. If we call the metre 3 feet $\frac{3}{8}$ inches our error will be $\frac{1}{160}$ inch only. The 'metrical system' received legal sanction 2d November 1801. The following are the fractions and multiples of the metre:

English Inches.			
Millimetre,	·0833707904		
Centimetre,	·833707904		
Decimetre,	3·93707904	English Feet,	English Yards.
METRE,	39·3707904	=	3·28083992 = 1·093633
Decametre,	393·707904	=	32·808992 = 10·93633
Hectometre,	3937·07904	=	328·08992 = 109·3633
Kilometre,	39370·7904	=	3280·8992 = 1093·633
Myriametre,	393707·904	=	32808·992 = 10936·33

The term 'metric system' is also extended to the French square measure based on the Are (q.v.), which is a square the side of which is ten metres; to the measure of weight based on the Gramme (q.v.), which is the weight of a cubic centimetre of distilled water; to the measure of capacity based on the Litre (q.v.), the volume of a cubic decimetre; and to the cubic measurement based on the Stère (q.v.), which is a cubic metre. The metre is practically $1\frac{1}{8}$ yard. The kilometre is = 0·621 of a mile; the square kilometre (kilomètre carré) is = 0·386 of a square mile. See DECIMAL SYSTEM.

Metronome, a small machine for indicating the correct time or speed at which a musical com-

position should be played. It is essentially an inverted pendulum moved by clockwork. The time is regulated by a weight which can be pushed up and down the pendulum-rod, on which is a graduated scale.

Metropolitan. See ARCHBISHOP.

Metternich, CLEMENS WENZEL NEPOMUK LOTHAR, Prince von Metternich and Duke of Potentilla, an eminent Austrian diplomatist, was born at Coblenz, 15th May 1773. His ancestors had obtained distinction in the wars of the empire against the Turks; his family had supplied more than one elector to the archbishoprics of Mainz and Treves; and his father, Franz Georg Karl, Count von Metternich, had secured a high reputation as a diplomatist and as the associate of Kaunitz. Young Metternich therefore entered the service of his country under the most favourable auspices, of which he was not slow in taking advantage. At the age of fifteen he matriculated at the university of Strasburg, where he had for his fellow-student Benjamin Constant, and from which he removed, two years afterwards, to Mainz to complete his education. In 1794, after a short visit to England, he was attached to the Austrian embassy at the Hague, in the following year marrying the granddaughter and heiress of his father's friend Kaunitz. He first came into notice at the congress of Rastadt, where he represented the Westphalian nobility, after which he accompanied Count Stadion to St Petersburg. From this point his rise was very rapid, as he added to the advantages of his birth and connections a more than ordinary share of diplomatic ability, with the most graceful and winning manners. At twenty-eight he was appointed Austrian minister at the court of Dresden, and after the lapse of two years he was sent as ambassador to Berlin, where he took a leading part in the well-known coalition which was dissolved by the battle of Austerlitz. After the peace of Presburg young Metternich was selected for the most important diplomatic appointment in the gift of the emperor—that of minister at the court of Napoleon. When he presented himself before the emperor, he was greeted with the remark, 'You are very young to represent so powerful a monarchy.' 'Your majesty was not older at Austerlitz,' replied Metternich, with a slight exaggeration which could not make the compliment less acceptable; and, indeed, young as he was, he exhibited an address and a knowledge before which Napoleon might bluster, but of which he never could get the better. Without much ardour, with very limited sympathies, with no deep convictions, he had a clear head and a firm hand; he could keep his own secret, and he could worm out the secrets of others; and, making himself the most agreeable man in the world, he plotted with a smiling countenance, manœuvred in a dance, and struck the hardest when he seemed to yield the most.

In 1807 he concluded the treaty of Fontainebleau, very favourable to the interests of Austria; and on the outbreak of the war between France and Austria in 1809 he was detained some time before he could obtain his passport. In the course of that year he succeeded Count Stadion as minister of Foreign Affairs, and it was during his tenure of office that he conceived the idea of a marriage between Napoleon and an Austrian archduchess as a means of purchasing a respite for the empire. Metternich escorted Marie Louise to Paris. Amidst the difficulties of 1812-13 Metternich maintained at first a temporising policy, but the obstinacy of Napoleon at length led him to resolve upon the declaration of war with France made in August 1813. In the autumn of that year the grand

alliance was signed at Teplitz, and Metternich, in recognition of his great ability in connection with the negotiations, was raised to the dignity of a prince of the empire. In the subsequent conferences and treaties the newly-created prince took a very prominent part, and he subsequently signed on behalf of Austria the second treaty of Paris on 20th November 1815. He afterwards paid a visit to England, and was made an LL.D. by the university of Oxford—the only honour this man of countless orders ever received from Britain. After this he still continued to conduct the diplomacy of Austria; in 1821 he was appointed chancellor of the empire, and in 1826 succeeded Count Zichy as president of ministerial conferences on home affairs. His efforts were now earnestly directed to the maintenance of peace in Europe and the preservation of the existing state of things in the Austrian dominions by the strictest measures of police and severe despotism. In the mildest expressions of individual opinion he saw symptoms of dangerous agitation, and his supreme object was to combine what he called the conservative forces of society against anarchy. Then came the French Revolution of 1848, and Metternich's hatred of revolution was fanatical. The shock, which overturned for a time half the thrones of Europe, was felt at Vienna, and the government fell, in spite of the resistance of Metternich, who maintained his policy of 'thorough' to the last. Leaving Vienna with an escort of cavalry, he fled to England, and there he remained till 1851, in the autumn of which year he made a sort of royal progress to his castle of Johannisberg on the Rhine. From this time, although the advice of the old statesman was occasionally asked by the emperor, he was never again requested to assume office. He died at Vienna on 11th June 1859. The *Autobiography* of Metternich (French, 1879-82; German, 1880-84; Eng. trans. 1880-83), edited by his son, throws valuable light on the stirring times in which he lived. In these volumes also appears the diary of his third wife, Countess Melanie Zichy-Ferraris, whom he married in 1831. She was a clever and beautiful woman, and gave her husband much effective aid. From many entries in her diary it is evident that, if her husband was stern and harsh in political strife, he was not without warm and genial affections. To her Metternich was as good and great a man as ever lived, and she expresses more than once her opinion that he alone 'could save the world.'

See works by Binder (1836), Gross-Hoffinger (1846), Schmidt-Weissenfels (1861), Beer (1877), Colonel Malleon (1888), Demelitsch (vol. i. 1898), Sandeman (1911), Welschinger (1913), and Gentz, and his own memoirs; besides such articles as AUSTRIA, VIENNA, &c.

Mettray, a village of France, 5 miles N. of Tours by rail, noted for its great agricultural and industrial reformatory, the parent of all such institutions (1839). See REFORMATORIES, &c.

Metz, the strongest fortress of Lorraine, stands on the river Moselle at the influx of the Seille, 216 miles E. of Paris. The strength of the place consists in its exterior defences, of which the principal are a cordon of forts, some greatly strengthened and improved since the German annexation, and some entirely new. The cathedral, a Gothic edifice (14th to 16th century), is remarkable for its vast size and its architectural lightness, and has a beautiful spire of open work, 363 feet in height. Of other Catholic churches, the most interesting is St Vincent's. The city has a library, a museum, a military academy, a music school, art and numismatic collections, &c. Apart from tanning and the making of saddles and shoes, there are few industries, though there are several iron-works in the vicinity. The trade is chiefly in

wine, brandy, preserved fruits, leather, &c. Pop., which in 1869 was 48,325, had in 1875, by reason of emigration into France, decreased to 45,856; and by emigration to Germany, &c., fell from 79,318 in 1910 to 62,311 in 1921. The Protestants are less than half as numerous as the Catholics. Metz, known to the Romans as *Divodurum*, was afterwards called Mettis (from *Mediomatrici*, the name of the people), hence the present form. Under the Franks it was the capital of Austrasia, and in 870 passed to the empire; it was afterwards made a free city of the empire. In 1552 it was treacherously taken possession of by the French; and, although Charles V. besieged the place from October 1552 to January 1553, they kept it till it was formally ceded to them in 1648. The fortifications, already strong, were completely reconstructed by Vauban in 1674; they were added to at various dates, and after 1830 thoroughly restored. In August 1870 Bazaine was compelled to retire with his army into Metz, which after a long siege was taken by the Germans; the treaty of Frankfurt annexed it to Germany, that of Versailles to France.

Metzgeria, a genus of Liverworts (q.v.).

Meudon, a village 5 miles W. of Paris by the railway to Versailles. The château, rebuilt by Mansard for the Dauphin in 1695, and fitted up for Marie Louise by Napoleon in 1812, was reduced to ruin during the bombardment of Paris in 1871. The Forest is a favourite holiday resort. There is an observatory. Rabelais was curé of Meudon. Pop. 10,000.

Meulebeké, a town in the Belgian province of West Flanders, on the Mandel, a tributary of the Lys, 24 miles SW. of Ghent; pop. 10,000.

Meulen, ADAM (not ANTOINE) FRANÇOIS VAN DER, Flemish painter, born at Brussels, 11th January 1632 (not 1634), was appointed by Colbert in 1666 battle-painter to Louis XIV., and thenceforward accompanied that king in his military expeditions. A long series of Van der Meulen's battle-pictures hang in the Louvre. He died in Paris, 15th October 1690.

Meung, JEAN DE, or Jean Clopinel, or Chopinel, a French satirist, the Voltaire of the middle ages as Gaston Paris calls him, was born at Meun-sur-Loire about 1250. He flourished under Philip the Fair, translated many books into French, became rich and prosperous, and died before November 1305. His *Testament* in single-rimed quatrains, with all its raillery, reveals a genuine piety. But his great work is his continuation to the length of 22,817 lines of the *Roman de la Rose*, left unfinished in 4670 lines by William of Lorris before 1260. He preserved the original metre, but completely altered the treatment, substituting for its tenderness, refinement, and elaborate allegorising, sharp satirical pictures of actual life, forming an invaluable mirror of the middle ages. See *Hist. Litt. de la France*, vol. xxviii.

Meunier, CONSTANTIN (1831–1905), Belgian painter and sculptor, born at Brussels, by the vigour of his art became a master from whom artists in other countries took inspiration. To him we owe the beautiful groups of the mining and industrial life of his country which he presented with great realism and strength ('*La glorification du travail*').

Meursius, JOHANNES, the elder (properly Jan de Meurs), a learned scholar, was born at Loozuinen near The Hague, 9th February 1579, studied philology at Leyden, next travelled through Europe with the son of the Grand-pensionary Barneveldt, and became in 1610 professor of History, and next year of Greek, at Leyden, and afterwards Historio-

grapher to the States-general. In 1625 he became professor of History in the academy at Sorø in Denmark, and here he died, 20th September 1639. His industry was portentous, and his works are a storehouse of materials for students, especially in Greek antiquities. He edited Cato's *De Re Rustica*, Plato's *Timeus*, the *Characters* of Theophrastus, and a long series of the writings of the later Greek writers, as Lycophron, Constantinus Porphyrogenitus, Philostratus, Aristoxenus, Constantinus Manasses, Theophylact, Theodorus Metochites, Antigonus Carystius, Apollonius Dyskolus, and Phlegon. Other works are the useful *Glossarium Græco-Barbarum* (1614), *Res Belgicæ* (1612), *Athens Batavæ* (1625), *Historia Danica* (1630), and a long series of monographs on questions of Greek antiquities which may be found in the *Thesaurus Antiquitatum Græcarum* of Gronovius. A collected edition of his works was prepared by Lami (12 vols. Flor. 1741–63).—His son, JOHANNES MEURIUS, the younger, was born at Leyden in 1613, and died in Denmark in 1654. He wrote several antiquarian works of value, but his name by a singular misfortune survives in connection with the filthy *Elegantie lingvæ Latine* (best ed. Leyden, 1757), with which it is certain that he had nothing to do. The original edition bears neither place nor date, but was most probably printed about 1680 at Lyon or Grenoble. It contains a little poem by Chorier (1609–92), hence his name has been too easily connected with the book, the origin of which still remains an unsolved puzzle.

Meurthe-et-Moselle, a department in the north-east of France, formed, after the treaty of 1871 with Germany, out of what remained of the former departments of Moselle and Meurthe. It has four arrondissements—Briey, Lunéville, Nancy, and Toul—an area of 2020 sq. m., and a pop. (1872) of 365,137; (1921) 503,810. The capital is Nancy. The department belongs to the plateau of Lorraine, has very fertile soil, producing corn, wine, potatoes, fruit, beet-root for sugar, hops, &c., and is drained by the Moselle and its tributaries. It has valuable iron-mines, and is the first department in France for iron and steel; there are also important manufactures of glass, pottery, woollens, cottons, chemicals, tobacco, paper, beer, artificial flowers, and embroidery-work. Rock-salt is mined in large quantities. In point of popular education it ranks second amongst the French departments, Doubs being first.

Meuse (Dutch *Maas*), an affluent of the Rhine, rises in the French department of Haute-Marne, flows in a northerly direction in a deep, narrow, winding valley, past Verdun and Sedan, entering Belgium just below Givet, on to Namur, whence it makes a huge curve to the east, then flows north past Liège and Maastricht, and, bending abruptly to the west, joins the Waal, one of the mouths of the Rhine, opposite Gorkum. The united streams take the name of the Maas, which soon divides again. The southern branch passes through the Biesbosch and Hollandsche Diep, and, again dividing, reaches the sea in two wide estuaries, Haringvliet and De Krammer. The northern branch, called the Merwede as far as Dordrecht and to the west of that town the Old Maas, likewise reaches the sea in two channels, the Old and the New Maas. On this last stands Rotterdam. The entire river is 500 miles in length; it is navigable from Verdun. Area of basin, 18,530 sq. m. Its principal affluents are the Sambre on the left and the Ourthe on the right.

Meuse, a department in the north-east of France, touching Belgium in the north; area, 2400 sq. m.; pop. (1872) 284,725; (1921) 207,309. The surface is traversed from south-east to north-

west by the wooded Argonne ranges, which form the right and left banks of the river Meuse, and separate it from the basin of the Seine on the west and from that of the Moselle on the east. The soil in the valleys is fertile and well cultivated. Wheat, oats, beet-root (for sugar), hemp, oil-plants, and wine are the principal products. Iron is mined and manufactured; glass and paper are the chief branches of industry. The four *arrondissements* are Bar-le-Duc, Commercy, Montmédy, and Verdun. The capital is Bar-le-Duc.

Mexico, an inland state of the republic of Mexico, on the central plateau, adjoining the federal district. The state is fertile, has silver-mines, and several volcanoes. It does not include the city of Mexico (q.v.), which is in a federal territory. Area, 9000 sq. m.; pop. 880,000; capital, Toluca.

Mexico (*Méjico*), a southerly country of North America, is a federal republic, embracing twenty-eight states, a federal district, and two territories. It extends between the United States and Guatemala, with an extreme length of nearly 2000 miles; its breadth varies between 1000 and (in the Isthmus of Tehuantepec) 130 miles. It has a coast-line of 6000 miles or more, but with scarcely a safe harbour beyond the noble haven of Acapulco; on the Atlantic side, with its sandbanks and lagoons, there are only open roadsteads, or river-mouths closed to ocean vessels by bars and shallows; harbour-works, however, have mitigated these disadvantages at Vera Cruz and Tampico. From the south-eastern and north-western extremities of the republic there extend the peninsulas of Yucatán and Lower California, enclosing the Gulfs of Campeche and California respectively.

The figures in the following table can in most cases be accepted only as approximate: large sections of Michoacán and Guerrero, and also of Sonora, have not yet been explored; and there are still many Indians that have never even come in contact with the white man. Of the entire population the whites are estimated to form 20 per cent., the Indians 35, and the half-castes (*mestizos*) 45.

States, &c.	Sq. Miles.	Pop. in 1921.	Chief Towns.
NORTHERN—			
Sonora.....	76,633	275,127	Hermosillo.
Chihuahua.....	90,036	401,622	Chihuahua.
Coahuila.....	63,786	394,341	Saltillo.
Nuevo León.....	25,032	336,412	Monterrey.
ATLANTIC—			
Tamaulipas.....	30,831	287,957	Ciudad Victoria.
Vera Cruz.....	27,880	165,104	Córdoba.
Tabasco.....	10,374	178,389	Villa Hermosa.
Campeche.....	18,089	70,087	Campeche.
Yucatán.....	15,939	358,221	Mérida.
PACIFIC—			
Sinaloa.....	27,557	341,265	Culiacán.
Nayarit.....	10,953	157,570	Tepic.
Jalisco.....	33,492	1,191,957	Guadalajara.
Colima.....	2,272	91,749	Colima.
Michoacán.....	22,621	935,654	Morelia.
Guerrero.....	25,279	531,565	Chilpancingo.
Oaxaca (Oajaca).....	35,689	949,978	Oaxaca (Oajaca).
Chiapas.....	27,527	422,683	Tuxtla Gutiérrez.
CENTRAL—			
Durango.....	42,272	338,511	Durango.
Zacatecas.....	24,471	379,329	Zacatecas.
Aguas Calientes.....	2,969	107,581	Aguas Calientes.
San Luis Potosí.....	24,004	445,681	San Luis Potosí.
Guanajuato.....	10,950	860,364	Guanajuato.
Querétaro.....	4,493	220,231	Querétaro.
Hidalgo.....	8,637	627,991	Pachuca.
Méjico (Mexico).....	9,230	879,846	Toluca.
Morelos.....	1,895	103,519	Cuernavaca.
Puebla.....	12,992	1,023,428	Puebla.
Tlaxcala.....	1,534	178,570	Tlaxcala.
Federal District.....	578	906,063	Méjico (Mexico).
Baja (Lower) California.....	58,338	62,831	La Paz.
Quintana Roo.....	19,270	10,966	Santacruz de Bravo.
Islands.....	1,575	684	
Total.....	767,198	14,234,799	

Surface.—For the most part Mexico consists of an immense tableland, which commences in the United States as far north as Colorado, and gradually rises to over 8100 feet at Marquez, 76 miles N. by W. of Mexico city; and a mean elevation nearly as great is maintained in all the south central plateau: at Ciudad Juárez, on the northern frontier, the elevation is only 3717 feet. The prevailing metamorphic formations are partly overlaid by igneous rocks of every epoch, rich in metalliferous ores. In the highest ranges granites and other igneous rocks prevail, with deposits of sulphur and pumice, and other recent volcanic discharges. In the north chalk and sandstones become prevalent. The escarpments of this plateau form most of the so-called Cordilleras; Humboldt's theory of a continuous chain extending from Patagonia to Alaska has now been abandoned. The most important range is the Sierra Madre (over 10,000 feet, and extending from Tehuantepec into the United States); parallel with this run the sierras of the east coast and of Lower California. The surface of the country is also much broken up by short cross-ridges and detached hills. The highest peaks of Mexico are all volcanic, including Orizaba (Citlaltépetl), 18,250 feet high, Popocatepetl (17,880 feet), Ixtaccihuatl (17,000), and Nevado de Toluca (15,000)—none of them reaching the altitude of Mount McKinley. Most of the Mexican volcanoes are extinct or quiescent, and violent earthquakes are of rare occurrence. No disturbance so remarkable has occurred since the upheaval of Jorullo (q.v.) in 1759. On the Atlantic side the plateau descends abruptly to the narrow strip (about 60 miles) of gently sloping coast-land; towards the Pacific, where the coast-lands vary in width from 40 to 70 miles, the descent is more gradual. Of the present lakes the only one of great size is Chapala (q.v.), which is traversed by the Rio Grande de Santiago; but considerable bodies of water collect in depressions in the uplands during the heavy rains, and even flood the surrounding country for a time. The rivers of Mexico are of little use for navigation. South of the Rio Grande del Norte, on the Texan frontier, they are mostly impetuous mountain-torrents, or flow through rocky gorges (*barrañcas*), sometimes 1000 feet deep. Only in the narrow strips between the plateau and the coast are they available as channels of trade and communication; and in this respect perhaps Arabia alone is less favoured than Mexico.

Climate and Agriculture.—In the plateau region, or *tierras templadas*, the climate is almost that of perpetual spring, and the atmosphere remarkably free from moisture. It is to this peculiar dryness that the city of Mexico, the soil of which has been soaked with the filth of centuries and never properly drained, owes its immunity from pestilence; but, on the other hand, throughout the plateau agriculture is dependent on the use and control of water for irrigation purposes, and an immense desert tract extends between Chihuahua and Zacatecas. Wood in all this upland region is scarce and dear, though there are valuable forests in the extreme north and south. On the coast-lands wood and water are abundant, and the soil fertile, but the climate is such that white men cannot work as labourers there. Yet Mexico contains as fine agricultural land as any in the world, and in most parts two crops a year are grown. Northern Mexico is the original home of the 'cattle-range' business, and there vast herds of horses, cattle, and sheep form the principal wealth of the people. The coast-belt and the terraces up to 3000 feet constitute the *tierras calientes*, where the temperature ranges from 60° to 110° F., and, in the south at least, magnificent tropical vegetation and yellow fever and *vómito* used to reign with

equal vigour. Two or three hours by the Vera Cruz Railway carry the traveller from Esperanza, at the very edge of the plateau, down into the heart of the tropics. The cold lands, or *tierras frias*, embrace all the country above about 8000 feet, including the few highest peaks covered with perpetual snow. South of about 28° N. there are only the wet and the dry season, the former from June to October. Farther north there are four seasons; but in the highest zone the rainfall is very scanty, and northern Mexico and the Californian peninsula especially are exposed to seasons of drought. The vegetation of Mexico has the same wide range as the climate. In the lowlands dye-woods and valuable timbers abound in the virgin forests, as well as henequen, medicinal plants, india-rubber, palms, &c.; and oranges and bananas, many varieties of cactus, olives, sugar, coffee, cocoa, rice, indigo, cotton, and tobacco, besides the omnipresent maize, all thrive. Many of these products, including the palms, oranges, cacti, olives, tobacco, and of course the maize, grow as readily over a great part of the temperate zone, where the characteristic vegetation embraces pines, evergreen oaks, the magney or *Agave americana* (q.v.). The last is nearly as frequent also in the *tierras frias*. The vine flourishes in some districts, especially near Ciudad Juárez, Durango, and Parras in Coahuila, where a good wine is made; and mulberry-plants have been imported from Europe to develop the silk industry. In Lower California a good deal of Archil (q.v.) is collected. Chicle gum is extracted and prepared in the forests along the coast. But agriculture in Mexico is very poorly developed. Primitive methods are followed by the people generally, and the American plough has only in a few localities displaced the crooked stick, sometimes shod with iron, and lashed by raw-hide thongs to the oxen's horns. There is, however, some agricultural machinery in use on the larger *haciendas* or great landed estates. To their absentee owners such estates, in spite of the expense of irrigation and the shiftless methods in use, are said to return large incomes; but the difficulty and cost of transport are so great that in many parts of Mexico no more corn is grown than suffices to meet the wants of the immediate neighbourhood. The staple crop is maize. The other principal crops are wheat, beans, barley, tobacco, cotton, sugar-cane, coffee. Henequen or sisal hemp is exported in large quantities.

Minerals.—Mexico is rich in minerals, many of which have been worked from a very early date. Silver-mining, especially, has been an important industry ever since the conquest, and a considerable number of the mines are still worked in all parts of the country. Gold is also produced. The coinage records, which date from 1537, and may be taken as substantially accurate, show the production of the precious metals from that year and for the next three and a half centuries to have been: gold, 114,000,000 Mexican dollars; silver, 3,000,000,000 Mexican dollars. Copper is largely mined in some sections, being found in a pure state in Chiapas and Guanajuato, and elsewhere associated with gold. Other important minerals are iron, including enormous masses of meteoric iron ore, and the mountain a mile from Durango, the Cerro de Mercado, a solid mass of magnetic iron ore; lead, found associated with silver; and sulphur, zinc, quicksilver, platinum, manganese, antimony, cinnabar, besides salt, graphite, marble, alabaster, gypsum, asphalt, and petroleum in great quantities, and some tungsten, molybdenum, and opals. There are also large deposits of coal, some of excellent quality, in various localities; but as yet little of it has been mined, mostly in the state of Coahuila. Mexico has about a thousand

petroleum wells, distributed over wide areas. The development of the oil-fields has been very rapid. From 3½ million barrels in 1908 the yield has risen to nearly 200 million.

Manufactures and Trade.—The manufacturing industries, which in the past had progressed slowly, developed rapidly under Porfirio Diaz's administration, owing to stable government and the consequent advent of much foreign capital, although as yet the manufactured articles are almost confined to what is required for home consumption. The principal manufacture is a coarse cotton cloth. There are also a good many distilleries and tobacco-factories, and several paper and numerous sugar mills, not to speak of smaller manufactures of candles, glass, porcelain; and the extraction of henequen fibre, too, is an important industry. Bounties are offered by some states for the establishment of factories within their bounds. But the handicraft production of such articles as pottery, saddles, sandals, many coarser textiles, the national hat, the sombrero, and the national drinks, pulque, mescal, and tequila, all from the various plants of the magney family (see AGAVE), is much more considerable. The great bulk of the Mexican exports is always formed by the precious metals—coin, bullion, and ores; yet the amount of agricultural products and other merchandise has greatly increased since the construction of railways. Of these in 1860 there were none; in 1880 there were 655 miles; now about 16,000 miles, open for traffic. The rapid construction of these lines, most of them in English hands, saddled the country with heavy responsibilities. Most of the railways have been taken over by the government since 1914. Many important productive regions, notably the peninsulas, have suffered from want of railway connection with other parts of the republic. This problem is now engaging the attention of the government. The spread of the railways was made an excuse for the almost utter neglect of the roads, which throughout Mexico were bad enough before. The fine highways constructed by the Spaniards were allowed to fall into destruction during the long civil wars, and their present deplorable condition makes them rather a hindrance than a help in the development of the country. A still more serious obstacle to internal commerce has been the crushing system of inter-state customs—the *alcabalas*—a heritage from the days of Spanish rule; they were abolished by a decree of 1886, but some of them continued to exist under other names. Under the excise system, moreover, nearly every possible product, every branch of industry, every social function even, is taxed; and a swarm of petty officials in every city, town, and hamlet see that nothing escapes its tax, from a bag of seaweed or shavings to a funeral or a fandango. Of the exports gold and silver make up about half the total value; petroleum, copper, coffee, henequen, rubber, and hides are also important. Most of the trade is with the United States; Great Britain follows, Germany at some distance, and France yet farther behind. Great Britain imports from Mexico oils, mahogany, log-wood, and silver ore, and exports thither cottons, woollens, and linens, iron, machinery, and coal.

Armed Forces.—The strength of the active army on a peace footing is fixed by law at 50,000 officers and men. Service is compulsory in the active army or the national guard. There is a small navy, and likewise an air-force.

Government Finances, &c.—The Mexican constitution of 1857, and that of 1917 which superseded it, are closely modelled upon that of the United States. The president, who is assisted by seven secretaries of state, is elected by direct popular vote for four years, and can be re-elected for a second term; the senators (two for each state) and

representatives (one for every 60,000 inhabitants) receive a salary of about 7000 dols. a year. Both senators and representatives are elected by universal male suffrage, voters being eighteen years of age if married, twenty-one if unmarried. The several states have elected governors and legislatures. It must be added, however, that neither government nor opposition is conducted on any principle: the government is a personal, and often a tyrannical, one; and the opposition also is personal—it rises and falls with its leader, and in the past has found its favourite and safest expression in revolution, which either lifts the pretender into power or leaves him before a firing-party. Either event dissolves the opposition, for no principle has been involved. A strong government, in these circumstances, is most necessary in Mexico. The judicial system occupies the same position as that of the United States.

Mexico made marvellous progress under the firm rule of President Porfirio Díaz, who so won the confidence of European investors that by their help the country was opened up and industries promoted. Before 1876 Mexico had been in a chronic state of civil war and revolution and contempt for law, a condition of almost complete ruin, with a treasury depleted and without credit. From Díaz's first year as president (1876) to his last (1910) the federal revenue increased fivefold. The interest on the public debt was punctually paid. Banks, railways, harbours, lighthouses multiplied manifold. Imports and exports grew tenfold. Manufacturing industries of all kinds advanced. Education is obligatory; schools doubled during Díaz's administration; pupils increased from 193,000 to 778,000, and the amount spent on public schools from £200,000 to £1,000,000. The National University in the city of Mexico was re-founded in 1910. Since Díaz's time civil wars have done much to check progress; but another university was founded in 1922 at Mérida (Yucatán). The bulk of the people are, at least nominally, Roman Catholic, but the constitution of 1917 confirms the separation of church and state. No church can acquire landed property. There are seven archbishops and twenty-three bishops. The federal government supports a complete public health establishment, with a legion of artisans for the execution of works of public utility—schools, penitentiaries, hospitals, roads, drainage and sanitation of ports and cities, irrigation-works, &c. The administration of justice has been raised to the level of modern nations. From 1923 judges are appointed for life. The cities have modern drainage and sanitation, with most of the conveniences of Europe.

History of Mexico.—Apart from the Mayas (q.v.) in the southern parts of the country, the history of ancient Mexico exhibits two distinct and widely differing periods—that of the Toltecs and that of the Aztecs. Both were Nahuatl nations, speaking a language which survives in Mexico to this day. The 8th century is the traditional date when the Toltecs are related to have come from the north, from some undefined locality, bringing to Anáhuac its oldest and its highest native civilisation. Their capital they established at Tula, north of the Mexican valley. Their laws and usages stamp them as a people of mild and peaceful instincts, industrious, active, and enterprising. They cultivated the land, introduced maize and cotton, made roads, erected monuments of colossal dimensions, and built temples and cities, whose ruins in various parts of New Spain still attest their skill in architecture, and sufficiently explain why the name Toltec should have passed into a synonym for architect. They knew how to fuse metals, cut and polish the hardest stones, manufacture earthenware, and weave various fabrics; and to their

invention are assigned the Mexican Hieroglyphics (q.v.) and calendar. It is related that a severe famine and pestilence all but destroyed the Toltec people in the 11th century, and drove the survivors southward to Guatemala and Yucatán, carrying their arts of civilisation with them; and near the end of the next century, after their place had been taken by the rude Chichimecs, a fresh migration brought, among other kindred nations, the Aztecs into the land. Within two centuries and a half this last people had become predominant. But their rule was, in a great degree, a reversion to savagery. They were a ferocious race, with a religion gloomy and cruel, and they grafted upon the institutions of their predecessors many fierce and sanguinary practices. Thus they produced an anomalous form of civilisation, which astonished the Spaniards by its mingled character of mildness and ferocity. After wandering from place to place, the Aztecs founded about 1325 the city of Tenochtitlan, or Mexico; a hundred years later they had extended their sway beyond their plateau-valley, and on the arrival of the Spaniards their empire was found to stretch from ocean to ocean.

Their government was an elective empire, the deceased prince being usually succeeded by a brother or nephew, who must be a tried warrior; but sometimes the successor was chosen from among the powerful nobles. The monarch wielded despotic power, save in the case of his great feudal vassals; these exercised a very similar authority over the peasant class, below whom, again, were the slaves. Taxation appears to have been heavy in Mexico even then. The laws were severe, nearly every crime being met with capital punishment in some form; but justice was administered in open courts, the proceedings of which were perpetuated by means of picture-written records. The Mexicans apparently believed in one supreme invisible creator of all things, the ruler of the universe; but the popular faith was polytheistic, with a number of chief and many inferior divinities, each of whom had his sacred day and festival; whilst a crowd of nature-spirits peopled the hills and woods. At the head of the Aztec pantheon was the frightful Huitzilopochtli, the Mexican Mars. His temples were the most splendid and imposing; in every city of the empire his altars were drenched with the blood of human sacrifice, to supply victims for which the emperors made war on their neighbours or on any revolted territory, and levied a certain number of men, women, and children by way of indemnity. The victims were borne in triumphal processions, and to the sound of music, to the summit of the great pyramidal temples, where the priests, in sight of assembled crowds, bound them to the sacrificial stone, and, slashing open the breast, tore from it the bleeding heart and held it up before the image of the god, while the captor carried the carcass off to feast on it with his friends. In the years immediately preceding the Spanish conquest not less than 20,000 victims were annually immolated, including infants, for the propitiation of the rain-gods. These atrocities, originally referable to the entire absence of live-stock, were incongruously blended with milder forms of worship, in which fruits, flowers, and perfumes were offered up amid joyous outbursts of song and dance. According to the tradition, Quetzalcoatl, who delighted in these purer sacrifices, had once reigned among the Toltecs in the golden age of the world, but, being obliged to retire from earth, he departed by way of the Mexican Gulf, promising to return. This tradition accelerated the success of the Spaniards, whose light skins and long dark hair and beards were regarded as evidences of their affinity with the long-looked-for divinity. The Mexican priesthood formed a rich and powerful

order of the state, and were so numerous that Cortes found as many as 5000 attached to the great temple of Mexico. The education of the young of both sexes was entrusted to the priests and priestesses; and the sacerdotal class were thus able to exercise a widely-diffused influence, which, under the later rulers, was almost equal to that of the emperor himself. The women shared in all the occupations of the men, and were taught, like them, the arts of reading, writing, ciphering, singing in chorus, dancing, &c., and even initiated in the secrets of astronomy and astrology.

Cortes landed at Vera Cruz in 1519; the history of the conquest of the Aztec land is told at length in the article on that greatest of the *conquistadores*, who gave to Spain what for centuries remained her richest province. Before his energy, and the superior civilisation of his followers, the power of the native empire crumbled away. In 1540 Mexico was united with other American territories—at one time all the country from Panamá to Vancouver's Island—under the name of New Spain, and governed by viceroys (57 in all) appointed by the mother-country. The intolerant spirit of the Catholic clergy led to the suppression of almost every trace of the ancient Aztec nationality and civilisation, while the commercial system enforced crippled the resources of the colony; for all foreign trade with any country other than Spain was prohibited on pain of death. The natives were distributed as slaves on the various plantations, though they were also christianised and looked after by the Inquisition, whose last *auto-da-fé* was held in Mexico city as late as 1815. Mexico was regarded as simply a mine to be worked by the labour of its people for the benefit of Spain. Yet, notwithstanding these drawbacks, it ranked first among all the Spanish colonies in regard to population, material riches, and natural products. For nearly three centuries it may be said to have lain in sullen submission beneath its cruel conquerors' heel, till in 1810 the discontent, which had been gaining ground against the viceregal power during the war of the mother-country with Napoleon, broke into open rebellion under the leadership of a country priest named Hidalgo. After his defeat and execution in 1811 Morelos, another priest, continued the struggle till he shared the same fate in 1815; and a guerilla warfare was kept up until, in 1821, the capital was surrendered by O'Donojú (a Spaniard of Irish descent), the last of the viceroys. In the following year General Iturbide, who in 1821 had issued the *plan de Iguala*, providing for the independence of Mexico under a prince of the reigning house, had himself proclaimed emperor; but the guerilla leader Guerrero, his former ally, and General Santa-Ana raised the republican standard, and in 1823 he was banished to Italy with a pension. Returning the following year he was taken and shot, and the federal republic of Mexico was finally established.

For more than half a century after this (till 1876) the history of Mexico is a record of nearly chronic disorder and civil war. Within that period the country had fifty-two presidents or dictators, another emperor, and a regency; and in nearly every case the change of administration was brought about with violence, a respectable proportion of these great men being ultimately shot by some opposing faction. In 1836 Texas secured its independence, for which it had struggled for several years, and which Mexico was compelled to recognise in 1845. In that year Texas was incorporated with the United States; but its western boundary was not settled, and the Americans coveted a particular strip of territory, and sent troops to seize it. The war thus wantonly provoked was continued with great energy by both

parties until 1848, when peace was finally concluded after several bloody engagements had been fought, and the city of Mexico had been stormed and taken by the Americans under General Scott. As the result of this war Mexico was compelled to cede half a million square miles of territory to her powerful enemy. For the details of the war, see UNITED STATES, and SANTA-ANA. Under the latter also falls to be told so much as is necessary of the history of the next few years. After his fall in 1855, down to 1867, great confusion prevailed. In 1858 Benito Juárez (q.v.) became president, but his claims were contested by General Miramón—the head of the reactionary or clerical party—and the country was plunged in civil war. The acts of wanton aggression and flagrant injustice perpetrated on foreigners in Mexico during this period of internal disorder brought a fleet of English, French, and Spanish ships into the Mexican Gulf for the purpose of enforcing satisfaction. In 1861 the Spaniards disembarked a force at Vera Cruz; and this step was soon followed by the arrival before that city of the allied fleet. Preparations to advance at once upon the capital alarmed the provisional government, and brought about an armistice and a treaty regulating commercial intercourse between Mexico and the great European powers. This treaty was not confirmed by France, and the French troops retained occupation of the Mexican territory. In April 1862 the French emperor formally declared war against the government of Juárez; but the French never met with the welcome they expected from the people, and had to withdraw in 1867—mainly because of the jealousy of their action shown by the United States. Maximilian, Archduke of Austria, who had become emperor of Mexico under French auspices, was executed in the same year, and Juárez returned to practically absolute power. See JUÁREZ and MAXIMILIAN. On the death of Juárez in 1872, the chief-justice, Lerdo de Tejada, assumed the presidency, in which, after a revolution, he was succeeded in 1876 by Porfirio Díaz, one of the ablest of Mexican rulers. He was re-elected for the eighth time in 1910, but resigned under pressure of revolution in 1911, and died in 1915. Under his autocratic, if not tyrannical, rule the position of the republic steadily improved. A long period of revolutions, anarchy, and confused faction fights followed. General Madero, elected president in December 1911, was murdered in 1913, when General Victoriano Huerta assumed power, dismissed congress, and ruled practically as dictator. Relations with the United States were severely strained. American pressure secured the 'elimination' of Huerta, who resigned in 1914. The 'Constitutionalist' leaders, Venustiano Carranza and Villa, then fell out. In addition to these, Zapata and other would-be presidents pushed their fortunes. Carranza was generally recognised abroad in 1915, and in 1917 was elected under the new constitution. Friction with the United States was renewed. A revolution under General Álvaro Obregón resulted in the shooting of Carranza in 1920, and the succession of Adolfo de la Huerta, of Obregón (1921), and of General Calles (1924).

See histories by Prescott, Bancroft, Frost, Miss Hale (1891), Priestley (1923). For forced labour or slavery in the culture of henequen and rubber in Yucatán, and other depressing features, see Turner's *Barbarous Mexico* (1911), and Baerlein's *Mexico the Land of Unrest* (1913), both of whom deal severely with Díaz, Baerlein computing Díaz's victims at 30,000. For antiquities, see Lord Kingsborough's *Antiquities of Mexico*; Tylor's *Anahuac* (1861); Strebel's *Alt-Mexiko* (1885-89); Peñafiel's *Monuments of Mexican Art* (1890); Arnold and Frost's *The American Egypt* (1909); Rickards's *Ruins of Mexico* (vol. i 1910); Joyce's *Mexican Archaeology* (1914); Seler's *Amerikanische Sprach- und Altertumskunde* (Berlin).

5 vols. 1902-15); Spinden's *Study of Maya Art* (Camb., Mass., 1913); *Bulletin 28* of the Bureau of American Ethnology (1904); Lewis Spence's *Gods of Mexico* (1923); and other works. See also books by Enoch (1909, 1924), MacHugh (1914), and Trowbridge (1919); Lumboltz, *Unknown Mexico*; and the articles CORTES and LAS CASAS.

Mexico (CITY), the capital of the republic, is situated in the Federal District (not the state of Mexico), 7347 feet above the sea, at the lowest level of the great lacustrine basin (1400 sq. m.) of the Anáhuac plateau. The largest of the six lakes that occupy this hill-girt valley, Lake Tezcuco, amid whose waters, Venice-like, the city first rose, has now retired $2\frac{1}{2}$ miles to the north-west—partly filled up by drainage deposits. In the Aztec city the principal thoroughfares radiated from an immense central square, in which towered the great temple of Huitzilopochtli; and this arrangement is yet preserved in the modern capital. All the main streets converge on the Plaza Mayor, where the site of the old *teocalli* is occupied by the no less famous cathedral (1573-1657). The walls of

Chalco and Xochimilco, where steamers run, a few of the floating gardens for which the ancient city was celebrated. Attempts had long been made to drain the valley of Mexico. A tunnel through the lowest hills to the Tula River (5 miles), cut in 1607-8 by Martinez, proved insufficient, and the city was flooded from 1629 to 1634; and even an open cut through the mountains (1637-67), 10 miles long, never entirely fulfilled its purpose. Consequently the climate, which is naturally one of the healthiest in the world, became a constant danger to its inhabitants. The federal government finally undertook the work, and operations, begun in 1890 by two English companies, were completed in 1898. Extensive drainage and sanitation works have since been carried out. In the 20th century a sumptuous legislative palace, a national Pantheon for the ashes of the great men of Mexico, and a monument to perpetuate the heroes of the Independence have been built, and the university re-founded. Mexico has extensive factories for cotton, linen, paper, tobacco and cigars, pottery, silver-ware,



Cathedral, City of Mexico.

this imposing building, forming a cross 426 by 203 feet, alone cost nearly £400,000, and the interior, with its twenty chapels and elaborate ornamentation, much more. Built into the foot of one of the two open towers (218 feet) is the famous 'Aztec' (Toltec) calendar stone. Facing the cathedral is the Municipal Palace, and on the sides of the plaza are the National Palace (the old vice-regal residence), the national Monte de Piedad, the post-office, and the national museum. Other noteworthy buildings are the national picture-gallery and library, the school of mines, the mint, and the former palace of the Inquisition, now a medical college; and, mostly in secularised ecclesiastical edifices, there are also schools of law and engineering, a conservatory of music, and an academy of fine arts. There are fifty churches or more, including the cathedral of the American Episcopal mission. The principal streets are broad, clean, and well paved and lighted, with houses of stone gaily painted in bright colours. Among the monuments of the city are the noble Columbus monument (1877), the statue of Cuauhtemotzin, the last of the Aztec emperors, and that of the engineer Martinez (1883). In addition to the *alameda*, with its stately beeches, Mexico is remarkable for the extent and beauty of its *paseos*, or raised paved roads, planted with double rows of trees, which diverge far into the country from every quarter; and there are still on Lakes

cork, bricks, and soap—many of them due to foreign enterprise. Five great railways connect the city with New Orleans, St Louis, Missouri, Chicago, New York, as well as with the other cities of Mexico. Pop. (1921) 615,367.

Mexico, GULF OF, a basin of the Atlantic Ocean, is closed in by the United States on the north, by Mexico on the west and south, and its outlet on the east is narrowed by the jutting peninsulas of Yucatán and Florida, which approach within 500 miles of each other. Right in the middle of this entrance is planted the island of Cuba, dividing the strait into two—the Strait of Florida and that of Yucatán, the former connecting the gulf with the Atlantic Ocean, the latter with the Caribbean Sea. Sir John Murray calculated the area of the gulf at 716,200 sq. m. Over a fourth of this area the ocean-floor lies at a depth

of between 1000 and 2000 fathoms, while 58,000 sq. m. is deeper still. The shores, however, are very shallow—as it were, the broad rim of this central cauldron; the portion less than 100 fathoms deep exceeds 400,000 sq. m. The extreme length from SW. to NE. is more than 1100 miles. Of the numerous bays, the largest is the Bay of Campeche (Campeche). The coasts are mostly low and sandy or marshy, and are lined with numerous lagoons; the best of the few good harbours are those of New Orleans, Pensacola, and Havana. The gulf is visited from September to March by violent north-easterly gales called *nortes*. There are very few islands. The principal rivers it receives are the Mississippi and the Rio Grande del Norte. See GULF STREAM.

Meyer, CONRAD FERDINAND, Swiss poet and novelist, was born on 12th October 1825 at Zürich, near which he lived from 1877 till his death in 1898. He excels in character-drawing and in genre-pictures of descriptive work. His chief novels are *Jörg Jenatsch* (1876), a story of Switzerland in the 17th century, and *Der Heilige* (1880), two of the best historical novels of modern German literature. His power is also well shown in *Das Amulet*, *Der Schuss von der Kanzlei*, *Die Leiden eines Knaben*, *Die Hochzeit des Mönchs*, *Die Richterin* (1885), and *Die Versuchung des Pescara* (1887). His poetical skill is best displayed in the idyllic epic poem *Huttens letzte Tage*

(1872), in *Gedichte* (1882), and in *Engelberg*. There are Memoirs of him by Reitler (1885), Frey (1909), Langmesser (1905), and by his sister Betsy Meyer (1903).

Meyer, JOSEPH, publisher and industrial organiser, was born at Gotha, 9th May 1796, and died on 27th June 1856. A man of great energy and liberal ideas, he started several industrial enterprises, the most important being the issue of great serial works by subscription at low prices, such as the German classics, the *Konversationslexikon* (new ed. in 12 vols, 1924 *et seq.*; see *ENCYCLOPÆDIA*), *People's Library of Natural Philosophy, Historical Library*, &c. His publishing business, the 'Bibliographical Institute,' was founded at Gotha, but in 1828 was transferred to Hildburghausen, and in 1874 (by his son) to Leipzig.

Meyer, KUNO (1858–1919), Celtic philologist, born at Hamburg, came to Liverpool in 1884, became professor of Old Irish there in 1895, and in 1911 professor of Celtic in Berlin. He died at Leipzig.

Meyerbeer, GIACOMO, operatic composer, was born at Berlin, September 5, 1791. The son of Herz Beer, a wealthy Jewish banker, his name was originally Jakob Beer; the name Meyer was afterwards adopted from a benefactor, and the whole consolidated and Italianised. His musical genius was first shown on the pianoforte; at the age of seven he played in public Mozart's D minor concerto. He was received, when fifteen, into the house of the celebrated musician, the Abbé Vogler, at Darmstadt; with his fellow-pupil Weber he was on terms of the most intimate and lasting friendship. His earlier works, produced at Munich and Vienna, were unsuccessful, but in the latter city he obtained fame as a pianist, which might have stood against that of any rival had he chosen to rely on this talent. His ambition, however, was to succeed as a composer; and on the advice of Salieri he proceeded to study vocal composition in Italy. There Rossini's music had just taken the public by storm; and Meyerbeer, with his remarkable adaptability, after three years was able to produce operas in the new style, which at once gained a cordial reception; the last of these, *Il Crociato*, brought out at Venice in 1824, was received with acclamation, and the composer was presented on the stage with a laurel crown. From 1824 to 1831 he lived mostly in Berlin, married, and had two children, whose loss in infancy he keenly felt. He also applied himself, with the unremitting industry he evinced from boyhood, to a minute and comprehensive study of French opera. The result of this was seen in the production at Paris in 1831 of *Robert le Diable* (libretto by Scribe), in which a totally new style was evident. It had unparalleled success over all Europe, and made the fortune of the Paris opera—even Rossini was thrown rather into the shade. It was followed in 1836 by the *Huguenots*, which, with the assistance of a magnificent cast, almost eclipsed its predecessor. He was soon after appointed by the king of Prussia as his Kapellmeister at Berlin. Here he wrote the opera *Ein Feldlager in Schlesien*, the success of which was signalled by the first appearance of Jenny Lind. After long preparation, *Le Prophète* appeared at Paris in 1849, also with success, though it was not altogether to the mind of even friendly critics. The composer now ventured into a fresh field, the Opéra Comique; *L'Étoile du Nord*, given in 1854, carried the day in spite of the prognostications of French critics, and was succeeded in 1859 by *Le Pardon de Ploermel*, known in England as *Dinorah*. He was subsequently occupied with a musical drama, *La*

Jeunesse de Goethe, the setting of which M. Blaze de Bury, the author of the work, says he saw complete, but which has not hitherto come to light. In 1861 he set to work with his usual anxiety and fastidiousness on the production of *L'Africaine*, which had been in hand since 1838. But his delicate health gave way before his ceaseless labours, and he died at Paris, 2d May 1864. The opera had a triumphant reception a year later.

The magnificent praise of Fétis and Blaze de Bury is counterbalanced by the emphatic condemnation of Schumann and the savage attacks of Wagner. Wagner's main charge is that, inspired by no deeply rooted artistic principles, he made everything subsidiary to theatrical effect. His grand operas, splendid melodramatic spectacular works, hit the taste of the public.

See Lives by Pougin (1864) and De Bury (1868), and the article in Grove's *Dictionary*.

Meynell, ALICE CHRISTIANA (1850–1922), was sister of Lady Butler (see the article on Sir W. F. Butler). A devout Catholic, she became in 1877 the wife of Wilfrid Meynell, Catholic author and journalist. From 1875, when she published her first volume of poems, she approved herself a poet of exceptional grace and tenderness and a critic of insight and sympathy. She published several volumes of delicate verse, four or five books of essays (collected in 1914), anthologies, and selections (from T. G. Hake and Coventry Patmore). She and her husband befriended Francis Thompson. Their daughter VIOLA is a poet and novelist; their son EVERARD wrote a life of Thompson.

Mezereon. See DAPHNE.

Mézenc, MONT. See CÉVENNES.

Mézières, the capital of the French department of Ardennes, on a bend of the Meuse, 155 miles NE. of Paris. Strongly fortified by Vauban, in 1521 it was successfully defended by the Chevalier Bayard, with 2000 men, against 40,000 Spaniards under Charles V.; in 1815 held out for two months against the Allies; in the Franco-German war of 1870–71 capitulated after a frightful bombardment; and in 1914–18 was again in German hands. In its Flamboyant church (restored 1884) Charles IX. was married in 1570. Pop. 8000.

Mező-Tur, a town of Hungary, 40 miles by rail SE. of Budapest; pop. 26,000.

Mezquite, the name of two trees or shrubs, of the natural order Leguminosæ, sub-order Mimosoideæ, bearing pods filled with a nutritious pulp, found in Mexico, Texas, Arizona, &c. The Common Mezquite (*Prosopis juliflora*) is usually a large shrub (though sometimes 40 feet high), with stems often decumbent, and armed with strong straight spines. In dry seasons it exudes a great quantity of gum (*Gum Mezquite*), similar in quality to gum-arabic. The Curly Mezquite, Screw Bean or Tornillo (*Prosopis pubescens*), although only a shrub or small tree, is of great value in the desert regions of the western part of North America.

Mezzanine. See ENTRESOL.

Mezzofanti, GIUSEPPE, Cardinal, a remarkable linguist, was born at Bologna, 17th September 1774. He was ordained priest in 1797, and appointed to the chair of Arabic at Bologna; soon after he was deprived because of his inability to take the oath to the Cisalpine Republic, but was reinstated later. In 1831 he settled in Rome with the rank of Monsignore, and two years after succeeded Cardinal Mai as Keeper of the Vatican Library. In 1838 he was raised to the dignity of cardinal. He died 15th March 1849 at Rome. Mezzofanti's European reputation was founded, not on his writings, but on the almost miraculous extent of his linguistic acquirements. Towards the end of his life he understood and spoke fifty-eight different

tongues. As early, indeed, as 1820 Lord Byron called him 'a walking polyglot, a monster of languages, and a Briareus of parts of speech.' Yet he was not in the strict sense a critical or scientific scholar, or even otherwise a man of great intellectual power. See his *Life* by Russell (1857).

Mezzo-soprano. See SOPRANO.

Mezzotint. See ENGRAVING.

Mfumbiro, a mountain-range of Central Africa, west of Victoria Nyanza. The name is sometimes restricted to one or other of its volcanoes, the active Kirunga-cha-gongo (11,000 feet) and the extinct Muhavuru (13,600).

Mhow (*Mhau*), a British cantonment in Indore state, Central India, 13 miles by rail SW. of Indore city. It is 1919 feet above the sea. Pop. 32,000, two-thirds Hindus.

Miako. See KYÔTO.

Miall, EDWARD, an apostle of disestablishment, was born in 1809, and served as an Independent minister at Ware, and afterwards at Leicester, down to 1840, when he founded the *Nonconformist* newspaper. In 1844 he helped to establish the British Anti-state Church Association, known later as the Liberation Society, and sat in the House of Commons for Rochdale, 1852-67, and for Bradford, 1869-74. On retiring he was presented with ten thousand guineas. He died at Sevenoaks, 29th April 1881. See the *Life* by A. Miall (1884).

Miasma. See MALARIA.

Miautsé, or MIAO-TSU, an aboriginal hill-tribe of southern China, who have contrived to maintain a practical independence and many curious local usages. They consist of numerous clans, inhabiting mainly Szechwan and the borders of Yun-nan. Some of them own Chinese sway; other tribes are absolutely independent. They are smaller than the Chinese, and unlike in features as in character. Physique and language indicate their affinity with the Annamese, Siamese, and various other inhabitants of the Indo-Chinese peninsula.

Mica, an important group of rock-forming minerals, of hardness of about 2, characterised by their perfect cleavage in one direction—the laminae being flexible and elastic. They are hydrous aluminium silicates with potassium (more rarely sodium or lithium), magnesium, or iron. Some species contain fluorine. All crystallise in monoclinic forms which approximate closely to hexagonal and rhombic crystals. *Muscovite* or potash mica is a silicate of alumina and potash, with some of the latter occasionally replaced by soda and small quantities of magnesia, ferrous oxide, and fluorine. It is seldom colourless, but usually yellowish, brownish, or greenish. The lustre is pearly or almost metallic. The thin plates are generally transparent. They were formerly much used in setting objects for the microscope, and are still for lamp-chimneys, fronts of stoves, and the like (as less liable than glass to break with sudden changes of temperature), for the mounts of natural history objects which are to be put in spirit (being more easily bored than glass), and in electrical apparatus (mica being a non-conductor). Plates of muscovite often a yard across are found near Lake Baikal, at Acworth in New Hampshire, and in China. Large plates also occur in Sweden and in Norway, and masses of the mineral are met with in Cornwall. In Siberia, China, Peru, and elsewhere it is used for window-panes. In India small pictures are frequently painted in distemper on mica. Muscovite occurs as one of the essential constituents of ordinary granite, gneiss, and mica-schist. It is also an ingredient of many other plutonic rocks and crystalline schists, but is not a primary con-

stituent of volcanic rocks: where present in the latter it is as an alteration-product. *Sericite* is a talc-like variety of muscovite, not uncommonly met with as a constituent of certain schistose rocks, to which it imparts a silky lustre on the planes of foliation. *Damourite*, somewhat like sericite, is also a variety of muscovite which occurs occasionally in schistose rocks. *Lepidolite* or lithia mica is a silicate of alumina with potash and lithia; white, rose-red, or violet as a rule, but sometimes greenish; does not occur in measurable crystals, but in irregular plates and tables, and now and again in scaly, granular, or compact aggregates. In Moravia a massive granular lepidolite is found with a fine reddish-violet colour. Like jasper, lapis-lazuli, &c., lepidolite is made into ornaments; as a rock-forming mineral it is of small account. Another lithia mica containing iron is called *Zinnwaldite*. *Phlogopite*, a magnesium mica, rich in potassium, with variable amounts of fluorine and hydrogen, and little iron, occurs chiefly in metamorphic rocks, and is found less frequently than biotite in igneous rocks. *Biotite* is iron-magnesium mica, rich in potassium, often containing much titanium, and varying considerably in the proportion of iron and magnesium. In most biotites (*merozones*) the plane of the optic axes lies in the plane of symmetry; in others (*anomites*) it is at right angles to it. Biotite is generally black or dark brown, less often yellow or green. It possesses strong pleochroism. Most 'black micas' are biotites. In microscopic section biotites usually show numerous inclusions of small crystals of apatite and zircon. Round the latter the biotite is stained a darker colour. These 'halos' have been shown by Professor Joly to be due to the presence in the zircon of radio-active substances, the diameters of the halos agreeing with the distance to which particular emanations can transmit their energy. Biotite is widely distributed alike in igneous and metamorphic rocks, chiefly in the more acid varieties of the former, in the intrusive granites, diorites, and syenites, and the equivalent lava-form rocks, rhyolites, andesites, and trachytes; it is less common in basaltic rocks, although locally abundant in their plutonic equivalents, the gabbros and peridotites. Biotites are of common occurrence in many varieties of gneisses and schists. *Lepidomelane* is a magnesia mica rich in ferrous and ferric oxides. It occurs in felspathic igneous rocks poor in magnesia and relatively rich in iron oxides. The biotites are much more readily decomposed than the muscovites, being often altered into chloritic minerals with epidote and calcite. *Paragonite* or soda mica, an aluminous silicate of soda, occurs chiefly in certain crystalline schists, and is known only in the form of small white or colourless scales. It closely resembles muscovite, from which it can only be distinguished chemically.

MICA-SCHIST is, next to gneiss, one of the most abundant of the crystalline schists. It consists of alternate layers of mica and quartz, but is sometimes composed almost entirely of the thin and shining plates or scales of mica, and from this it passes by insensible gradations into phyllite, as this in turn passes into clay-slate. The quartz occurs pure in thin layers like vein-quartz, thinning off and swelling out abruptly. Sometimes it appears as irregular swollen-shaped lumps round which the folia of mica are arranged. The mica is usually muscovite, but occasionally it is biotite. Many accessory minerals are found in mica-schist, especially garnets: others are schorl, kyanite, hornblende, andalusite, beryl, &c. In many places the mica-schist has a finely corrugated or wavy structure.

Micah, or MICAHIAH, as the name is given in Jer. xxvi. 18 (*Micayah*—i.e. 'Who is like unto Jah?') Vulg. *Micheas*), the sixth in order of the

twelve minor prophets (third in LXX., after Hosea and Amos), is described as 'the Morashtite'—i.e., a native of Moresheth Gath in the lowland of south-western Judah near Eleutheropolis, and as having prophesied during the reigns of Jotham, Ahaz, and Hezekiah, more particularly during that of Hezekiah, and so as a younger contemporary of Isaiah, Hosea, and Amos. He is carefully to be distinguished from the Micah or Micaiah of 1 Kings, xxii. 8 *et seq.*, the son of Imnah, who was a prophet of the northern kingdom, contemporary with Elijah, in the reign of Ahab. The Book of Micah is described in the superscription as the word of the Lord that came to Micah which he saw concerning Samaria and Jerusalem. It consists of a collection of detached prophecies the phraseology of which is in some cases extremely obscure; no chronological order or other method of arrangement is discernible. The opening passage (i. 2-8) contains a threatening of the divine judgment against Samaria on account of her idolatry; but the rest of the book, as might be expected in a Judæan prophet, seems to relate entirely to the southern kingdom, and probably was not spoken or written until after the fall of the kingdom of Israel in 722 B.C. The oracle contained in i. 9-16, relating to Judah and Jerusalem, is best interpreted in connection with the Assyrian invasions, threatened and actual, of the Judæan lowland, shortly after that date; it is rendered obscure for the English reader by a number of plays upon words which can be appreciated only in the original language. Micah was not, like his contemporary Isaiah, a politician, but he lived (though not in the capital) in the same religious and social environment, and took practically the same view of the position of the people of Jehovah. His whole activity was directed to a work of moral reformation; his book consists of unsparing denunciations of mercenary prophets, rapacious and corrupt priests, cruel and oppressive nobles, and a treacherous, fraudulent, godless people. He went beyond Isaiah in his threatenings, for he did not regard even the holy city as inviolable, but, anticipating Jeremiah by a hundred years, foretold the destruction of Jerusalem and the Temple (see iii. 12; iv. 9, 10; some critics regard iv. 11-13, a passage which seems to take the opposite view, as an interpolation). Like Isaiah Micah pointed the hopes of the people of Jehovah forward, in noble language, to the establishment of the kingdom of righteousness and peace based on the knowledge and fear of the Lord; he also looked forward to the kingship of a Messiah of the house of David, who (in this Micah was original) like his great ancestor should come forth from Bethlehem. Some critics refer chapters vi. and vii. to an anonymous author in the reign of Manasseh; Wellhausen and many others give a still later date to chapter vii. 7-20.

See works by Cheyne (1882); Taylor (1891); J. M. P. Smith, *International Critical Commentary*; and books cited at HOSEA.

Michael. See ANGEL, MOHAMMED; and for the Emperor, BYZANTINE EMPIRE.

Michael (St) and St George. ORDER OF, was instituted by George III. in 1818 to commemorate the acquisition of the Ionian Isles (q.v.) and Malta (q.v.), and to be conferred on natives of those islands. But later its scope was widened so as to include distinguished members of the colonial service. It has three classes, Knights Grand Cross, Knights Commanders and Companions, with collar and badge, and star. The cross is of white enamel, with St Michael on the obverse and St George on the reverse; the ribbon blue, with scarlet stripe; the motto *Auspicium melioris ævi* ('A pledge of better times').

Michaelis, JOHANN DAVID, was born 27th February 1717 at Halle, the son of Christian Benedict Michaelis (1680-1764), a theologian and orientalist. After completing his studies at Halle he travelled to England; in 1745 he began to teach at Göttingen, and in the following year was appointed professor of Philosophy. He took an active part with Haller in the formation (1751) of the Göttingen Academy. In 1750 he had been elected to fill the chair of Oriental Languages in addition to that of Philosophy. He died on 22d August 1791. Michaelis was a man of vast attainments, especially in history, archaeology, and natural science; and to him belongs the credit of being one of the first to study the biblical narratives as an integral part of oriental history.

His chief works are *Einleitung in die göttlichen Schriften des Neuen Bundes* (2 vols. 4th ed. 1788; Eng. trans. by Marsh, 4 vols. 1802); *Mosaïsches Recht* (2d ed. 5 vols. 1776-80; Eng. trans. by Dr Alexander Smith, 1814); *Spicilegium Geographiæ Hebræorum* (1769-80); *Orientalische und exegetische Bibliothek* (1775-85); *Supplementa ad Lexicæ Hebræica* (6 vols. 1784-92); and numerous others. See his *autobiographic Lebensbeschreibung* (ed. by Hassencamp, 1793).

Michaelmas Daisy. See ASTER.

Michaelmas Day. On this festival, which was instituted in the year 487 in honour of St Michael and all Angels, is elected the Lord Mayor of London. In England, too, Michaelmas Day is one of the four quarterly terms on which rents are paid; and among the curious manorial rites connected with this season may be mentioned the Lawless Court kept on King's Hill, near Rochford, in Essex, on the Wednesday morning following Michaelmas Day. The Michaelmas goose is an ancient institution. For Michaelmas term, see TERM.

Michel, FRANCISQUE (1809-87), born at Lyons, became in 1839 professor in the Faculté des Lettres at Bordeaux, and earned a reputation by researches on Norman history, French *chansons*, argot, the Basques, and the history of medieval commerce. Among his books were *Histoire des Races Maudites* (1847); *Histoire des Hôtelleries, Cabarets, Hôtels Garnis* (1851-54); *Les Écosseis en France et Les Français en Écosse* (1862); and *A Critical Inquiry into the Scottish Language* (1882), a misleading book.

Michel, LOUISE (1833-1905), came from Haute Marne to Paris as a teacher, and, condemned to death for her share in the Commune (1871), was transported to New Caledonia. Freed by the amnesty of 1880, she was soon in trouble with the home authorities as a persistent agitator. She gave anarchist lectures, and published novels and *mémoires*.

Michelangelo, often MICHAEL ANGELO. Michelangelo Buonarroti, the most distinguished sculptor of the modern world, was born on March 6, 1475. His father, Ludovico di Leonardo Buonarroti Simoni, was a poor gentleman of Florence, who, though bankrupt in fortune, did not lack the consideration which is paid to ancient lineage. When the sculptor was born, his father was *podestà* or mayor of Caprese and Chiusi, two townships in Tuscany. He returned to Florence when his term of office was expired, and the child was entrusted to the fostering care of a stonemason's wife at Settignano, where Ludovico owned a small property. The boy's enthusiasm for art revealed itself at an early age, and, though he was sent to the school of Messer Francesco di Urbino to learn the elements, his best energies were devoted to drawing. To his father's aristocratic prejudice sculpture seemed a calling unworthy of a gentleman. The lad, however, was resolute, and in 1488, while yet only thirteen years of age, he entered the *bottega* of Domenico Ghirlandajo, to whom he was bound

apprentice for three years. None was ever more fortunate than Michelangelo in the time and place of his birth. From his boyhood he was familiar with the masterpieces of Donatello, and he joined his contemporaries in making a pilgrimage to the convent of the Carmine, where he studiously copied the supreme examples of Masaccio's art. By Ghirlandajo he was recommended to Lorenzo de' Medici, and entered the school which the 'Magnifico' had established in his garden on the Piazza. Here was gathered together, under the care of Bertoldo, a priceless collection of antiques, and here Michelangelo encountered what proved the most enduring influence of his life. His talent was not long in arresting the notice of Lorenzo, who henceforth gave him a room in his house and a seat at his table; and to the beneficence of his patron he owed the acquaintance of Poliziano and many of the most learned of the day. To this period belong two interesting reliefs. In the 'Battle of the Centaurs' (now in the Casa Buonarroti at Florence) the classical influence of Lorenzo's garden is strikingly apparent. In truth it has little of the dignified calm which distinguishes the work of Phidias and his contemporaries; the style of a later period was its inspiration; but it reveals the lasting characteristics of Michelangelo's genius. The inexhaustible variety of pose, the straining muscles, the contorted limbs, which mark the artist's mature work, are already visible. A marvellous contrast to the 'Centaurs' is the 'Madonna,' conceived and executed in the spirit of Donatello, which without a suggestion of movement is quiet and harmonious in composition, and though not consciously antique is far more classical.

In 1492, when Michelangelo had spent some three years in his house, Lorenzo died, and the school which had conferred so great benefits upon art was straightway dissolved. Piero, Lorenzo's son and successor, it is true, retained for a time the services of Michelangelo, but he is said to have treated him with scant courtesy; and Michelangelo fled to Bologna. Nor did he here wait long for a patron; Gianfrancesco Aldrovandi commissioned him to execute a statue. In Bologna the sculptor lingered for a year; then he once more (in 1495) returned to Florence. It was during this sojourn in his native city that he fashioned the marble 'Cupid' to which he owed his first introduction to Rome. Baldassare del Milanese persuaded him to give the work the air of an antique by burial, and despatch it to Rome. Here it was purchased by Cardinal San Giorgio, who, though he speedily discovered the fraud which had been put upon him, was quick to detect the talent of the sculptor who had tricked him. He therefore summoned him to Rome, and on June 25, 1496 Michelangelo arrived for the first time in the Eternal City. The influence of Rome and the antique is easily discernible in the 'Bacchus,' now in the National Museum at Florence; it is modelled with an elegance and restraint which are evidence of the hold which the classical tradition, as interpreted by the Græco-Roman sculptors, had upon Michelangelo. To the same period belongs the exquisite 'Cupid' of the South Kensington Museum. The 'Pietà,' which is now in St Peter's, was executed in 1497, but presents an amazing contrast. There is in it a touch of the middle ages, a suggestion of realism which is wholly at variance with the antique ideal. But it is beautifully composed, the drapery is handled with a masterly breadth, and the body of the dead Christ is an epitome of anatomical research.

For four years the sculptor remained in Rome, perpetually urged to return to Florence by his father, who, though he objected to his son's craft as unbefitting his station, was nothing

loth to profit by the wealth which was the reward of artistic success. Michelangelo went back; and Soderini, who was then gonfaloniere, permitted him to convert into a statue the colossal block of marble upon which Agostino d'Antonio had been at work many years before, and out of the irregular block grew the celebrated 'David.' The sculptor was compelled to modify his composition on account of the shape and size of his material. Indeed, it is characteristic of this titan's impetuous genius that obstacles were ever an incentive. His 'David' is the Gothic treatment of a classic theme. The influence of the antique is obvious, but the personal touch of the sculptor is also apparent (especially in such details as the treatment of the hands). The figure is modelled with strength and simplicity; the surface is not furrowed by an endless series of lines; there is no parade of anatomical knowledge; in pose and composition there is a stately grandeur, a dignified solemnity, which do not for an instant suggest that the artist was hampered by material difficulties. Indeed, so far from being a *tour de force*, it is a complete, well-ordered achievement. In 1504 it was placed upon its pedestal in the Piazza de' Signori, whence it was removed in 1873 to the Academy of Arts. Michelangelo's sojourn in Florence was a period of great activity. A second 'David' (this time of bronze) was commissioned and sent to France, where all trace of it is lost. The sculptor also designed two marble reliefs, one of which passed into the possession of Sir George Beaumont, and is now at Burlington House. The 'Holy Family of the Tribune' and the 'Manchester Madonna' in the National Gallery belong to the same time, and prove that Michelangelo had not wholly neglected the art of painting. His genius, however, was essentially plastic. He had far more interest in form than in colour; indeed, in his hands pictorial art was but an opportunity for the vigorous modelling of the human form. The zeal of Soderini, the gonfaloniere, in the cause of art inspired the scheme of decorating the Great Hall of the Council. For one wall Leonardo da Vinci was commissioned to design a fresco; a second was entrusted to Michelangelo. The latter chose as his subject an incident in the war of Pisa, and executed a cartoon which Vasari with devout exaggeration proclaims to have been of divine rather than of human origin. A body of soldiers were represented bathing; their camp has been attacked by the enemy, and they are hastening to seize their arms and repulse the assault. The motive is admirable, and gave the artist scope for the variety of pose and the violent action in which he took peculiar delight. The fresco was never completed, and on the return of the Medici to Florence the cartoon was removed to the hall of their palace, to which painters were permitted unrestrained access. The result was that over-zealous admirers of Michelangelo cut the cartoon to pieces. The original is lost as irretrievably as the masterpieces of Zeuxis and Apelles; and our impression of it is obtained from literary sources, from the engravings of Marcantonio and Agostino Veneziano, who reproduced single groups, and from a suspicious copy at Holkham Hall.

In 1503 Julius II. succeeded to the pontificate, and, being not merely a warrior but a patron of the arts as well, he lost no time in summoning Michelangelo to Rome. In Michelangelo the sturdy pope met his match. The two men, indeed, were not unlike in temperament. Each was endowed with the extraordinary vigour of mind and body which was the best characteristic of the Renaissance. But both had the defects of their qualities; Michelangelo no less than Julius was violent and overbearing; the sculptor could as little brook opposi-

tion as the pope, and their dealings were continually interrupted by bitter quarrels and recriminations. It is impossible to accept Vasari's anecdotes as statements of the literal truth, but there is no doubt that they have solid foundation in fact. Had Michelangelo known the misery and disappointment which were in store for him, he might well have hesitated before obeying the summons of Julius. The pope commissioned the sculptor to design his tomb, and thus began what Condivi aptly calls *la tragedia della sepoltura*. For forty years Michelangelo clung to the hope that he would yet complete the great monument in honour of Pope Julius and his own genius. But intrigue and spite were too strong for him. Other demands were continually made upon his energy, and the sublime statue of Moses is the best fragment that is left to us of the tomb of Julius. However, at the outset both pope and sculptor were full of enthusiasm. The plans were approved and the work would have at once proceeded had not the sculptor one day asked audience of the pope in vain. In a sudden fit of temper Michelangelo left Rome, and the entreaties of the pope availed not to procure his return. After much fruitless negotiation they met at Bologna, and, with the generosity that was characteristic of both, were instantly reconciled. Michelangelo, as a pledge of renewed friendship, commenced a statue of Julius II., which was cast in bronze and placed over the gate of San Petronio (afterwards melted down and converted into a cannon). Michelangelo followed the pope to Rome, eager to resume his work upon the monument. In the meantime, however, Bramante, if Vasari's account be true, had poisoned the pope's mind against the sculptor; instead of being allowed to devote himself to the monument, which he deemed the work of his life, he was ordered to decorate the ceiling of the Sistine Chapel with paintings. In vain he protested that sculpture was his profession, in vain he urged Raphael's higher qualifications for the task; the pope was obdurate, and in 1508 Michelangelo began the work for which his training had ill adapted him. However, he set himself resolutely to the toil, and in four years achieved a masterpiece of decorative design. The flat oblong space of the ceiling is divided into nine compartments, each of which contains an incident drawn from the Old Testament. The lunettes above the windows, the spandrels, as well as the ressaunts between the lunettes, are filled with heroic figures. The designs are admirably accommodated to the space they are intended to fill, and the broad effect is one of harmony and homogeneity. It is only when you analyse the composition and examine each compartment by itself that you realise the superhuman invention, the miraculous variety of attitude and gesture, which place this marvellous work among the greatest achievements of human energy. Michelangelo, however, had not forgotten the monument of Pope Julius, and no sooner had he finished his work in the Sistine Chapel than he returned with eagerness to the tomb. But once again his favourite project was interrupted. In 1513 Pope Julius II. died, and, though he had commanded the cardinals Santi Quattro and Aginense to see that his monument was completed in accordance with his expressed wishes, the cardinals were thrifty men, and demanded of Michelangelo another and a more modest design. This was furnished, but before the work could be undertaken Pope Leo X. had despatched Michelangelo on business of his own to Florence. Leo was of the Medici family, and professed no interest in the tomb of his predecessor; his whole anxiety was to do honour to his ancestors by the adornment of Florence. He therefore commissioned Michelangelo to rebuild the façade of the church of San Lorenzo and enrich it

with sculptured figures. The master reluctantly complied, and set out for Carrara to quarry marble. Even here the pope would not permit Michelangelo to work his will, but urged him to leave Carrara and seek what material he needed at Serravezza, which lay in Leo's own territory. In vain the sculptor insisted that the marble was of inferior quality, and that to convey it to Florence roads must be cut through mountains and laid upon stakes over marsh-land and swamp. Leo X. was deaf to reason, and for eight years Michelangelo was forced to devote himself to toil as idle as that of Sisyphus; from 1514 to 1522 his artistic record is a blank. Nor were the next years fruitful of achievement. The sculptor remained in Florence still working on the tomb of Julius and building the Sacristy of San Lorenzo. In 1528 the unsettled state of his native city turned him again from the practice of his art. He devoted himself heart and soul to the science of fortification, and when in 1529 Florence was besieged Michelangelo was foremost in its defence. The city was forced to surrender in the following year, and for some time Michelangelo, fearing treachery, lay in concealment. His safety, however, being assured, he resumed his work upon the tombs of the Medici, and completed the monuments to Giuliano and Lorenzo de' Medici, which are among the greatest of his works. In 1533 yet another compact was entered into concerning Pope Julius's ill-fated sepulchre; it was at last determined to reduce it to a mere façade, and Michelangelo would doubtless have carried it to completion had he not been once again commissioned to adorn the Sistine Chapel with frescoes. After a delay of some years he began in 1537 to paint 'The Last Judgment.' The design was finished and displayed on the Christmas-day of 1541, and was the master's last pictorial achievement. In the following year he was appointed architect of St Peter's, and devoted himself to the work with loyalty and devotion until his death, which took place on the 18th February 1564.

Michelangelo is by far the most brilliant representative of the Italian Renaissance. He was not only supreme in the arts of sculpture and painting, but was learned in all the learning of his age, a poet of powerful individuality, an architect and military engineer. From an artistic point of view his was by far the greatest personality, his the most potent influence, the modern world had seen. His debt to the antique was immense, yet it must be remembered that he knew only the decadence of classical art; had he seen the masterpieces which have since been brought to light, it is possible that his style might have been largely modified. But, though in the finest examples of his art classical influence is conspicuous, he was rarely able to exclude his personality. As he was violent in his life, so there is ever a touch of violence in his art. He is making, as it were, an emphatic protest against the dark ages which lay behind him; he is discovering to the world the utmost possibilities of the reawakened arts. There is generally to be observed in his work a profound learning, an extraordinary knowledge of perspective and foreshortening, a firm conviction that there is nothing in heaven or on earth that art cannot express. At beauty Michelangelo does not aim. Grandeur, sublimity, power, these are his themes. And he recurs to them again and again with the persistence which characterises a man of transcendent genius. Both Donatello, who came before him, and Raphael among his contemporaries, were more richly endowed than he with the artistic temperament. Neither the one nor the other was wont to overstep the limits of art. Their ambition was to attain perfection; they did not chafe against the restraints imposed by beauty and

simplicity. But Michelangelo, though their inferior in art, had a far greater, if less governable, genius. He was not content to model a perfect statue, to paint a perfect form; he was ever striving to throw himself and his intelligence into marble or on to canvas. And so, though his works will be ranked till the end of time among the masterpieces of the world, he is neither for sculptor nor for painter the most valuable model. As an influence he was more potent than any of his contemporaries, and it can hardly be said that his influence was wholesome. The Flemish and Dutch painters, who visited Italy in the 16th century, carried home with them his love of distorted limbs and twisted draperies, but failed to catch a breath of his invention and vigour. It is easy, even for the mediocre, to parody a strongly-marked talent.

The master's career is not without irony. His genius was plastic; by temperament and training he was a sculptor, and yet frescoes were the only works he was destined to bring to fulfilment. He has left behind him, it is true, not a few grandiose statues, such as the 'Moses,' but none of his elaborate designs for sculptural monuments was ever completed. His career, indeed, was, until he came for the last time to Rome, a prolonged struggle against fate and his patrons. Time after time his own projects were set aside at the pleasure of a pope. For this his own waywardness and excitability were in some measure to blame, and throughout his life he seems to have been unable to attack any enterprise except at fever-heat. His sonnets, the composition of which he, unlike the rest of mankind, reserved for his old age, possess the same qualities as his statues. Just as his 'David' was torn from the marble, so his verses are rough-hewn out of the language. In all of them it is meaning rather than form that is sought after. Dr Johnson's criticism of a production of Bentley's is precisely applicable to them. 'They are the forcible verses of a man of a strong mind, but not accustomed to write verse.' The best of them were inspired by his friendship for the accomplished Vittoria Colonna, the widow of the Marchese di Pescara. Michelangelo's life was untouched by the passion of love, and his one romance belongs to his old age. He is said to have met Vittoria for the first time in 1538, and until her death, which took place in 1547, the closest ties of friendship bound them. Her loss was the severest blow which ever fell upon him. He painted her portrait, and this honour he conferred on none other save Tommaso Cavaliere, for whom he cherished a romantic attachment and to whom also he addressed sonnets.

Michelangelo's character was a strange medley of conflicting qualities. Though kind and loyal to those who depended on his care—as is proved by his untiring interest in his nephew and his devotion to Urbino, his faithful servant—he showed himself resentful and even suspicious to his enemies. He could brook no opposition to his wishes, and he mercilessly attacked those who dared to withstand him. But he lived in an age of treachery and intrigue, and much may on this count be forgiven him. He loved solitude and a simple life. From his earliest youth he was an eager student of literature, and applied himself with peculiar devotion to Dante and Petrarch. Though feared and attacked by the envious among his contemporaries, he earned his full meed of praise during his lifetime, and at his death universal honour was paid to his memory.

See Lives by Vasari and Condivi. The best edition of the letters is Milanese's *Lettere di Michel Angelo* (1873). The sonnets have been edited by Cesare Guasti, *Rime di Michelangelo Buonarroti* (1863), and translated into English by J. A. Symonds. Of modern and critical biographies there is no lack—those, for example, by Springer, Grimm, Von Scheffler (1892), Ollivier, Gabriel Thomas, Justi, Thode, Frey, J. A. Symonds (1892), Holroyd (1903;

new ed. 1911), Horne (translating Condivi, 1904), Davies (1909), and Rolland (trans. by Lees, 1912).

Michelet, JULES, a great French historian, was born a printer's son at Paris, 21st August 1798. After a brilliant course of study under Villemain and Leclerc, he became at twenty-three a professor of History in the Collège Rollin. Later he lectured at the Collège Sainte-Barbe and the École Normale, and after the revolution of 1830 was given an important post at the Archives, became assistant to Guizot at the Sorbonne, and tutor to the Princess Clémentine. In 1838 he was elected to the Academy, and at the same time became professor of History at the Collège de France. Already he had made his name known by admirable handbooks on French and on modern history, and commenced the monumental work which was to give him an illustrious place among great historians, his *Histoire de France* (24 vols. 1833-67; new ed. 19 vols. 1879), the labour of about forty years. Other works were *Origines du Droit Français cherchées dans les Symboles et Formules du Droit Universel* (1837), *Mémoires de Luther* (1845), and *Procès des Templiers* (1841-51). Michelet had a great dislike for priests, but especially for the Jesuits, and he now plunged into controversy with all the impetuosity of his nature and eloquence, bringing to bear upon the enemy at once all his powers of sarcasm and all his unrivalled knowledge of history. Three books were the fruits of his polemic: *Des Jésuites*, written in conjunction with Edgar Quinet (1843); *Le Prêtre, la Femme, et la Famille* (1845); and *Le Peuple* (1846). Next followed his famous *Histoire de la Révolution* (7 vols. 1847-53; centenary ed. 5 vols. 1889), which is not a good history with all its eloquence and enthusiasm. Before its conclusion Michelet had lost his office by refusing to take the oath of allegiance to Louis Napoleon. Henceforth he lived mostly in Brittany and in the Riviera, buried in his gigantic literary labours. A series of books of a novel kind, full of rhapsodic eloquence and more valuable as literature than as science, were *L'Oiseau* (1856), *L'Insecte* (1857), *La Mer* (1861), and *La Montagne* (1868). Other books of unusual interest were *L'Amour* (1858), *La Femme* (1860), *La Sorcière* (1862), and *La Bible de l'Humanité* (1864). The little book, *Nos Fils* (1869), was a plea for compulsory education. Michelet's great history brings down the story of France to the outbreak of the great Revolution. The second instalment continues it to the close of the Revolution. In the last years of his life he set himself to complete his task, and thus bequeath a great continuous history to France, but he did not live to carry it beyond Waterloo (3 vols. 1872-75). He died at Hyères, 9th February 1874.

Michelet ever treats history from a personal point of view, and his imagination is prone to bring into undue relief striking figures and dramatic scenes and incidents. Thus his work is a series of tableaux, as these were visible to the eyes of a man of genius, full of prejudices for and against his puppets, and destitute of the sense for historical perspective. Yet the whole stands out a masterpiece of genius, instinct with life, and the wide range of historical literature must be ransacked for episodes surpassing his treatment of Joan of Arc or the Templars, or the luminous geographical survey of France with which the works opens.

See books by G. Monod (1875 and 1905), Corréard (1886), Jules Simon (1889), and Madame Quinet (1900).

Michelson-Morley Experiment. See RELATIVITY.

Michigan (Chippewa-Indian *Mitchi Sawgyegan*, 'Great Lake,' originally applied to both Lakes Huron and Michigan), the third in size of the five great fresh-water lakes of North America, and the

only one lying wholly in the United States, having Michigan on the N. and E., and Wisconsin and Illinois on the W. It is about 335 miles long, and from 30 to 88 broad; the mean depth is 325 feet. It has the same elevation as Lake Huron (with which it is connected by the Strait of Mackinaw)—581 $\frac{1}{2}$ feet above sea-level; this is 20 $\frac{1}{2}$ feet lower than Lake Superior, and 8 $\frac{1}{2}$ feet above Lake Erie. Its surface area is 22,450 sq. m., or 1350 less than that of Lake Huron; but its drainage area—37,700 sq. m.—is 6000 sq. m. greater than its neighbour's. There is a neap-tide of 1 $\frac{1}{2}$ inch, and a spring-tide of about 3 inches. The shores of Lake Michigan, which are guarded by a number of lighthouses, are for the most part low; the annual erosion amounts to about 5 feet. Its principal harbours are those of Chicago, Milwaukee, Racine, Escanaba, and Grand Haven. It has important fisheries; whitefish (*Coregonus*) and trout are largely exported.

Michigan, one of the northern tier of states of the American Union, the twenty-second in area and seventh in population, is in 41° 42' to 48° 20' N. lat., and 82° 25' to 90° 32' W. long. It has an area of 57,980 sq. m.; 1114 sq. m. are occupied by 5173 small lakes, while the surface of 179 islands and islets, from one acre upwards, measures about 633. The coast-line in navigable lake waters is 1624 miles. The state is bounded on the S. by Indiana and Ohio; on the E. by Lake Erie, Detroit River (properly Strait), Lake St. Clair, St. Clair River, Lake Huron, and St. Mary's River, beyond all which lies the province of Ontario, Canada; on the N. by Lake Superior, on the SW. (upper peninsula) by Wisconsin, and on the W. by Lake Michigan. From its north-western point at the mouth of Montreal River to the extreme south-east on Maumee Bay is about 500 miles. It is sometimes called the Peninsular State, from its formation in two great peninsulas, the upper and lower, or northern and southern. The upper has an extreme length of 318 and width of 164 miles, the lower of 277 and 197 miles; the latter includes the Huron Peninsula, or the 'thumb' of the 'mitten,' in eastern Michigan, and the small Leelanaw Peninsula in the north-west. The eastern part of the other, looking toward St. Mary's River, is sometimes called St. Mary's Peninsula. Keweenaw Peninsula, bearing the great copper-mines, stretches far north into the waters of Lake Superior; and on the south, near Mackinac Island, is the little but picturesque St. Ignace Peninsula. The upper region is mostly rugged, broken, rocky, and comparatively barren, though teeming with mineral wealth; but hopeful beginnings of agriculture have been made in the eastern half of it. In the north-west, near Lake Superior, is the highest land in the state, among the hills known as the Porcupine Mountains (1830 feet above the sea). The famous Mineral range passes south of this, from Keweenaw Point south-westward into Wisconsin; but it is merely a gentle swell from both sides, nowhere really mountainous. No part of the lower peninsula is more than 1780 feet above sea-level; and the mean height is only 160 feet above the environing waters of the lakes. The highest part of Detroit is but 73 feet above the river at this point, and the uplift of a few feet in the adjacent river and lake beds would flood a thousand square miles of Michigan soil. This soil is mainly formed by the glacial drift, in alternated clay, sand, and gravel beds, supplying all the chemical constituents of a good soil, and enabling the growth of all crops adapted to this climate. The mean annual temperature of the state is 48° F. (summer, 72°; winter, 24°); the annual rainfall is 32.2 inches. Both peninsulas, with occasional exceptions of swamps or small prairies, were originally covered with dense forests, the products

of which have proved exceedingly valuable. The geology of the state is highly interesting; it represents every rock series known from the oldest strata to the top of the Carboniferous. In the west of the upper peninsula, on the Wisconsin border, are the Laurentian, and on either side and eastward the Huronian formations, in which are the great deposits of iron ore. The Mineral range is of volcanic rock, with older strata tilted upon its sides. Farther eastward are the long belts of the Lower Silurian, curving from Green Bay through the St. Mary's Peninsula. The lower peninsula is compared, geologically, to a nest of wooden dishes. Its centre is a coal-bearing area. In succession beyond, and in mighty sweeps around the central tract, are the upturned edges of other Carboniferous strata, then the Devonian formations, and finally the Lower Helderberg group of the Silurian. In the Michigan salt group are the rich brine wells of the Saginaw valley; in the Marshall or Waverley are the Huron grindstones, quarried on the shore of Lake Huron; and other groups yield valuable mineral products.

Copper and iron are the chief minerals, copper-mining dating from 1845. The great Calumet and Hecla copper-mines, probably the largest in operation, are on the Keweenaw Peninsula. The copper is of a quality nowhere surpassed, and for some purposes unequalled. Iron ore is mined mainly in Marquette county. Coal and salt are got. Silver is mined to some extent, while gypsum appears in immense deposits, mostly in Kent county. Portland cement is also found in large quantities, and building-stones abound in both peninsulas. Glass sand is found in the extreme south-east of the state; and lime, brick, tiles, and the like are made easily and cheaply in many parts. There are many mineral springs, the waters of some of which have a commercial value.

Lumbering and wood manufactures constitute interests of some importance, maple, beech, and birch figuring largely. Consequent upon the extensive destruction of forests, attempts are at present being made to effect reforestation. Agriculture employs a considerable proportion of the population, the production of maize, potatoes, sugar-beet, and wheat being of some importance. From the fruit areas of the south and south-west come large supplies of cucumbers, apples, grapes, and strawberries. The dairy-produce is worthy of note.

The motor-car industry is centred in Michigan, especially in Detroit, where the factories of Henry Ford are the most noteworthy. There is also a large output of machinery, chemicals, and furniture, and the state ranks seventh in shipbuilding.

The commerce of the state is very great, and is promoted by three ship-canal—one among the shallows at the head of Lake St. Clair, another near the head of St. Mary's River, at the Sault de Ste. Marie, and another on the Keweenaw Peninsula, known as the Portage Lake Canal. The commerce of Detroit is large, especially the export trade, consisting mostly of grain, pork, wool, and copper. There are other ports of entry, at Port Huron, Grand Haven, and Marquette. The railways in the state have about 10,000 miles of track. Popular and higher education has been liberally developed; the illiterates form only 3 per cent. of the population, and most of them are foreign born. Besides the state university at Ann Arbor, there are denominational colleges and state normal schools; the agricultural school, the school for the blind, and reform school for boys at Lansing; the deaf and dumb institute at Flint, and an industrial home for girls at Adrian. Other principal state institutions are several asylums for the insane, an asylum for insane criminals, and the Soldiers' Home at Grand

Rapids. There are state prisons at Jackson and Marquette, and houses of correction at Detroit, Marquette, and Ionia.

History.—The Michigan country was probably visited by Jean Nicolet in 1634, at the Sault de Ste Marie, where the first permanent white settlement was made by Father Marquette in 1668 for a Jesuit mission. Detroit was founded in 1701 by a French colony under Cadillac. The country passed to the English in 1760, and to the United States in 1796; it was again occupied by Great Britain in 1812, but was recovered by the Americans the next year. It formed a part of the North-west territory, erected in 1787; became a part of the Indiana territory in 1802, was organised as Michigan territory in 1805, and admitted as a state in 1837. Pop. (1800) 551; (1840) 212,267; (1880) 1,636,937; (1900) 2,420,982; (1920) 3,668,412. Detroit, with a population of over 1 million, has always been the chief city; Grand Rapids (137,643) is second, and Flint (91,599) third. Other cities are Saginaw, Sault Ste Marie, Marquette, Bay City, Muskegon, Jackson, Kalamazoo, Port Huron, Lansing (the capital), Battle Creek, Manistee, Ishpeming, Menominee, Ann Arbor, Adrian, &c.

Michigan City, a city of Indiana, on Lake Michigan, 38 miles by water ESE. of Chicago. It has a good harbour, contains a college, a state prison, and railway-shops, and manufactures cars, refrigerators, furniture, &c. Pop. (1860) 3320; (1890) 10,704; (1920) 19,457.

Mickiewicz, ADAM, the greatest of Polish poets, was born near Novogrodek on 24th December 1798, and educated at Vilna. In 1822, whilst teaching Polish literature at Kovno, he published his first collection of poems, full of the inspirations of Polish national life. Two years later he was banished to the interior of Russia for being concerned in the formation of a students' secret society. In 1825 he paid a visit to the Crimea, whose beauties he celebrated in a series of exquisite sonnets. Before quitting Russia in 1829 he published three epic poems, *Dziady* (1823–27), on the religious commemorations of their ancestors by the Slav races, and *Konrad Wallenrod* (1828; Eng. trans. 1841, 1925) and *Grazyna* (1827), the last two drawn from the struggle between the Lithuanians and the Knights of the Teutonic Order, and both glowing with patriotic feeling. From Russia Mickiewicz passed through Germany (where he visited Goethe and awakened the old Olympian's warm admiration) and France to Italy and Rome. In 1834 appeared his masterpiece, the epic poem *Pan Tadeusz* (Master Thaddeus; trans. 1886, 1917)—a most admirable delineation of Lithuanian customs and manners, traditions, ideas, and beliefs, and Lithuanian character, including fine poetical descriptions of the gloomy primeval forests and of the scenery of the country. After teaching for a while at Lausanne, Mickiewicz was appointed professor of the Slavonic Literatures at Paris in 1840; but three years later he was deprived of his chair, having given offence to the government of the day by political utterances in his lectures. For some years he lived a hard and unsettled life—in 1848 he was in Italy, helping to organise the Polish legion that fought side by side with the Italian republicans at Rome—until in 1852 Louis Napoleon appointed him a librarian in the Arsenal Library at Paris. He died 28th November 1855 at Constantinople, whither the French government had sent him to organise a Polish legion to fight against Russia. Mickiewicz is pre-eminently the national poet of the Poles, and next after Pushkin the greatest of all the poets of the Slavs.

His collected works were issued at Paris in 11 vols. (1860–61), at Leipzig in 5 vols. (1862–69), and at Lemberg,

in 4 vols. (1885–93). See *Life* by his son Ladislas (French, 1888; Polish, 4 vols. 1890–94); and a life with analysis of his work, and translations, by Monica M. Gardner (1911).

Mickle, WILLIAM JULIUS, translator of the *Lusiad*, was born in Langholm manse, Dumfriesshire, in 1734. He was educated at Edinburgh High School, failed in business as a brewer, and next went to London to make a living by writing. In 1765 he published his would-be Spenserian poem, *The Concubine* (in its next edition entitled *Syr Martyn*), and so prepared the way for his version rather than translation of the *Lusiad* of Camoens (1771–75), which he completed during four years' seclusion in a farmhouse. In 1779 he went to Lisbon as secretary to Commodore Johnstone, but his last years were spent in London, where he died in 1788. Of his other works none are now of importance. His ballad of *Cumnor Hall*, which suggested to Scott the romance of *Kenilworth*, is poor stuff, but the delightful song, 'There's nae luck about the house,' is long since safely assured of its immortality. An attempt has been made to ascribe this song to the ill-fated Greenock poetess, Jean Adam (1710–65), but her claim will not bear serious examination. See *Athenæum* for January 27, 1877. The best edition of Mickle's poems is that edited, with a Life, by the Rev. John Sim (1806).

Micmacs, a tribe of Algonquin Indians, the first with whom the English came in contact; they remained hostile to the English and their colonies till 1760. They now number from 3000 to 4000, and are mostly in Nova Scotia, Newfoundland, and New Brunswick. See Rand, *English Micmac Dictionary* (Halifax, 1888).

Microbe, **Micrococcus**. See BACTERIA, GERM.

Microcline. See FELSPAR.

Microcosm and **Macrocosm**. The belief of the ancients that the world or kosmos was animated, or had a soul (see ANIMA MUNDI), led to the notion that the parts and members of organic beings must have their counterparts in the members of the kosmos. Thus, in a hymn ascribed to Orpheus, the sun and moon are looked upon as the eyes of the animating godhead, the earth and its mountains as his body, the ether as his intellect, the sky as his wings. The natural philosophers of the 16th century—Paracelsus at their head—took up this notion anew in a somewhat modified shape, and considered the world as a human organism on the large scale, and man as a world, or kosmos, in miniature; hence they called man a *microcosm* (Gr., 'little world') and the universe itself the *macrocosm* ('great world'). With this was associated the belief that the vital movements of the microcosm exactly corresponded to those of the macrocosm, and represented them as it were in copy. From this it was an easy transition to the further assumption, that the movements of the stars exercise an influence on the temperament and fortunes of men (see ASTROLOGY).

Microcosmic Salt is used in blowpipe analysis, and may be prepared by mixing concentrated solutions of phosphate of soda and chloride of ammonium. It has the composition $\text{NaNH}_4\text{HPO}_4 \cdot 4\text{H}_2\text{O}$.

Microlestes, a name given to one of the early fossil representatives of Mammals, in the order Multituberculata, probably allied to Monotremata (q.v.). Only the small teeth are known, from the Trias of England and Germany.

Micrometer (Gr. *mikros*, 'little'; *metron*, 'measure') is an instrument used for the measurement of minute distances and angles. Its different forms, depending on different principles, may be divided into two sections, according as they are

applied to physics or astronomy. Of the former section are the Vernier (q.v.) and the Micrometer Screw, the latter instrument being merely a screw with a very regular thread, and a large round head, which is carefully graduated, generally to sixtieths, and furnished with an index. It is easily seen that if a complete turn of the screw advance its point $\frac{1}{60}$ of an inch, a turn sufficient to pass the index from one graduation to another will only advance it $\frac{1}{3600}$ of an inch, &c. This is the micrometer used in the construction and graduation of instruments. Of those applied to astronomical purposes the most simple is a short tube, across the opening of which are stretched two parallel threads, which are moved to or from each other by screws. These threads are crossed by a third perpendicularly, and the whole apparatus is placed in the focus of a lens. The distance of two stars is found by adjusting the two parallel threads, one to pass through the centre of each star, taking care that the threads are placed perpendicular to the line joining the stars, and finding how many turns and parts of a turn of the screw are required to bring the wires to coincide. The angle of position of two stars is also obtained by turning round the instrument till the third wire, which is normally horizontal, bisects both stars, and reading off on the circumference the arc passed over. *Fraunhofer's suspended annular micrometer* consists merely of a steel ring surrounded by a flat rim of glass, and the position of the star is deduced from the time when it crosses the ring and its path while within it. The Abbé Rochon substituted for the wire micrometer one made of two prisms of rock-crystal or Iceland spar, capable of double refraction.

Microphone. This instrument, invented in 1878 by Professor Hughes, does for faint sounds what the microscope does for matter too small for sight. One of the most sensitive substances for microphonic action is willow-charcoal, plunged in a state of white heat into mercury. The theory is that in a homogeneous conductor of electricity the compressions and dilatations of the molecules balance each other, and no variation of current ensues; while, with a state of fine grained non-homogeneity of the conductor, variations of pressure on the conductor produce variations in its conducting power, and thus induce variations in the strength of the electric current traversing it; and these variations of current, when the current passes through a second similar conductor, induce corresponding variations in its molecular stresses, which may act upon the surrounding air and give rise to sonorous waves; or the variations in the current may be detected by the Telephone (q.v.). One form of microphone consists of a piece of mercury-tempered carbon, an inch long, placed vertically between two carbon-blocks hollowed to receive its ends; wires connect the blocks with the battery and with the receiver by which the sounds are to be heard. 'A piece of willow-charcoal,' says the inventor, 'the size of a pin's head is sufficient to reproduce articulate speech.' Two nails laid parallel, with wire connections, and a third nail laid across them, make a simple form of microphone. A few cells of any form of battery may be used. Many useful applications of the microphone have been made or suggested. See WIRELESS TELEPHONY.

Microscope (Gr. *mikros*, 'small;' and *skopeō*, 'I see') is an instrument for enabling us to examine objects which are so small as to be almost or quite undiscernible by the unaided eye. Its early history is obscure; but, as it is quite evident that the property of magnifying possessed by lenses must have been noticed as soon as they were made, we are quite safe in attributing its existence in its simplest form to a period considerably anterior

to the time of Christ. It is generally believed that the first compound microscope was made by Zacharias Jansen, a Dutchman, in the year 1590, and was exhibited to James I. in London by his astronomer, Cornelius Drebbel, in 1619. It was then a very imperfect instrument, colouring and distorting all objects. For many years it was more a toy than a useful instrument, and it was not until the invention of the achromatic lens by Chester Moor Hall (1729) and John Dollond (1752-57), and its application to the microscope by Lister and others, that it was set on the way to reaching the advanced position it now occupies among scientific instruments.

An object to be magnified requires simply that it be brought nearer to the eye than when first examined; but as the minimum focal distance of the eye ranges from 6 inches to 14 inches—10 inches being the average minimum focal distance—it follows that a limit to the magnifying power of the eye is attained whenever the object to be examined is brought too near. If, however, we blacken a card, and pierce a hole in it with a fine needle, and then examine a minute object, as, for instance, the wing of an insect held about an inch from the card, we shall see it distinctly, and that, too, magnified about ten times its size. This is explained by the fact that the pin-hole limits the divergence of the pencil of rays from each point of the object, so that the eye can converge it sufficiently on the retina to produce a distinct impression, which is faint; and did not the blackened card exclude all other light it would be lost. If we now remove the blackened card without either moving our eye or the object under examination, it will be found that the insect's wing is almost invisible, the unassisted eye being unable to see clearly an object so near as one inch; thus demonstrating the blackened card with the needle-hole in it to be as decidedly a magnifying instrument as any set of lenses.

In fig. 1 AB is a double convex lens, in front of which, between it and its focus, K, but near that focus, we have drawn an arrow, EF, to represent the object under inspection. The cones drawn from its extreme points are representative rays of light, diverging from these points and falling on the lens. These rays, if not interrupted in their course by the lens, AB, would be too divergent for the eye to bring them to a focus upon the retina (see EYE). But after traversing the lens, AB, they travel, if the object be sufficiently near the focus, K, in lines which are nearly parallel, or which apparently diverge from points, such as C, D, not nearer to the eye than the least distance of distinct vision, which is, for most individuals, about ten inches. Suppose the lens is as close as may be to the eye, and that the object, EF, is brought up to it to such a distance that the virtual image, CD, is at 10 inches' distance from the eye; and let us further suppose that the focal length of the lens is such (see LENS)

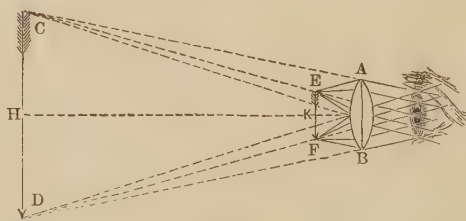


Fig. 1.

that the image, CD, is ten times, linearly, as great as EF; then the eye, instead of vainly striving to see the small object, EF, near K, will seem to perceive distinctly an image ten times as great

linearly, and situated at the convenient distance, H. The magnification of the lens is independent of the eye, and is the relation between the size of the image and that of the object. When one of these is at an infinite distance and the other at a principal focus, the magnifying power depends on the position of the eye, and is the ratio between the apparent size of the object at any given distance and that of the virtual image as seen with the aid of the lens; this may be seen to increase as the eye is withdrawn to a greater distance, especially when the one eye is used to look at the object, say a page of print, and the other to look through the lens; but the greatest retinal image is formed when the lens is close to the eye.

We have supposed the whole of the light to enter the eye through the lens, AB (fig. 1); but so large a pencil of light passing through a single lens would be so much distorted by its spherical figure, and by the chromatic dispersion of the glass, as to produce a very indistinct and imperfect image. This is partly rectified by applying a stop to the lens, so as to allow only the central portion of the pencil to pass. But, while such a limited pencil would represent correctly the form and colour of the object, so small a pencil of light is generally unable to illuminate the whole of the magnified picture with any adequate degree of brilliancy. Dr Wollaston was the first to overcome this difficulty, which he



Fig. 2.

achieved by constructing a doublet (fig. 2), which consists of two plano-convex lenses, having their focal lengths in the proportion of 1 to 3, and placed at a distance best ascertained by experiment. Their plane sides are placed towards the object,

and the lens of shortest focal length next the object. By this arrangement the distortion caused by the first lens is corrected by the second, and a well-defined and illuminated image is seen. Dr Wollaston's doublet was further improved by Mr Holland, who substituted two lenses for the



Fig. 3.

first in Dr Wollaston's doublet, and retained the stop between them and the third. This combination, though generally called a triplet, is virtually a doublet, inasmuch as the two lenses only accomplish what the anterior lens did, although with less precision, in Dr Wollaston's doublet. In this combination (fig. 3) of lenses the errors are still further reduced by the close approximation of the lenses to the object, which causes the refraction to take place near the axis, and thus we have a still larger pencil of light transmitted, and have also a more distinct and vivid image presented to the eye.

Simple Microscope.—By this term we mean an instrument by means of which we view the object through the lens directly. These instruments may be divided into two classes—those simply used in the hand, and those provided with a stand or frame, so arranged as to be capable of being adjusted by means of a screw to the exact focal distance, and of being moved over different parts of the object.



Fig. 4.

The single lens used may be either a bi-convex or a plano-convex. When a higher power is wanted a doublet, such as we have already described, may be employed, or a Coddington lens, which consists (fig. 4) of a sphere in which a groove is cut and filled up with opaque matter. This is perhaps the most convenient hand lens, as it matters little, from its spherical form, in what position it is held. In the simple microscope single or combined lenses may be employed, varying from a quarter to two inches focal length. There are many different

kinds of stands for simple microscopes made, but, as they are principally used for dissection, the most important point next to good glasses is to secure a firm, large stage for supporting the objects under examination. When low powers alone are used the stage-movements may be dispensed with; but when the doublet or triplet is employed some more delicate adjustment than that of the hand is necessary.

Compound Microscope.—In the compound microscope in its simplest form the observer does not view the object directly, but an inverted real image or picture of the object is formed by one lens or set of lenses, and that image is looked at through another lens. The compound microscope consists of two lenses, an object and an eye lens; but each of these may be compounded of several lenses playing the part of one, as in the simple microscope. The eye-lens, or ocular, is that placed next the eye, and the object-lens, or objective, that next the object. The objective is generally made of two or three achromatic lenses, while the eye-piece generally consists of two plano-convex lenses, with their flat faces next the eye, and separated at half the sum of their focal lengths, with a diaphragm or stop between them. Lenses of high power are so small as to admit only a very small beam of light, and consequently what is gained in magnifying power is often worthless from deficient illumination. Various devices have been employed to overcome this difficulty. The light may be concentrated by achromatic condensers placed beneath the stage, or the curvature of the lens may be such as to allow as large a number of divergent rays as possible to impinge upon it. Such a lens is said to have a large 'angle of aperture,' the angle of aperture being that made by two lines converging from the margins of the lens to its focal point. Lenses, termed 'immersion lenses,' are also constructed, of such a curvature that when they are immersed in a drop of liquid placed over the object light is admitted under a high angle of aperture. With an immersion lens there is high magnifying power with sufficient illumination.

The accompanying diagram (fig. 5) explains one manner in which the complete compound microscope acts. We have here represented the triple achromatic objective, consisting of three achromatic lenses combined in one tube, in connection with the eye-piece, which now consists of the field-glass, FF, in addition to the eye-glass, EE. The function of the field-glass, FF, is that the rays of light from the object tend, after traversing the objective, to form an image at AA; but coming in contact with the field-glass, FF, they are bent, and made to converge at BB, where a real image is formed, at which place a stop or diaphragm is placed to intercept all light, except what is required to form a distinct image. From BB the rays proceed to the eye-glass, EE, exactly as they do in the simple microscope. The real image formed at BB is therefore viewed as an original object through the eye-glass, EE. The lens, FF, is not essential to a compound microscope; but as it is quite evident that the rays proceeding to AA would fall exterior to the eye-lens, EE, if it were removed, and only a part of the object would

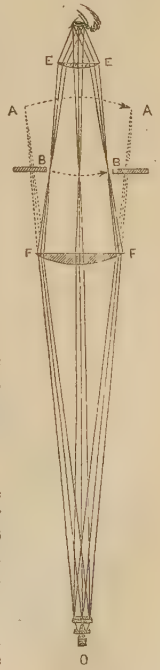


Fig. 5.

thus be brought under review, it is always made use of in the compound microscope. In use, the microscope is first lowered so as to bring the object-glass as near as may be to the object; the real image is then formed, or tends to be formed, above BB; the whole is then gradually lifted away from the object, during which operation the real image descends towards BB; when it reaches BB, the virtual image is first distinctly seen, at AA; the instrument is then 'in focus.'

The theory of the conditions which must be fulfilled in order to obtain accurate images of extremely minute objects with very fine markings is a very elaborate one; a good sketch of Professor Abbe's investigations will be found in the 8th edition of Carpenter's *The Microscope*. The calculation of the corresponding curvatures which must be given to the component lenses and of the special characteristics of the kinds of glass from which they must respectively be made is the subject-matter of a very recondite branch of mathematics. In the early days of antiseptic surgery Professor Lister (Lord Lister, q.v.) had to walk by inference and not by sight, for his 'germs' had never been seen in the existing microscopes; the very special kinds of glass from which the required lenses could be made were themselves not obtainable until the year 1887 (Abbe-Schott glasses, Jena); now the modern science of bacteriology is a commonplace of medical study with the aid of modern microscope lenses.

A mirror is placed under the stage for reflecting the light through the object under observation. This method of illumination by transmitted light is used when the object is transparent. When opaque, light is reflected on the object by a bull's-eye lens, called a condenser. Of late years considerable attention has been devoted to lateral illumination, which enables objects of a degree of minuteness inaccessible to the microscope used with transmitted light to be seen as bright points against a dark background (Ultra-microscopy).

The best instruments are supplied with six or seven object-glasses, varying in magnifying power from 20 to 2500 diameters. The eye-pieces supplied are three in number, each of which consists of two plano-convex lenses, between which a stop or diaphragm is placed, half-way between the two lenses. As the magnifying power of

a compound microscope depends on the product of the magnifying powers of the object-glass and the eye-piece, it follows that its power may be increased or diminished by a change in either or both of these glasses. In the mechanical arrangements it is of importance to have the instrument so constructed that, while every facility is afforded for

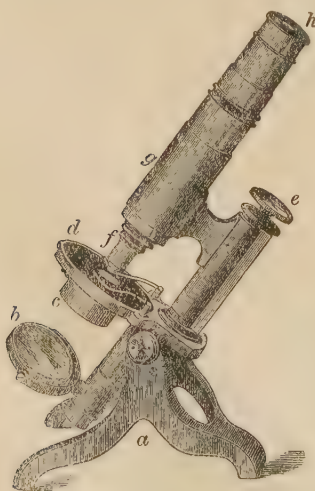


Fig. 6.

observation and easy adjustment, there should also be great steadiness. These ends are achieved in various ways, of which fig. 6 is one of the

simplest: *a*, brass stand, supported on three feet; *b*, mirror supported on trunnions; *c*, diaphragm, pierced with circular holes of various sizes, to regulate the admission to the object of reflected light from the mirror; *d*, stage-plate, on which the object is placed; *e*, screw, with milled head for fine adjustment; *f*, the object-glass or objective; *g*, brass tube in which the body of the instrument is moved, so as to effect the coarse adjustment; *h*, the eyepiece, or ocular. Recently Mr Bertram has developed methods for the examination of exceedingly minute objects by the use, instead of ordinary light, of ultra-violet rays of extremely short wavelengths (*Super-microscope*).

For a more complete account of the different kinds of microscopes, and the various purposes to which they are applied, see Quekett *On the Microscope* (1885); Carpenter, *The Microscope* (8th ed. 1901); works by Hogg and Beale; Spitta's *Microscopy* (1920); Cotton and Mouton, *Les Objets Ultramicroscopiques* (1907).

Microtome, an instrument for cutting thin sections of portions of plants and animals preliminary to their microscopic examination. The objects to be cut are imbedded in some material such as paraffin or celloidin, or frozen in gum, which makes the slicing of minute or delicate objects readily feasible. The cutting used to be done by holding the prepared object in one hand and wielding a razor in the other, but this method, apt to yield sections of unequal or insufficient thinness, has given place to the use of some form of microtome, which is at once quicker and more effective. These instruments are quite simple devices by which a sliding razor slices a fixed but adjustable object, or by which the object is made to move across the edge of the razor.

Midas, a common name of the ancient Phrygian kings, most famous of whom is Midas, son of Gordius and Cybele, and pupil of Orpheus. For his kindness to Silenus he was promised by Dionysus whatever he should ask, and in his folly he asked that everything he touched should become gold; but, as the very food he touched was at once changed into gold, he was soon fain to implore the god to take back his fatal gift. He was told to bathe in the sources of the Pactolus, and from that day to this its sands have yielded grains of gold. Once, when Apollo and Pan were engaged in a musical competition on the lyre and the flute, Midas was called in to decide between them. He gave the palm to Pan, whereupon Apollo changed his ears to those of an ass. He concealed the deformity under his Phrygian cap, but could not hide it from his barber, who felt so heavy the burden of a secret he dared not reveal that he dug a hole in the ground and whispered into it, 'King Midas has ass's ears.' He then filled up the hole, and his heart was lightened; but out of the ground sprung up a reed which ever whispered the shameful secret to the breeze.

Middelburg, capital of the Dutch province of Zeeland, in the island of Walcheren, and 4½ miles by rail N.E. of Flushing. In former times it was one of the leading mercantile cities of the United Provinces, sending many ships to the East and West Indies, and the Levant (Thomas Cromwell was one of its merchants); but its commercial importance has greatly declined, except for an active inland trade in corn, potatoes, and madder. Cotton-factories represent its only industry of note. The town-house, founded by Charles the Bold in 1468, is adorned with twenty-five statues of counts and countesses of Holland and Zeeland. A once celebrated abbey is now used as offices. The museum of the Academy of Sciences contains a telescope made by Lippershey, a native of the town, inventor of the instrument. Pop. 18,000.—Middelburg in the Transvaal (pop. 5000), 250 miles

W. of Lourenço Marquez, is a trading and mining centre; Middleburg in the Cape Province (4000) is 250 miles N. by W. of Port Elizabeth.

Middle Ages is the collective term for the centuries that intervened between the close of classic times and the dawn of the modern epoch. The term does not apply to Asiatic history, except, in part, in the Orient. By general acceptance, the middle ages are considered to begin after the overthrow of the Western Empire of Rome in 476, and to terminate at the Reformation, in the first quarter of the 16th century, or even earlier, in the last half of the preceding century, when printing was invented, America discovered, and the Renaissance (q.v.) of Learning was in full career. See the *Cambridge Medieval History* (1912 *et seq.*).

Middle Level. See BEDFORD LEVEL.

Middlesbrough, a great iron and steel manufacturing and shipbuilding and shipping centre in the North Riding of Yorkshire, is a municipal, parliamentary, and county borough, and capital of the district of Cleveland. It is on the south bank of the Tees near its mouth, 15 miles by rail ENE. of Darlington, 50 N. of York, and 246 N. by W. of London. In 1829 the site was occupied by a solitary farmhouse surrounded by marshy land; the town owes its remarkably rapid growth partly to the extension thither (in 1830) of the Stockton and Darlington Railway, but mainly to the discovery of iron ore in the adjoining Cleveland hills (1850) and its nearness to the Durham coalfield. Another industry—that of boring salt—was added in 1886. There are iron and steel works, blast-furnaces, shipbuilding and ship-repairing yards, marine engineering works, bridge works, iron pipe and tube works, iron, steel, copper, and brass foundries, chemical works and wire works; factories for oil and grease, fertilisers, paving blocks and bricks, steel hoops, firebricks, and much else. The Cleveland district contributes nearly one-half of the total production of pig-iron in the United Kingdom. The London and North Eastern Railway has a dock (26 acres); and there are wharves and dry docks appurtenant to the shipbuilding and repairing yards of the river. In addition the corporation is constructing docks for small vessels and a public landing-stage. The Tees Conservancy Commission (1852) has by dredging and the construction of two breakwaters at the mouth of the river and the erection of training walls made of waste slag from the local ironworks converted the Tees into a navigable river capable of accommodating the largest vessels. The South Gare breakwater was begun in 1863, and took twenty-four years to build, being over 2½ miles long. The North Gare breakwater has been completed to a length of about three-quarters of a mile. The parish church of St Hilda was erected in 1840 on the site of a monastic cell supposed to have been established 686 A.D. and destroyed by the Danes about 857. A chapel was erected soon after 1066, and by a grant of Robert de Brus the church of Middlesbrough was founded in 1120, which church was affiliated to Whitby Abbey, and demolished in 1660. There are besides Anglican and Nonconformist churches a Catholic cathedral and a Jewish synagogue. The town-hall and municipal buildings, of 13th-century style, are by repute architecturally the finest public buildings in the North of England. Among other public buildings are a public library and museum, and several hospitals. The Constantine Technical College, chiefly for metallurgy, is about to be erected. A transporter bridge (1911), for pedestrians and vehicles, connects Middlesbrough with Port Clarence. The Albert Park (72 acres) was given in 1868 by Mr H. W. F. Bölekow, the first mayor and member of parliament;

Marton Hall and Park (134 acres), now the 'Stewart Park,' was presented in 1923 by Councillor Stewart of Middlesbrough. In the Victoria Park, opposite the municipal buildings, there are statues of Mr Vaughan, the founder of the Cleveland iron trade, and Sir Samuel A. Sadler, the first Conservative member of parliament for Middlesbrough, a public-spirited benefactor. Mr Bölekow's statue stands in Zetland Place. The first governing body, 'The Middlesbrough Improvement Commission,' was established in 1841; the borough was incorporated in 1853, and created a county borough in 1889. From 1867 it returned one member to parliament, since 1918 two. Middlesbrough (not Middlesborough) is the local and official spelling, the charter having spelt it so from the first. Pop. (1921) 131,070.

Middlesex, a small county in the south of England, bounded on the N. by Hertfordshire, on the E. by Essex, on the W. by Buckinghamshire, and on the S. by the Thames and the county of London. The northern boundary is irregular, having been determined originally by the estates of the abbey of St Albans and the bishopric of Ely. On the east the river Lea and on the west the Colne and the Brent form the natural boundaries. Although the area is but 233 sq. m., the population is large (1,253,164 in 1921), which is accounted for by the neighbourhood of the county and city of London. We first hear of Middlesex as a sub-kingdom dependent on Essex. Its position between the territory of the East Saxons and that of the West Saxons accounts for the name. The greater part of the surface was covered with a forest, of which Enfield Chase and Hampstead Heath are relics; but it was traversed by the great road which crossed the Thames, probably by a ford at Westminster, and led north-westward under the name of the Watling Street. The population was very sparse, and it has been remarked that no castle stood within its boundary, and no great abbey except that of Westminster. After the Conquest we hear little of the county until 1101, when Henry I. granted it in farm to the citizens of London. The position of Middlesex thenceforward until the passing of the Local Government Act in 1888 was wholly peculiar. For a rent of £300 per annum the citizens had the appointment of the sheriff and all other regal rights. It was usual for the sheriffs of the city to hold the office on alternate days, whence the legal form, 'the sheriffs of London and sheriff of Middlesex.' The whole body of citizens held the office, and their nominees were strictly speaking not high but sub-sheriffs, while the Lord Mayor was Lord-lieutenant. Under this régime, as is well known, the county shared in the prosperity of its great neighbour, and became at last so populous that by the act already named those portions of it which lay nearest the Thames and the city were severed from it, and, with certain districts of Kent and Surrey, were incorporated into a new 'county of London' (q.v.). At the same time a sheriff for Middlesex and a lord-lieutenant were appointed by the crown, and a singular usage which had subsisted for more than seven centuries ceased to obtain. Middlesex has (since 1918) ten members of parliament.

The low rolling undulations consist of London Clay, topped here and there with river-drift, in which indications of early human life have been found. There is but little tillage, except for market-gardens, and a great part of the county consists of grazing land, being covered largely with villa residences, surrounded in many places with large parks. Brickfields occupy the western border, and the number of large suburban villages—without, however, any important town—is remarkable. Brentford, Uxbridge, and Ealing are

to the west of London, and the first-named is usually reckoned the county town. Northward are Harrow, with its school, Enfield, and Tottenham. Eastward are Highgate and Hornsey. London, it may be well to note, was never in Middlesex.

Middlesex, and especially its eastern border, was the scene of many conflicts with the Danes. During the Wars of the Roses, Barnet on the northern verge gave its name to the battle on the neighbouring Hadley Common, where in 1471 the King-maker was defeated and slain. The principal mansions are Hampton Court (see HAMPTON), Sion House (see ISLEWORTH), and Osterley, near Hounslow, a handsome building by Robert Adam.

Middle Temple. See INNS OF COURT.

Middleton, a town of Lancashire, on the Irk, 3 miles W. of Oldham and 6 NNE. of Manchester. An old town which in 1791 received a charter for a weekly market, it was incorporated as a municipal borough in 1886, the borough area including the townships of Middleton, Tonge, and Alkrington, with parts of Hopwood and Thornham. The staple industry is cotton. It has an interesting church, a grammar-school (1421; re-founded 1572), library, &c. Pop. (1851) 5740; (1921) 28,290.

Middleton, a town of Ireland, 13 miles by rail E. of Cork. At the college (1696) Curran was educated. Pop. 3200.

Middleton, CONYERS, a famous controversialist, was born at Richmond in Yorkshire in 1683. He studied at Trinity College, Cambridge, and in 1706 obtained a fellowship, which a prudent marriage soon enabled him to resign. About 1722 he became librarian to the university, and in his later years was presented to the living of Hascombe in Surrey. He died at his seat at Hildersham in Cambridgeshire in 1750. All his life through Middleton was busy in controversy, and in bitterness of tone and ferocity of temper he was a match for any of his contemporaries. His first antagonist was the redoubtable Bentley; but, though at first successful, he was afterwards obliged to apologise to him for libel. His later controversies were theological in character, and in these he gained great distinction, but left his own sincerity under grievous suspicion. His *Letter from Rome, showing an exact Conformity between Popery and Paganism* (1729), was a severe attack on the Catholic ritual. He next assailed the orthodox champion Waterland, and startled the devout by giving up literal inspiration and the historical truth of the Old Testament stories. In 1747 and the following year he published his famous *Introductory Discourse* and the *Free Inquiry* into the miraculous powers claimed for the Christian church after the apostolic age. He attacked the ecclesiastical miracles, pointing out that their true source was in the general intellectual condition of the age that produced them, without needing to postulate either supernatural interference or human imposture. Middleton's best-known book is his well-written and enlogistic *Life of Cicero* (1741). See Sir Leslie Stephen's *English Thought in the Eighteenth Century*; also the article BELLENDEN (WILLIAM).

Middleton, JOHN, 1ST EARL OF MIDDLETON, born, probably in 1619, of a noble Scottish family, served with a regiment in France, then in the English parliamentary army, and became prominent in the army of the Covenant in Scotland, distinguishing himself at Philiphaugh (1645). He was one of the leaders of the Scottish army which invaded England in 1648 to deliver the king from the Independents, and was taken prisoner after a stern fight at Preston. Thereafter a royalist, he attempted several risings in Scotland, and was again taken prisoner at Worcester. He fled to the Continent, and returned as Earl of Middleton with Charles II. in 1660. Commissioner to the Scottish

parliaments of 1661 and 1662, he overreached himself in his endeavours to restore Episcopacy in Scotland, quarrelled with Lauderdale, and lost his offices in 1663. Later becoming governor of Tangier, he died there in 1673.

Middleton, RICHARD, poet and essayist, born in 1882, committed suicide in Brussels in 1911. Two series of *Poems and Songs* appeared in 1912-13, besides essays and short stories. See Savage, *Richard Middleton: The Man and his Works* (1922).

Middleton, THOMAS, dramatist, born about 1570, was the only son of William Middleton, gentleman, who settled in London and married Anne, daughter of William Snow. The earliest mention of Middleton in Henslowe's *Diary* is under date 22d May 1602, when he was engaged with Munday, Drayton, Webster, and others on a lost play, *Cæsar's Fall*. First on the list of his printed plays is *Blurt, Master Constable* (1602), a light, fanciful comedy. Two interesting tracts, *Father Hubbard's Tale* and *The Black Book*, exposing the practices of London rogues and sharpers, were published in 1604, to which year belongs the first part of *The Honest Whore* (mainly written by Dekker, but containing occasional scenes by Middleton). *The Phoenix* and *Michaelmas Term* (both published in 1607) are lively comedies; and even more diverting is *A Trick to Catch the Old One* (1608). *The Family of Love* (1608) and *Your Five Gallants*, n.d. [1608], are of slender merit; but *A Mad World, my Masters*, from which Aphra Behn pilfered freely in *The City Heiress*, is conducted with singular adroitness. All these early comedies of Middleton, even the poorest of them, are distinguished by smartness and buoyancy. *The Roaring Girl* (1611), written in conjunction with Dekker, describes the exploits of Mary Frith, a noted cut-purse and virago, who is turned into an attractive heroine by the kindly playwrights. In 1613, and frequently in later years, Middleton was employed to write the Lord Mayor's pageant. The highly amusing but somewhat indecorous comedy, *A Chaste Maid in Cheapside*, printed in 1630, was probably produced in 1613; and to that year may belong *No Wit, No Help like a Woman's*, first printed in 1657. *A Fair Quarrel* (1617), written with William Rowley, presents in the person of Captain Ager a noble example of blameless magnanimity. *The World Tost at Tennis* (1620), to which Rowley contributed, is an ingenious, well-written masque, contrived with more elaborate care than was usually bestowed on such compositions. On 6th September 1620 Middleton was appointed to the office of City Chronologer. A MS. City Chronicle compiled by him was extant in the 18th century, but has since disappeared. *More Dissemblers besides Women* (circa 1622, probably written in conjunction with Rowley), is more elaborate and substantial than the early comedies.

The dates of *The Witch*, *The Mayor of Quinborough*, and *The Old Law* are difficult to fix. *The Witch*, first printed in 1770, is interesting from the resemblance that it offers in the incantation scenes to the similar scenes in *Macbeth*, which was (probably) written earlier. Some of the songs from Middleton's play were foisted into *Macbeth* by the players. *The Mayor of Quinborough* (first printed in 1661) was supposed by Dyce to be one of Middleton's earliest plays; but a passage in iv. 3 is certainly imitated from *The Tempest*. The tragic scenes contain some of Middleton's most powerful writing; the broadly comic scenes may be safely assigned to Rowley. The delightful comedy, *The Old Law*, first published in 1656 as the work of Massinger, Middleton, and Rowley, bears some indications of having been originally produced in 1599. Massinger did no more than

revise the play on its revival at the Salisbury Court Theatre; and there is more of Rowley in it than of Middleton.

In the three posthumously published plays, *The Changeling*, *The Spanish Gypsy*, and *Women beware Women*, Middleton's genius is seen at its highest. Rowley had a share in the first two and probably in the third. *The Changeling* (written circa 1623) has not the sustained tragic power of Webster's masterpieces, and is weighted with a cumbrous comic underplot (evidently managed by Rowley); but it contains one scene (the colloquy between De Flores and Beatrice after the murder of Alonzo) that for sheer intensity of passion finds no parallel outside Shakespeare's greatest tragedies. It was one of the first plays revived at the Restoration. *The Spanish Gypsy* (circa 1623), a rich romantic play, opens sombrely, leading us to expect a tragical issue, but ends cheerfully; the breezy Gypsy-scenes are doubtless by Rowley. *Women beware Women* has a blithe beginning, but closes in tragic gloom. As a whole it is even more powerful than *The Changeling*.

A very curious, interesting, and skilful play is *A Game at Chess*, which was acted for nine days continuously, with unbounded applause, in August 1624. The cause of its great popularity was that it gave expression to the general feeling of satisfaction at the failure of the negotiations for the Spanish marriage. Gondomar ('the Black Knight') was satirised with scathing severity; and the Archbishop of Spalatro ('the Fat Bishop') was rudely handled. After the performance had continued for nine days a strong protest from Gondomar caused the withdrawal of the play; and both author and actors were summoned to appear before the Privy-council. Middleton shifted out of the way.

The Widow, a comedy of uncertain date, was published in 1652 as the work of Jonson, Fletcher, and Middleton; but it is difficult to assign any part to Jonson, and Fletcher's share was slight. The scene in act iv. where Latrocinio disguises himself as an empiric and dispenses his nostrums seems rather to be imitated from Ben Jonson than written by him. *Anything for a Quiet Life*, printed in 1662 and written circa 1619, may have been revised by Shirley.

In 1626 Middleton composed the city pageant, *The Triumphs of Health and Prosperity*. On 4th July 1627 he was buried at Newington Butts. He had married in 1602 or 1603 Mary, daughter of Edward Morbeck, one of the six clerks in Chancery; and his son Edward, the only child of the marriage, was born in 1604. The widow survived for about a year. Ben Jonson succeeded to the post of City Chronologer.

Middleton was concerned in the authorship of some of the plays included in the works of Beaumont and Fletcher. Mr Fleay plausibly assigns to him *A Match at Midnight* (usually attributed to Rowley) and the pseudo-Shakespearean *Puritan*.

Dyce's edition of Middleton appeared in 1840 (5 vols.); A. H. Bullen in 1885-86 (8 vols.). Selected Plays, with an Introduction by Swinburne, are included in the 'Mermaid' Series, ed. Havelock Ellis.

Middletown. (1) a city and port of entry of Connecticut, on the right bank of the Connecticut River, 15 miles below Hartford, at the junction of three railway lines. It is a well-built town, dating from 1636, with wide, shaded streets and numerous handsome residences. Here are the Wesleyan University (1831), the Berkeley Divinity School (Episcopal), a large state hospital for the insane, and an industrial school for girls. The manufactures include pumps, textiles, hardware, &c. Pop. 14,000.—(2) A city of New York, 67 miles by rail NNW. of New York City. It contains

the state homœopathic insane asylum, and has manufactures of machinery, hats, &c. Pop. 18,400.—(3) A city of Ohio, on the Miami River and Canal, 28 miles N. of Cincinnati, with paper-mills and other factories. Pop. 23,600.

Middlewich, an old-fashioned market-town of Cheshire, on the river Dane and the Grand Trunk Canal, 21 miles E. of Chester. Its salt-manufacture dates from Saxon times at least. Pop. 5000.

Midgard. See SCANDINAVIAN MYTHOLOGY.

Midge, a common name for many different kinds of delicate flies, more or less gnat-like in structure, but usually harmless in habit. The adults dance in great swarms in the air; the larvæ are usually aquatic. A common little brown midge, *Corythra plumicornis*, has beautifully transparent larvæ, frequent in stagnant water; while those of *Chironomus plumosus* are bright red, known as blood-worms, and much sought after by birds and fishes. The name is sometimes extended beyond the limits of the family Chironomidæ to include such forms as the formidable Danubian gnat (*Simulium columbascense*) or the allied buffalo gnat of the southern United States. See GNAT.

Midhurst, a small town of Sussex, on the Rother, a navigable tributary of the Arun, 65 miles by rail SW. of London and 12 N. of Chichester. Cobden was born close by, and Lyell was educated at the grammar-school (1672). Cowdray House, $\frac{1}{2}$ mile NE., built about 1530 by Southampton, was in 1793 reduced by fire to a beautiful ruin. Till 1885 Midhurst borough (35 sq. m.) returned a member to parliament.

Midi, CANAL DU, DENT DU. See GARONNE, DENT DU MIDI.

Midianites, an Arab race, descended, according to Scripture, from Midian, the son of Abraham by Keturah. They occupied great part of the country between the Red Sea and the Plains of Moab, and had their headquarters east of what is now the Gulf of Akabah. They were at least partly nomadic, but their caravans brought gold and incense from the south to Palestine, and traded between Egypt and Syria. Some of them lived near Sinai; to them belonged Jethro, priest or sheik of Midian—the father-in-law of Moses. The Midianites were very troublesome neighbours to the Israelites till Gideon's victory over them. The national god was Baal-Peor. In Midian proper, to the east and south-east of the Gulf of Akabah, the Romans had valuable mines. Sir Richard Burton was convinced that gold was still to be found there, and as an outcome of visits paid in this interest wrote his *Gold Mines and Ruined Cities of Midian* (1878), and *Midian Revisited* (1879). Later travellers have not confirmed his opinion; but petroleum seems to occur. Midian ceased to be Egyptian and became Turkish again in 1887. Turkish rule ended with the Great War. The political conditions in Arabia at the present day are unstable and many of the neighbouring tribes are affected, so that it is difficult to forecast the immediate future and to guess to which of the four states—Egypt, Palestine, Trans-Jordania, or Arabia—the modern descendants of the ancient Midianites either do or will own allegiance. The biblical references to Midian are critically discussed in the *Cambridge Ancient History* (vol. ii.). See also articles in *Jew. Ency.* and *Ency. Brit.* For the general relations of Jews and Arabs, see Prof. D. S. Margoliouth (Schweich Lectures for 1921, publ. Oxford, 1924). The works of modern travellers should also be consulted, e.g. W. E. Palgrave, *Narrative of a Year's Journey* (Lond. 1868); C. M. Doughty, *Travels in Arabia* (Lond. 1921), *Wanderings in*

Arabia (Lond. 1923); and H. St John B. Philby, *The Heart of Arabia* (Lond. 1922).

Midlothian. See EDINBURGHSIRE, ROSEBERRY.

Midnapur, capital of a district in Bengal, on the Kasai River, 63 miles W. of Calcutta by road and canal. There are some manufactures, and an American mission to the Santals. Pop. 29,000.

Midrash, the Hebrew exposition of the Old Testament. See EXEGESIS.

Midriff. See DIAPHRAGM.

Midshipman, the title under which formerly young officers entered the British navy. From song and story, and especially from Marryat's novels, 'the midshipmite' has acquired a historic interest, and become inseparably associated with the navy. The term is derived from the fact that in the old British men-of-war the 'young gentlemen' had their quarters *amidships* on the lower deck. The United States, whose navy borrowed the term from Britain, abolished it by act of congress in 1882, but revived it in 1902. Great changes have taken place in the method of entry of junior officers in the British navy. These new regulations involved the final disappearance from the service of the sailing training-vessels, and the fact that 'training in masts and yards and sails has disappeared never to return.' See NAVY.

Midsummer Day—24th June—is one of the four English quarter-days. For Midsummer Eve, see JOHN'S (EVE OF ST.).

Midwifery. The Midwives Act of 1902 provides that after 1st April 1905 any woman, not being certified under this act, who shall use the name and title of midwife in England shall be liable, on conviction, to a fine not exceeding £5; that after 1st April 1910 no woman shall for gain attend women in childbirth except under the direction of a qualified medical practitioner, unless certified under this act, the penalty being a fine not exceeding £10. The act, however, does not apply to legally qualified medical practitioners, or to any one rendering assistance in cases of emergency. The Midwives (Scotland) Act of 1915 made like provision for Scotland from 1st January 1917 and 1st January 1922 respectively. See OBSTETRICS.

Mieris, FRANS VAN, Dutch painter, born at Leyden, 16th April 1635, died there, 12th March 1681. He painted genre pictures and portraits, all of small size. He was a pupil of Gerard Dow, but, though a very able painter, scarcely rises to the level of his master. His son, Willem (1662-1747), and Willem's son, Frans (1689-1763), followed closely in his footsteps.

Miescher's Vesicles. See GREGARINIDA.

Mignard, PIERRE (1612-95), French artist, trained with Vouet at Paris, but soon went to Rome, where he won for himself no small reputation as a painter of portraits and frescoes. Migrating in 1658 to the court of Louis XIV., he employed himself painting portraits of all the great personages of the society of the day—Maintenon, Sévigné, Turenne, Molière, Bossuet, &c. The king sat to him ten times. Amongst other buildings he decorated the cupola of the Val de Grâce, a most elaborate piece of work, while he also produced numerous religious pictures. After a lengthy quarrel with Le Brun, the president of the Academy, he succeeded him in office in 1690. He intended to decorate the cupola of the Invalides, but he was already over eighty, and death cut short his project.

Migne, JACQUES PAUL, to whom Catholic theology owes a great debt of gratitude, was born at St Flour in Cantal, 25th October 1800, and died in Paris on his seventy-fifth birthday. He was educated at the seminary at Orleans, was ordained priest in 1824, and served some time as

curate at Puisieux in the diocese of Orleans. A difference with his bishop about a book on the liberty of the priests drove him to Paris in 1833, where he started *L'Univers Religieux*, afterwards called simply *L'Univers*. In 1836 he sold the paper, and soon after set up a great publishing house at Petit Montrouge, near Paris, which gave to the world, besides numerous other works of theology, *Scriptura sacrae cursus completus* and *Theologie cursus* (each 28 vols. 1840-45), *Collection des Orateurs sacrés* (100 vols. 1846-48), *Patrologia cursus completus* (Latin series, 221 vols., 1844 *et seq.*; 2d ed. 1878 *et seq.*; 1st Greek series, 104 vols., 2d series, 58 vols., both since 1857), and the *Encyclopédie théologique* (171 vols. 1844-66). Unfortunately these editions were prepared too hastily, and moreover by superficial scholars, so that they do not possess critical value. The Archbishop of Paris, thinking that the Abbé Migne's great undertaking had become a mere commercial speculation, forbade it to be continued, and, when the indefatigable director refused to obey, suspended him. A great fire, more powerful than the veto of the archbishop, put an end to the work in February 1868.

Mignet, FRANÇOIS AUGUSTE MARIE, a great French historian, was born 8th May 1796 at Aix in Provence, studied at Avignon, and then law at Aix. His true vocation was at once apparent in the no less solid than brilliant prize-essay for the Academy of Inscriptions on the institutions of France in the time of St Louis. In 1821 he went to Paris, and soon began to write for the *Courrier Français*, and to lecture with applause on Modern History at the Athénée. In the spring of 1824 appeared his *Histoire de la Révolution Française*, a sane and admirable summary—the first complete history by one other than an actor in the great drama. Mignet joined the staff of the *National*, and with Thiers signed the famous protest of the journalists on 25th July 1830. After the revolution of 1830 he became Keeper of the Archives at the Foreign Office, but lost this in 1848. In 1833 he went on a confidential mission to Spain, and used the opportunity to explore the famous Simancas Archives. Elected to the Academy of Moral Sciences at its foundation in 1832, he succeeded Comte as its perpetual secretary in 1837, and was elected to fill Raynouard's chair among the Forty in 1836. He died 24th March 1884. Mignet was the first great specialist in French history who devoted himself to the complete study of particular periods, and in his work he displayed a marvellous mastery of documents.

Mignonette (*Reseda odorata*), a plant of the natural order Resedaceæ, a native of Cyrenaica, in universal cultivation on account of the delicious fragrance of its flowers. Though usually cultivated as an annual, it is really a perennial, and assumes a sub-shrubby character when protected from cold and wet in winter. It was first introduced into England by Lord Bateman, who brought it from the Royal Garden at Paris in 1752; nor had it then been long known in France. It rapidly became a universal favourite throughout Europe. The French name *mignonette*, now its popular name everywhere, signifies *Little Darling*. In French the name *mignonette* is applied to many flowers, to this among others, but its usual name is *réséda*. What is called *Tree Mignonette* is not even a distinct variety, but merely the common kind trained in an erect form, and prevented from early flowering by pinching off the ends of the shoots. The name *Mignonette tree*, however, or *Jamaica mignonette*, is sometimes given to *Lawsonia inermis*, or Henna

(q.v.), of the order Lythraceæ.—Weld (q.v.) belongs to the same genus as *mignonette*.—Another British species is *Reseda lutea*, or wild mignonette, a smaller plant than weld, also found in waste places. It has commonly six sepals and six petals, the two upper petals having three lobes, the two lateral petals two, and the two lower being undivided.

Migraine (Fr., from Lat. *hemisphæra*, Gr. *hēmi*, 'half,' *kranion*, 'skull;') the same word as *megrin*, a severe headache usually affecting only one side of the head. See HEADACHE.

Migration is generally understood to mean the movement of a people as a whole, and is distinguished from Emigration (q.v.) and Immigration (q.v.), in which only individuals and families participate, from Colonisation, in which the surplus population swarms off (see COLONY), and from mere military invasion. Some possible early migrations of the Indo-Germanic peoples are discussed in the article ARYANS and ARYAN LANGUAGES. A later series of movements called the *Völkerwanderung* occurred among the German tribes. The movements of the Huns and Avars, their pressure upon the Germans, the wanderings of the Goths and other Germanic nations, their strife among themselves and with the Roman Empire, are dealt with in the articles HUNS, AVARS, GOTHs, BURGUNDY, VANDALS, ALBEMANNI, GEPIDÆ, LOMBARDS, FRANKS. For the peopling of England and Lowland Scotland see ANGLES, JUTES, SAXONS, and ENGLAND (*History*); and for the last stages in the Germanic *Völkerwanderung* see the article NORTHMEN and the references there. For other peoples see SLAVS, HUNGARY (*History*; for the Magyars), and similar articles.

Migration, a term applied rather loosely to more or less periodic mass-movements of animals, notably birds, from one place to another. Thus many naturalists speak of the migration of locusts, of herring, of eels, of lemmings, though the mass-movements of these animals are very different in character from the typical migrations of birds. The central facts in regard to migration in the strict sense are that it recurs with regular periodicity, that it takes place between one seasonal habitat and another, that there is always a return journey, and that it has a twofold reference, partly to changes in meteorological conditions and food-supply, partly to the continuance of the race and the requirements of the young. Thus in birds there is a seasonal oscillation between the summer-quarters, the breeding and nesting-place, in the colder part of the range, and the winter-quarters, the feeding and resting-place, in the warmer part of the range. In a north temperate country, like Britain, the majority of the birds are migratory, a small minority are residents, such as red grouse and sparrow. The migrants may be distinguished as follows: (a) There are *summer visitors*, arriving from the south in spring and early summer, breeding in the country, and leaving again for their southern winter-quarters in late summer or autumn. Swallow and swift, cuckoo and nightingale, corn-crake and puffin, are familiar examples. (b) There are *winter visitors*, such as fieldfare and redwing, snow-bunting and great northern diver, which come from the north in autumn, remain throughout the winter, and return in early spring to their northern breeding haunts. (c) There are the *birds of passage* in the stricter sense, such as some sandpipers, which spend a short time twice a year in the country in question on their way farther north or farther south. (d) There are the *partial migrants*, such as lapwing and goldfinch, which shift their quarters from one part of the country to another, or which include many representatives that leave

the country and many that stay. It is plain that birds which seem to be resident in a particular area, since there is no month in the year when they are unrepresented, may be, in point of fact, partial migrants. One set may go southwards, for instance, and their place may be taken by another set from farther north. Careful investigations have shown that this is common. It is also plain that a winter visitor in one country will be a summer visitor farther north, and that a 'bird of passage' in one country will be a summer visitor or a winter visitor in another country.

The migratory movements differ greatly in range. In warm countries there may be little more than an oscillation between the uplands and the valleys. Many British curlews frequent the shore-areas in the cold part of the year and the high moors in their breeding season. Arctic terns, on the other hand, have been seen within the Antarctic Circle, and the Pacific golden plover flies from the Hawaii Islands to Alaska to breed. Whatever be the distance travelled, the general rule is that birds breed in the colder part of their migratory range. There is in many cases a twofold regularity in the migratory movement as regards time and as regards space; this points to the fact that the migration is old-established, and that it has come to work with great smoothness. As regards time, there is often a striking uniformity in the dates of arrival in a given area, and a less marked uniformity in the dates of departure. As regards space, it has been proved by marking birds that, in some cases, e.g., stork and swallow, an individual may return from a winter sojourn in the south to the building where it was hatched, or where it made its nest, the year before. For certain birds there seems to be considerable regularity in the migratory routes, but precise knowledge is still scanty. There is often a tendency to follow a coast-line, a chain of islands, a river-valley, and so on; and in some cases, e.g., that of the Pacific golden plover, there is evidence of a gradual short-cutting of the paths followed. In a north temperate country the prevalent direction of the autumnal movement of the summer visitors is from north to south, from north to south-east, from east to west and then south. The immigration of the summer visitors into a north temperate country is mainly from south to north, or from south to north with a divergence eastward and westward. By marking birds with numbered rings, some secure data as to migratory routes are being gradually accumulated; thus it is certain that many North-European storks pass southwards in autumn through Africa to Natal and similar areas. There is sometimes a marked difference between the spring flight northwards, which tends to be impetuous, with few or no interruptions, and by the shortest route, and the autumn flight southwards, which tends to be more leisurely and dallying and more circuitous. The first migrants to arrive in a north temperate country in spring are the mature birds, the males often leading; the immature birds bring up the rear. In autumn, however, the order is reversed; the older birds linger longer, the younger birds leave first, with the exception of the European cuckoo, where the parents may leave a month or so before their offspring. Some migrants, such as larks, starlings, thrushes, and hooded crows fly rather low; the majority fly high; and some pursue their way at a great height—of 1000–3000 feet. Many migrants continue their journey by night. Estimates of the velocity of the migratory flight are often exaggerated, but some birds attain to fifty miles an hour.

The impulse to migrate at particular times, and the capacity of migrating, seem to be inborn or instinctive, engrained in the race in the course of

ages. The impulse is exhibited by young birds who have known no winter, and by caged birds physically comfortable; it often asserts itself before there is any pinch of external circumstances; it occurs at many different levels of intelligence among other backboned animals, such as salmon, turtle, and seal. Its history is probably wrapped up, like that of many racial peculiarities in mankind, with the history of changing climates. Not that the climatic changes can be thought of as directly engendering a migratory habit, but rather that variations of the nature of periodic restlessness, like 'roving' in mankind, would have survival-value in certain conditions, and tend to become racial characteristics. Long, cold, dark, and sterile winters would favour the survival of restless experimenting birds which began migrating southwards; they would make for the elimination of the dull, the sluggish, the foolhardy, and the inept. Another factor would be the overcrowding at the end of the breeding season. The return journey in spring from the winter-quarters, say in a semi-tropical country, to the colder breeding area, may be associated with the risks and discomforts of nesting in hot and dry places, and also with the abundance of food (insects, fruits, and seeds) characteristic of summer in many northern areas. It is not inconsistent, with this view of the migratory impulse and capacity, to look for internal and external conditions which serve as trigger-pulling stimuli, or to look for facts which may throw light on the way-finding.

While there is considerable mortality in the yearly migrations of birds, especially when the weather is unpropitious, the striking fact is that a large measure of success usually attends the adventure. This way-finding remains an unsolved problem. Allowance may be made for the utilisation of land-marks; but these are not available at night, nor across the pathless sea. Allowance may be made for some measure of social tradition, those birds that followed well one year may lead well the next; but, in the case of most British birds, the novices are said to go off first, apparently unattended by old experienced hands. As it is difficult to be confident in regard to statements of this sort, the further difficulty in the way of the tradition theory may be noted that it is not possible to indicate what the physiological or psychological content of the tradition would be in the case of birds migrating in the darkness, at a great height, and across an expanse of sea. Very important experiments by Watson and Lashley have shown, for instance, that nesting terns from the Tortugas, at the mouth of the Gulf of Florida, may be transported by steamer, in hooded cages, over unknown waters to the north and west, for 800 miles or more, and yet find their way back in a short time in a varying percentage of cases. A provisional eclectic statement may be suggested, that birds utilise stimuli, at present undetected, which have hereditarily come to have directive significance; that the impulse and constitutional capacity represent the outcome of ages of selection operating on favourable germinal variations; and that something may be allowed for individual acuteness and for socialised co-operation.

The march of Lemmings (q.v.) is not a true migration; it is an attempt to deal with irregularly recurrent over-population, and there is no return journey. The same may be said in regard to the invasions of Locusts (q.v.). The mass-movements of some gregarious fishes—like mackerel and herring—imply (1) a pursuit of the crustaceans and the like which form the staple food, and which vary in abundance according to the seasons and local conditions; and (2) a working along tracts of congenial temperature, salinity, oxygenation, and

the like; but they are not migrations in the strict sense. Apart from birds, true migrations are illustrated by some fishes, such as salmon and sturgeon (and also by eels, though there is no return journey of the adults after spawning); by some marine turtles among reptiles; by seals, some whales, and some bats among mammals.

See W. Eagle Clarke, *Studies in Bird Migration* (1912); T. A. Coward, *The Migration of Birds* (1912); Charles Dixon, *The Migration of Birds* (1898); A. Newton, article 'Migration' in *Dictionary of Birds* (1893-96); Gätke, *Heligoland as an Ornithological Observatory* (1895); W. P. Pycraft, *History of Birds* (1910); J. B. Watson and K. S. Lashley, *Observations on Nesting Terns at the Tortugas* (Carnegie Institution, Washington, vii. 1915); J. Arthur Thomson, *The Biology of the Seasons* (1911), *The Wonder of Life* (1914), *Secrets of Animal Life* (1919), *The Biology of Birds* (1923).

Miguel, MARIA EVARIST, usurper of the throne of Portugal, was born at Lisbon, 26th October 1802, the third son of King John VI. A determined hater of all constitutional principles, he plotted (1824) to overthrow the constitutional form of government granted by his father: he caused the ministers to be arrested and his father to be closely watched in his palace; but the aged king escaped to an English man-of-war anchored in the estuary. Miguel and his mother, his principal abettor, were banished. At the death of John VI. in 1826 the throne devolved upon Miguel's elder brother, Pedro, the emperor of Brazil; he, however, resigned it in favour of his daughter, Maria, but making Miguel regent till her majority. Miguel at once dissolved the constitutional cortes, summoned the cortes that had preceded it, and was on 30th June 1828 by it proclaimed king. But Pedro (who had abdicated in 1831) gathered an army at the Azores, and in 1832 captured Oporto and Lisbon, and Charles Napier destroyed Miguel's fleet off Cape St Vincent (1833). Next year Maria was restored to the throne, and Miguel withdrew to Italy, protesting. He died on 14th November 1866 at Bronnbach, near Wertheim in Baden, having been a spoilt youth, a wildly dissolute man, and a tyrannical ruler.

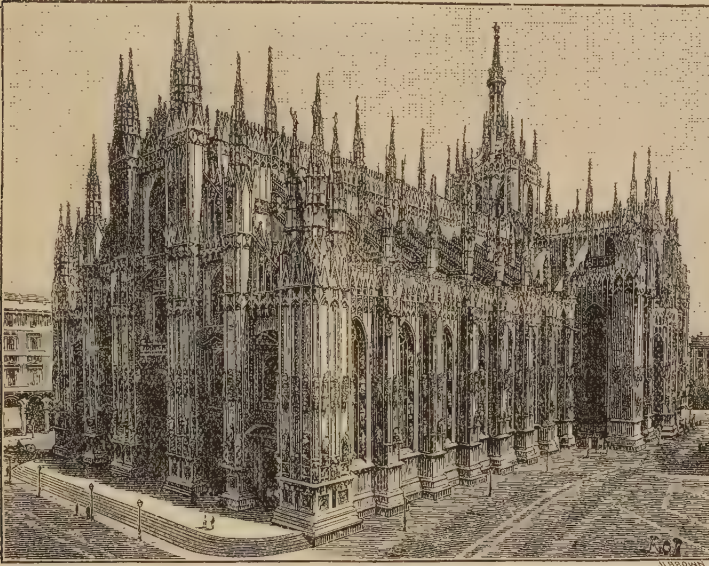
Miklosich, FRANZ VON, the greatest of Slavonic scholars, was born at Luttenberg, in the Slovenian part of Styria, 20th November 1813. After studying law at Graz University he went in 1838 to Vienna to practise as an advocate, but was led by Kopitar to the study of philology, and in 1844 obtained a post in the Imperial Library. From 1850 to 1885 he was professor of Slavonic at Vienna, in 1851 being elected to the Academy, and knighted in 1869. He died 7th March 1891. His works, nearly thirty in number, include *Radices Linguae Palaeoslovenicae* (1845); *Lexicon Linguae Palaeoslovenicae* (1850); *Vergleichende Grammatik der Slawischen Sprachen* (4 vols. 1852-74), which did for Slavonic what Grimm and Diez did for the German and the Romance languages; *Die Bildung der Slawischen Personennamen* (1860); *Ueber die Mundarten und die Wanderungen der Zigeuner Europas* (12 parts, 1872-80); *Rumänische Untersuchungen* (1882); and *Etymologisches Wörterbuch der Slawischen Sprachen* (1886).

Miknas, MEQUINEZ, or MIKNASA, a town of Morocco, 32 miles W. by S. of Fez and 70 miles from the coast, stands amidst olive groves on the slope of a hill. It is surrounded by walls, and is perhaps the best built town in Morocco. The palace is the summer residence of the sultan, and the mosque of Muley Ismail is the burial-place of the royal house. Pop. about 30,000. For the place and its history, see works named at MOROCCO.

Mikulov. See NIKOLSBURG.

Milan, the second in size of Italian cities, stands in the great plain of Lombardy, 80 miles N.E. of Turin, 155 W. of Venice, and 25 S. of the Lake of Como at the foot of the Alps. The city, nearly circular in shape, is surrounded on three sides by walls, has a circuit of nearly 8 miles, and is entered by 14 gates. Although a place of great antiquity, it does not possess many very old buildings: it has been too greatly ravaged by war. The modern city is a busy, enterprising, and wealthy community. The streets are broad and regular, and the houses substantial and roomy. The principal church is the cathedral of the archbishop, the foundation of which was laid, on a site where already two cathedrals had stood, by Gian Galeazzo Visconti in 1386; it was completed by order of Napoleon I. in 1805-13. It is built entirely of marble, and in the Gothic style, with an approach to Flamboyant in the ornamentation; but the windows and portals of the façade (16th century) are Italian. The

(given by the king to the nation in 1919), with fine modern frescoes; the Late Renaissance municipal palace (1558); the Poldi-Pezzoli palace, with a collection of paintings of Leonardo da Vinci's school, armour, and artistic objects; and several others. In 1900 the municipal art and archaeological museums were transferred to the restored Castello Sforzesco. The arcaded colonnade of Victor Emmanuel (1865-67), lined with fine shops, forms a favourite promenade of the people. The Arch of Peace, built of white marble (1807-38), commemorates the exploits of Napoleon. The Della Scala opera-house (1778) is the second largest (next after San Carlo at Naples) in Italy. Beccaria, Manzoni, the popes Pius IV. and Gregory XIV. were natives of Milan. A university was opened in 1924. The principal other scientific and artistic institutions are an academy, a higher technical institute, several scientific societies, a museum of natural history, schools of veterinary practice, music, and a military geographical institute. The charitable institutions are numerous and splendidly endowed; the Great Hospital (founded in 1448) can accommodate 2500 patients. Owing to its central situation in the upper valley of the Po, to the fact that it is the principal meeting-place of the north Italian railways and canals, and owing to its proximity to the Alpine passes, Milan has always been a place of much commerce. It now carries on a vast trade, much increased since the opening of the Gothard railway, in raw silk, cotton, grain, rice, and cheese, and manufactures silks, velvets, gold, silver, and iron wares, railway carriages, tobacco, porcelain, electric-light apparatus, and is an active centre of the printing-trade. Milan is the chief financial and banking city of North Italy. Pop.



Milan Cathedral.

exterior is adorned with some 2000 statues in niches and a vast number of pinnacles. Other noticeable churches are St Ambrose, founded in 868, on the site of one dedicated by the saint himself in 387—it has early mosaics, an altar with clever goldsmith's work, and other antiquities; St Eustorgius, dedicated in 320, with interesting sepulchral monuments; St George, founded in 750 but greatly modernised, with pictures by Luini and Ferrari; St Maria delle Grazie (built 1463), on the walls of whose refectory is Leonardo da Vinci's 'Last Supper'; and St Maurice the Greater (1497-1506), adorned with paintings by Luini and his school. The principal secular building is the Brera Palace (12th century), formerly a Jesuit college, now the palace of arts and sciences, which shelters within its precincts a very valuable gallery of paintings by such masters as Raphael, Da Vinci, Luini, Mantegna, the Bellinis, Titian, Vandyck, &c., an academy of art, a collection of casts for modelling, the magnificent monument of Gaston de Foix, the national library (1770), archaeological museum, and observatory. In the famous Ambrosian Library (1609) there are collections of drawings, engravings, and pictures. The city is adorned with numerous palaces, as that of the archbishop (1570); the royal palace

(1911) 599,200; (1921) 718,800.

Milan (Lat. *Mediolanum*) was originally a town of the Insubrian Gauls. It was conquered by the Romans, 222 B.C., and under them became a conspicuous centre of wealth and civic influence; its citizens were noted for their refined manners and literary tastes, and the public buildings for their beauty and elegance. In the beginning of the 4th century it was selected as the residence of the imperial court by Maximian. It was sacked by the Huns (under Attila) in 452, by the Goths in 539, and passed to the Longobards (569), and to the Franks previous to its subjection by the German empire. Here several of the German emperors were crowned with the Iron Crown. The city was in the 11th century the head of the Lombard League of towns that opposed Frederick I., who twice besieged it, and once razed it to the ground. Nevertheless it continued to prosper, notwithstanding that it was distracted by the intestine feuds of the Guelphs and Ghibellines. Supreme power became eventually (from 1277) vested in the Ghibelline Visconti, who extended the ascendancy of Milan over the whole of Lombardy, and in 1395 bought from the emperor the title of duke. The successors of the Visconti in the lordship of Milan were the Sforzas (1450-1535). From 1555 to 1713

Milan submitted to the predominance of Spain, and from Spain passed to Austria. Under Bonaparte it was declared the capital of the Cisalpine Republic, of the Italian Republic, and, finally, of the kingdom of Italy. In 1815 Milan was restored to Austria, and continued the capital of the Lombardo-Venetian kingdom until the annexation of Lombardy to Piedmont in 1859 by the peace of Villafranca.—The province has an area of 1220 sq. m. and a pop. (1921) of over 1,900,000. See Histories by Rosmini (1820), Canù (1844), Cusani (1862-67), Bonfadini (1890), Holtzmann (1899), and Dorothy Muir (1924); also E. Hutton, *Milan and Lombardy* (1925). For the Milan Decrees, see CONTINENTAL SYSTEM.

Milazzo (anc. *Mylæ*), a fortified seaport of Sicily, on a promontory 21 miles W. of Messina. Off *Mylæ* in 260 B.C. the Romans won a great sea-fight over the Carthaginians; and here on 20th July 1860 Garibaldi, with 2500 men, defeated 7000 Neapolitans. Pop. 20,000.

Mildew (O. E. *meledæaw*, 'honey-dew,' confused with *meal*), a general name applied to numerous diseases of plants caused by or associated with the parasitism of certain fungi. Some of the most important are species of *Erysiphe*, and are common both on leaves and green stems of many Dicotyledons and a few Monocotyledons. The filaments of the fungus branch and spread over the epidermis of the plant, sending suckers every here and there into the cells. They multiply by the asexual formation of spores, and in most cases also from sexually produced fructifications. Among the common forms may be noted: *Erysiphe lamprocarpa* on Compositæ, Plantago, Verbascum, Labiatae; *E. graminis* on grasses; *E. Martii* on Umbelliferae and Leguminosæ; *E. communis* on Polygonum, Rumex, Convolvulus, Teasel, Ranunculus, &c.; *Oidium Tuckeri* on the vine; *Podosphaera Kunzei* on Prunus; *P. castagnei* on hops. These are all nearly related, but the mildew or rust of corn (*Puccinia graminis* or *Æcidium berberidis*), whose life is divided between barley and cereal, belongs to a distinct series. See FUNGI.

Mildura, an irrigation district on the Murray River, in the north-west of Victoria. Thanks to the success of irrigation, Mildura has rapidly become one of the chief fruit-growing centres in Australia. It produces oranges, lemons, grapes, also some wheat. Population of town, 5500.

Mile, a terrestrial measure of length, is derived from the Roman *milliare*, which contained 1000 paces (*mille passuum*) of 5 Roman feet each, the pace being the length of the two steps made by a pair of feet. The Roman foot being between 11·65 and 11·62 English inches, the Roman mile was thus less than the present English mile by from 142 to 144 yards. The length of the modern mile in different countries exhibits a remarkable diversity not satisfactorily accounted for. Before the time of Elizabeth, scientific writers made use of a mile of 5000 English feet, from the notion that this was the Roman mile, forgetting the difference in value between the English and Roman foot. The present statute mile was incidentally defined by an act passed in the thirty-fifth year of the reign of Elizabeth to be '8 furlongs of 40 perches of 16½ feet each'—i.e. 1760 yards of 3 feet each; and it has since retained this value. The *geographical* or *nautical mile* (see KNOT) is the sixtieth part of a degree of the equator (= 1·151 English statute mile), and is employed by the mariners of all nations; but in Germany the geographical mile denotes $\frac{1}{15}$ th part of a degree in the equator, or 4 nautical miles.

Milesians, another name for the Scots, the last of the prehistoric invaders of Ireland (q.v.);

from an assumed eponymous ancestor *Milesius*, whose name is a modification of *Miles*, a Latin translation of the Celtic *Gulam*. See also MILETUS.

Miletus, anciently the most flourishing city of Ionia, in Asia Minor, situated near the mouth of the Mæander, was famous for its woollen cloth and carpets, and its furniture, and for its extensive trade. Before being forcibly colonised by the Ionians (see IONIA) under Neleus, it appears to have been inhabited by Carians or by Leleges. Its people early founded nearly fourscore colonies on the Black Sea and in the Crimea—Abydos, Lamp-sacus, Cyzicus, Sinope, Amisus, Olbia, Panticapæum, &c.—sent merchant fleets to every part of the Mediterranean, and even into the Atlantic, and maintained an obstinate war with the early Lydian kings, until Croesus was at length acknowledged as their master. They were believed to be the purest representatives of the Ionians in Asia. After the conquest of Lydia by the elder Cyrus, Miletus submitted to Persia; but in 500 B.C. it was stirred up to rebellion against the Persians. Six years later Darius besieged the city, stormed it, plundered it, massacred most of its inhabitants, and banished the survivors to the mouth of the Tigris. Afterwards it was rebuilt, but never regained its former importance, although its people frustrated the attempt of the Athenians to compel their allegiance, and dared to resist Alexander till he stormed the city. It was a second-rate commercial town down to the time of Pliny, and was finally ruined by the Turks. Miletus was the birthplace of the philosophers Thales, Anaximander, and Anaximenes, and of the historians Cadmus and Hecataeus. See a history by Miss Dunham (1915).—Short tales, mostly in dialogue, and of a witty and obscene character, were greatly in vogue amongst the Greeks under the name of 'Milesian tales.'

Milfoil, a name applied to several kinds of plants as the Common Milfoil or Yarrow (*Achillea Millefolium*), the Hooded Milfoil (*Utricularia*), and the Water Milfoil (*Myriophyllum*). The first-named is invariably understood by the term when it is used without any qualifying adjective. The plant belongs to the Compositæ. It is one of the commonest of British plants, and is very abundant in Europe and Russian Asia, from the Mediterranean to the Arctic Circle, and extends over a great part of North America. The plant is medicinal, being mildly aromatic, tonic, and stimulant; and yields tannin, a bitter extractive, a volatile oil, and an acid called *achilleic acid*.

Milford, a town of Massachusetts, 36 miles W. by S. of Boston, with manufactures of boots and shoes, straw goods, and machinery; pop. 13,500.

Milford Haven, a seaport of South Wales, in the county of Pembroke, till 1918 a parliamentary borough of the Pembroke group, is pleasantly situated on the north side of Milford Haven, about 7 miles ENE. of St Ann's Head, and (by rail) 27½ miles W. of London. The town itself presents few features of interest; the Haven, which as a natural harbour is unequalled in area, complete shelter, and facility of entrance, being by far the greater attraction. Stretching inland some 10 miles, it varies in breadth from 1 to nearly 2 miles, and has a depth in most places of from 15 to 19 fathoms—even at low-water spring-tides there being a minimum depth of 8 fathoms. In 1485 the Earl of Richmond (afterwards Henry VII.) disembarked here from Brittany shortly before the battle of Bosworth. The history of the town proper is relatively short but varied. At present it is of considerable importance as the headquarters of a fleet of steam-trawlers, while fish-curing is largely carried on. New docks were

constructed towards the close of last century, but the trade of the port has not developed much, although proposals have been made from time to time to make it a terminus of transatlantic trade. Pop. 6400.

Milford Haven, MARQUESS OF. See **BATTENBERG**.

Military Law. See **MARTIAL LAW, COURT-MARTIAL, and MUTINY.**

Military Orders, religious associations whose members united in themselves the double characters of monk and knight. These orders arose about the period of the Crusades, the first to be formed being the Hospitallers (q.v.). Their primary duties were to tend sick pilgrims at Jerusalem, afterwards to protect them also on their way to the holy city. The order of the Templars (q.v.) soon followed; their purpose was to protect pilgrims, a duty to which was afterwards added that of guarding the Temple at Jerusalem. The orders of Alcántara, of Calatrava, and of Santiago of the Sword, in Spain, had for their immediate object the defence of their country and creed against the Moors. These orders, as well as that of St Bennet of Aviz in Portugal, which was instituted with a similar view, differed from the Templars and the Knights of St John (Hospitallers) in that their members were permitted to marry. The same privilege was enjoyed in the Savoyard order of Knights of St Maurice and the Bavarian order of St Hubert. On the contrary, the Teutonic Knights (q.v.), who had their origin in the Crusades, but afterwards made the south-east and east shores of the Baltic the theatre of their activity, were bound by an absolute vow of chastity. These religious associations have mostly been abolished or have fallen into disuse, though some still subsist as orders of knighthood.

Military Schools in connection with the British army are of three classes. First, the Royal Military School (Duke of York's) now at Dover, the Queen Victoria School at Dunblane, and the Royal Hibernian Military School at Shorncliffe, Kent, where the sons of soldiers receive a general education free of charge. Preference is given to orphans and to those whose parents are in straitened circumstances or have rendered meritorious service. Candidates must be likely to become fit for military life, and though there is no compulsion to enter the army on leaving the majority do so. The commandants of these establishments are officers of the army, and the indoor teaching is conducted by members of the Army Educational Corps. The Duke of York's School was founded in 1801; the Queen Victoria School, founded in 1905 as a memorial to the Scottish soldiers and sailors who fell in the South African war, was opened in 1909, and also admits the sons of sailors. To this class belonged also the Royal Hibernian School at Dublin, afterwards at Shorncliffe. It originated from the Hibernian Society of 1765, and was abolished in 1924. The second class comprises the Royal Military Academy, Woolwich, the Royal Military College, Sandhurst, and the Royal Army Medical College at Millbank, where cadets qualify for commissions under special instruction. The third class includes those establishments where officers, non-commissioned officers, or men, already in the service, receive technical instruction in various branches of military art—the Staff College at Camberley, the War Office School of Education at Shorncliffe, the School of Gunnery at Shoeburyness (the Artillery College), the School of Musketry at Hythe, the Army Veterinary School, the Royal Military School of Music at Kneller Hall, Hounslow, and many others. All are under officers of the army,

and, with very few exceptions, the instructors are also officers or sergeants. The Royal Military Academy at Woolwich is described at **ARTILLERY**.

The Royal Military College at Sandhurst, in Berkshire, 33 miles WSW. of London, was organised in 1858. Admission to Sandhurst is obtained by open competition at examinations. Successful candidates remain there normally for eighteen months, and, subject to passing the half-yearly examinations in various subjects, are then given commissions as second-lieutenants. At the Royal Army Medical College in London (superseding the Netley school) medical candidates already professionally qualified are given further instruction. Professors and assistant professors are mostly officers in the Royal Army Medical Corps. After examination the candidates are commissioned as surgeons in the army. Entrance to the Staff College at Camberley, near Sandhurst, is obtained by competitive examination. A service of at least five years is also required, and candidates must be under thirty-seven years of age, be captains or have passed the qualifying examination for that rank, and have been selected by their commanding officers as fit for the staff in physical qualifications, military knowledge, conduct, habits, and temper. At the School of Gunnery, Shoeburyness, officers and men of the Royal Artillery undergo a course of gunnery and artillery exercises; while at the Artillery College, Woolwich, officers are instructed in the manufacture of ordnance, &c. The School of Military Engineering, Chatham, is for the instruction of engineer officers and men in construction and estimating, practical fortification, surveying, submarine and military mining, and other subjects. Young officers on appointment from the Royal Military Academy remain under instruction and on probation at this school for two years. For officers of other branches of the service there are classes for instruction in field-works and surveying; for cavalry soldiers, a 'cavalry pioneers' course. For the Royal Military School of Music, Kneller Hall, see **BAND**. At the School of Gymnastic Instruction, Aldershot, officers qualify for the appointment of superintendent of gymnasiums, and non-commissioned officers or men for that of gymnastic-instructor. Within recent years, especially since the Great War, the system of officers' training corps has been developed, branches being attached to the universities and some of the public schools.

In India there is a Staff College at Quetta founded on the lines of Camberley. In Canada there is a Royal Military College at Kingston (1876), which offers commissions of all arms; and a similar one at Sydney will perform equivalent services for Australia. A South African Military School is situated at Roberts Heights.

Army Schools (see section thereon under **ARMY**) are provided for the general education of soldiers and their children; and 'garrison classes' under specially qualified staff-officers, generally graduates of the Staff College, for the technical instruction of officers studying for the examinations which they must pass before promotion to the ranks of captain and major.

For the United States Military Academy, see **WEST POINT**.

Militia is the name sometimes given to the troops of the second line of a national army. Though at first intended for home defence only, those troops are freely used to reinforce the regular army if the exigencies of the campaign require it. In several respects the militia of Great Britain, as it existed until 1908, differed from that of other European nations. It could only be sent out of the country if it volunteered and with the consent of parliament, and with few exceptions the men composing it had never served in the regular army.

It was a constitutional force raised under the sanction of parliament for the defence of the country against invasion. Organised by counties and cities, it was essentially a local force. In Anglo-Saxon times all men were required to bear arms as a sort of body-rent for the land they held, but it was Alfred who first organised the *fyrð* or general levy, making land the basis of numbers, and the family system that of discipline; so many families were a tything, ten tythings a hundred, and hundreds were united into county powers, each under its *heretoga*, dux, or duke. Each section of the community had not only to furnish its quota in time of war, but also to provide arms, keep them in repair, and train its men for so many days every year. After the Conquest the feudal troops deprived the general levy of its former importance; but it never ceased wholly to exist, and when the crown began to contend with the Norman barons it naturally found its most powerful instrument in the old *fyrð*. Henry II. established 'an assize of arms,' at which every holder of land was bound to produce one or more men, fully equipped and capable of fighting in the national defence. This annual assembly of the *fyrð* or general levy is first recorded after the Conquest in 1181, but it gradually fell into decay. In the years of the Armada the old shire levies, under the name of Trained Bands or Militia, as they now first came to be called, began to show signs of a more permanent organisation, though they still remained deficient both in discipline and drill. During the Civil War the trained bands for the most part sided with the parliament. After the Restoration the loyal parliament of Charles II. declared the disposition of the militia to be the undoubted right of his majesty, but as the crown now largely depended upon a mercenary army, the militia was much neglected until 1757, when, a large portion of the regular army being absent in the Seven Years' War, it was carefully organised for the defence of the kingdom. Important militia acts were passed in 1786, 1802, 1852, and 1882. In 1871 the control of the militia was transferred to the War Office from the lords-lieutenant, who still recommended for commissions. When in 1876 the United Kingdom was divided into 69 infantry regimental districts, each had its territorial regiment, consisting generally of two line battalions and two to nine militia battalions, besides the regimental depot, volunteer battalions, and the men in the Army Reserve and Militia Reserve. The latter were militiamen who, by taking a double bounty (£2) at the end of each training, rendered themselves liable in time of emergency to be drafted into the regular army. The Militia Reserve was established in 1867; enlistment for it ceased in 1901. The 'quota' or number of militiamen to be provided by each territorial district was fixed by government in proportion to the number of battalions in each such district. These numbers were to be raised by voluntary recruitment, serve six years, and might re-enlist for six more; but should volunteering fail, a levy by ballot would be made upon all the inhabitants of the locality between the ages of eighteen and thirty to serve five years. The power of making this ballot always existed, and would have by law to be enforced but for the annual Militia Ballot Suspension Act. Many classes were exempt from the ballot, as peers, volunteers, yeomanry, resident members of universities, clergymen, parish schoolmasters, articled clerks, apprentices, crown employés, and 'poor men' with children. From the year 1871 onwards many steps were taken to increase the efficiency of the militia and assimilate its position to that of the regular army. Large barracks were built at the headquarters of regimental districts, and camps

constantly formed; the officers were frequently employed with regular troops, both infantry and artillery; and recruits were trained under regular officers at district headquarters. The general status of the force was fixed by an act of 1882. Recruitment was for six months; annual training for not less than twenty-one days, with a possible extension to fifty-six days. The period of service was for six years, with re-engagement for the same period. The area of service was limited to the United Kingdom. When out for training or embodied, officers and men received the same pay as regular troops of corresponding arms of the service, and were subject to military law. Officers were at all times so subject; they ranked with, but were junior to, those of the regular army. Broadly speaking, the force might be embodied in any national emergency, and its services in this respect were frequently called for. Part or whole was called out from 1757 to 1763, from 1778 to 1783, from 1792 to 1803, and in 1815. Several battalions served in the Peninsula, and won high praise from the Duke of Wellington. During the Crimean War of 1854-56 the force was embodied, and provided garrisons for Malta and Gibraltar. It was embodied again during the Indian Mutiny of 1857-59, partially in 1885, and finally in 1899 for the South African War.

This war brought up once more the question of the relation of the militia to the regular army and its place in the scheme of national defence. The problem was solved in 1907-8 by the transformation of the force into the Special Reserve (see RESERVE). Hitherto it had been called on to give annually some 12,000 recruits in time of peace to the line, and then in time of war (as in 1899) invited to serve abroad with depleted battalions. Not only was it deficient in strength, but without organisation for war; and the Royal Commission of 1904 had declared that, by no fault of its own, it was unfit to take the field for the defence of the country. It was inevitable, therefore, that it should be drastically dealt with in any scheme of reconstruction. The policy which Mr Haldane (Lord Haldane) ultimately adopted was to abolish its existing constitution and use its substance to form a true reserve to the regular army. Thus, after the annual training of 1908, the old constitutional force, with its splendid record of patriotic service, ceased to exist either in name or in fact. At this time it consisted of 124 infantry battalions, 32 corps of garrison artillery, 3 field battalions, and 2 engineer corps. Its true descendant must be looked for in the Territorial Force (see VOLUNTEERS, &c.). Of the 124 battalions of infantry, 23 were disbanded, and the remaining 101 were converted into units of the Special Reserve—74 of these serving at the regimental depôts, and 27 being made extra-reserve battalions. The Royal Garrison Artillery Militia, except certain Irish corps, was converted into the Royal Reserve Artillery, and the engineer corps into reserve, siege, and railway companies, and the Royal Army Medical Corps Militia was disbanded. Then two Irish regiments of Imperial Yeomanry were at the same time re-formed into Special Reserve units. The new units for the most part corresponded territorially with the old militia units, and their substance was at first largely composed of transferred militiamen, the remainder being men directly enlisted under Part III. of the Territorial and Reserve Forces Act. The name Militia was restored to the Special Reserve in 1921.

The celebrated local militia was the former general levy; it was instituted in 1808, and suspended but not abolished in 1816. It consisted of a force for each county six times as numerous as the regular militia quota. The men were drawn

by ballot from those between the ages of eighteen and thirty, served four years, and were not paid bounties or allowed to find substitutes. The counties were liable to a fine of £15 for every man short of the quota. These troops could only be marched beyond their respective counties in the event of actual invasion, but were liable to be called out in case of rebellion. Their numbers reached in 1811 to 213,000 men.

The militia of Scotland was not organised until 1797, and in 1802 it was brought under the same rules as the English militia. The Irish militia (Protestants from sixteen to sixty) dated from 1715, and in 1809 was organised like the English force. The Channel Islands militia dates from 1201. Canada and other British oversea dominions and colonies have many of them a militia force. The militia of the United States is not a federal or national force unless when called into the national service; nominally it is a state organisation. See ARMY, LANDWEHR, and the articles on the several countries.

Miliukov, PAUL NIKOLAEVICH, Russian politician and historian, born in 1859, studied and afterwards lectured at Moscow, but dismissed in 1904 for his political leanings went abroad, lecturing in the United States. As political editor of the *Rech*, he took a leading part in forming the Constitutional Democratic party. At the revolution he was foreign minister under Prince Lvov, and on the seizure of power by the Bolsheviks escaped to Kiev and became editor of a journal in Paris. He has proved himself an able historian.

Milk is an opaque white fluid secreted by the mammary glands of the females of the class Mammalia, after they have brought forth their young, and during the period in which their offspring are too immature to live upon ordinary food. It is devoid of odour, except for a short time after its extraction; is of a slightly sweet taste, most commonly of a slightly alkaline reaction (except in the Carnivora, in which it is acid); and its average specific gravity (in the case of human milk) is 1.032.

When examined under the microscope milk is found to consist of numberless transparent globules, of very minute size, floating in a clear, colourless fluid, the milk plasma. These globules are composed of fat, and when milk has stood for some time the larger globules rise to the surface and form a layer of *cream*, which is therefore rich in fat and poor in other nutritive substances (presently to be described) that are found in the milk plasma. If the cream be agitated in a churn the surface tension, which keeps the fat in globular form, is overcome, and the fat runs together to form Butter (q.v.). The casein which exists in solution in the plasma is an albuminous substance combined with calcium phosphate. This calcium phosphate is necessary for its solution, and if its union with the albumen be interfered with, as by the addition of an acid, the casein separates out in microscopic filaments which interlace, enclosing the milk globules, and forming a more or less solid clot. If milk be allowed to remain in an open vessel in warm weather, a few hours will produce this result; the casein clots in little masses, and we say 'the milk has turned.' It is acid or sour to the taste, and contains micro-organisms (*Bacterium lacticum*), by whose agency these changes are brought about. These little microbes have the power of converting the milk sugar into lactic acid, which in its turn coagulates the casein. These microbes do not exist in milk freshly passed from the mammary glands; they must find their way into the milk, where they rapidly multiply; and, as their germs are very freely distributed, this occurs sooner or later. The dairy-keeper, by efficient ventilation and scrupulous clean-

liness, endeavours to keep his dairy and his milk as free from these organisms as possible, and the careful nurse scalds out the infant's bottle in order that they may not multiply, as they will readily do, in any stale milk, rapidly infecting the fresh milk each time the bottle is used. The casein is not only clotted by acids, but a secretion of the stomach called rennet has a similar action, and a preparation of this, made from the stomach of calves, is used in cheese-making. This clotting occurs in the stomach when we drink milk, and this is one reason why milk may disagree: in order to render it more digestible it may be 'sipped' or it may be taken with lime-water, for in this way the formation of large clots within the stomach may be avoided. In Cheese (q.v.) formed after the addition of rennet we have a rich supply of nitrogenous matter (casein) together with fatty matter derived from the milk globules held fast in the curd.

Milk contains a sugar—milk sugar—in solution, and in addition a rather large proportion of inorganic salts. It contains all that a child requires for the growth and nourishment of the body, and is manufactured at great expenditure of the mother's strength if continued beyond the normal lactation period of 7 to 9 months. The first milk that flows from the breast at the beginning of a lactation period is termed the *colostrum*, and is rich in casein and albumin. The colostrum has an aperient effect. After a few days the secretion becomes thoroughly established. In a healthy, well-fed woman this continues for some months, after which time the drain upon the energy of the mother's body renders the milk poorer and less nutritious. The milk contains the salts, chiefly of lime, from which the infant builds its skeleton. It is well known that many medicines taken by the mother are excreted in the milk; much nonsense is, however, believed in regarding the fatal and sudden injury done to children as a result of severe mental excitement on the part of the wet-nurse. See INFANT (FEEDING OF), BREASTS.

The following table gives the average percentage composition of human milk and that of various domesticated animals:

	Water.	Fat.	Milk Sugar.	Casein.	Albumin.	Ash.
Woman.....	88.2	3.3	6.8	1.0	.5	.2
Cow	87.4	3.7	4.65	3.0	.5	.75
Mare.....	89.8	1.17	6.89	1.70	.14	.3
Ass.....	90.12	1.26	6.5	1.32	.34	.46
Goat.....	86.04	4.63	4.22	3.49	.86	.76
Elve.....	79.46	8.63	4.23	5.23	1.45	.95
Bitch.....	75.47	9.57	3.08	6.10	5.05	.73

Disease is very frequently transmitted by milk, not only from using contaminated water for washing the milk cans and for adulterating it, but also from the cow itself (see TYPHOID FEVER, SCARLATINA). It is not improbable that many obscure tubercular conditions are thus acquired by children.

Condensed milk is generally prepared from that of the cow, sweetened by the addition of ordinary cane sugar, and evaporated to about $\frac{1}{3}$ of its bulk. While hot it is poured into tins and sealed up. When used for food the milk may be diluted with six or seven times its volume of water, but in the case of infants the dilution must be more liberal. It is, however, never advisable to make use of condensed milk for the feeding of infants.

Milk is frequently adulterated, chiefly with water (see ADULTERATION). In this case a given volume of milk will contain an abnormally small number of fat globules. As these fat globules are the cause of the opacity of milk, a thin layer of milk will, if adulterated, be less opaque than a similar layer of unadulterated milk. At Lactometer (q.v.) is described the apparatus for testing the opacity and consequent dilution of milk. Unskimmed milk should yield in standing 12 to 24

parts per cent. of cream, and its specific gravity should be 1.028 to 1.034. Skimmed milk is heavier—1.032 to 1.040. In order to avoid the adulteration of milk a standard has been adopted by Government which requires that whole milk should contain not less than 3 per cent. of fat and 8.5 per cent. of other solids. See DAIRY, and for substitutes COW-TREE, SOYA.

Milk-fever. The establishment of the secretion of milk about two days after delivery is occasionally the cause of considerable constitutional disturbance, with all the symptoms of the feverish state. This occurs especially when the infant is not applied soon enough to the breast, and especially when the mother is kept on too low a diet; a fact which probably explains the much greater frequency of the condition in former times, when such treatment was considered necessary. The disturbance of health is not serious, and passes off when the breasts are emptied.

In the lower animals, also, milk-fever comes on within a few days after parturition. One variety, common to most animals, consists in inflammation of the membranes of the womb and bowels, and is produced by exposure to cold, overdriving, or injury during labour; it is best treated with oil and laudanum, tincture of aconite, fomentations to the belly, and antiseptics such as carbolic acid (largely diluted) injected into the womb itself. The other variety, to which alone the term 'milk-fever' is usually applied, is almost peculiar to the cow. This disease, though designated a 'fever,' is accompanied by a sub-normal temperature. It attacks animals in high condition, that are good milkers, and have already borne several calves, and consists in congestion of the brain and large nervous centres, and impairs all the vital functions, leading to dullness, loss of sensation, stupor, and complete unconsciousness. The treatment consists in giving the animal attacked 1 oz. chloral hydrate with 8 lb. treacle, repeating half the dose in half-an-hour if there is no motion of the bowels. As the treatment produces intense thirst, large quantities of water must be given to the cow. Preventive measures consist in giving the cow laxative foods before and after calving, in drawing small amounts of milk at frequent intervals, never completely emptying the udder during the first three days. The disease is particularly prevalent in dairies where the practice of removing the calf from the cow immediately after birth is followed. The above method of milking during the first few days follows the natural method of the calf in sucking.

Milk-tree. See COW-TREE, SAPOTACEÆ.

Milk-weed. See ASCLEPIAS.

Milkworts are various species of plants of the order Polygalææ or Polygalacææ. The order comprises about 10 genera and 700 species, which are widely distributed over the tropical and sub-tropical parts of the world; several species are natives of North America and of Europe. They are herbaceous plants or shrubby, occasionally in the latter case being of climbing habit. The leaves are usually simple and destitute of stipules; the flowers are irregular. Their qualities are generally tonic and slightly acid; and some are very astringent.—The Common Milkwort (*Polygala vulgaris*) is a small perennial plant, growing in dry hilly pastures, with an ascending stem, linear-lanceolate leaves, and a terminal raceme of small but very beautiful flowers, having a finely-crested keel. It varies considerably in size, in the size and even shape of the leaves, and in the size and colour of the flowers, which are sometimes of a most brilliant blue, sometimes purple, pink, or white.—*P. Senega* is a North American species, with erect

simple tufted stems, about one foot high, and terminal racemes of small white flowers. The root, which is woody, branched, contorted, and about half an inch in diameter, is the Senega Root, Seneka Root, or Snake Root of the United States, famous as an imaginary cure for snake-bites, but really possessing important medicinal virtues—stimulating, diuretic, diaphoretic, emmenagogue, and in large doses emetic and purgative—employed in catarrhs, pulmonary affections, rheumatism, low fevers, &c. Its chief active principle is Polygalic Acid, $C_{22}H_{18}O_{11}$. The root of *P. Senega* has been employed as a cure for snake-bites by the American Indians from time immemorial, and it is a curious fact that *P. crotalariaoides* is employed in the same way in the Himalayas. *P. vulgaris* is tonic, stimulant, and diaphoretic; and *P. amara*, a very similar European species, possesses the same properties in a higher degree, as does



Common Milkwort
(*Polygala vulgaris*).

P. rubella, a small North American species. The root of *P. angulata*, a Brazilian species, with leathery leaves, is an active emetic, and in a fresh state is employed in bilious fevers. *P. tinctoria*, a native of Arabia, furnishes a blue dye like indigo. *P. venenosa* is by the natives of Java dreaded on account of its noxious heavy odour, which they say causes severe headache and violent sneezing. Rhatany (q.v.) Root was placed in this order by Benthams and Hooker. The bark of the roots of *Monnina polystachya* and *M. salicifolia* is used in Peru as a substitute for soap; and *Mundtia pinosa*, a South African shrub, produces an eatable fruit.

Milky-way. See GALAXY.

Mill. This word is now used in a general way as a name for almost all kinds of manufactories, as well as for machines used for grinding; but in this article we shall describe only a flour-mill. For other mills, see SPINNING, WEAVING, COTTON, FLAX, WOOL, &c.

From time immemorial, until comparatively recent times, wheat was always ground between two stones. At first hand-mills were used such as are still met with amongst uncivilised peoples (see QUERN); but the mill subsequently passed through many mechanical developments up to large merchant mills, some of which contained upwards of 100 pairs of great millstones. These were made of 'buhr,' a very hard silicate, the best stones coming from the valley of the Seine. The millstones were circular, usually about four feet in diameter, formed of wedged-shaped pieces strongly cemented together, and bound by iron hoops. The surfaces were cut into a series of radiating ridges and furrows, by which means the wheat was pushed from the centre to the circumference of the stones, as well as broken between the edges of the ridges. Great care had to be taken that the surfaces of the

two stones were perfectly level and perfectly parallel to each other. Only the upper stone or runner revolved, the lower or bedstone being fixed. The first successful steam flour-mill was erected in London in 1784.

Iron rollers in place of millstones were first practically tried at the roller mill in Pest, founded in 1840 by the patriot Count Szechenyi. This new system, called the high grinding or gradual reduction roller system, ultimately spread throughout Hungary, and made Budapest for many years the greatest flour-milling centre in the world. By 1875 this system had been adopted by the millers of the north-western states of America; and it enabled them to outstrip their teachers: Minneapolis is now the largest flour-milling centre in the world. Since 1880 this system has been universally adopted. The great advantage of rollers over millstones is found to be that the former avoid the rasping of the outside of the wheat berry which was inseparable from millstones, and produced a small quantity of very dark powder which necessarily mixed with the flour and greatly deteriorated its colour.

The following is a description of the different processes which together form the high-grinding or gradual reduction system of flour-milling. (1) The wheat is cleaned by means of sifting, winnowing, and being put through a cylinder of wire-cloth, with rapidly revolving arms inside, which combines the actions of sifting and polishing the wheat. A machine furnished with hard brushes may be employed to scrub the wheat; which is often also cleaned by washing, and is subsequently dried by passing through hot air. (2) The cleaned wheat is sent to grooved chilled-iron rollers (see fig. 1), and slightly broken between them; the product is sifted by means of cylinders covered with wire-cloth or silk-gauze, by which means a proportion of flour is separated, mixed with a substance composed of small pieces of the floury part of the wheat berry, and called usually 'middlings,' sometimes 'semolina.' The pieces of broken wheat are sent to other rollers to be again broken, and the product sifted as before. This process is repeated from four to seven times, according to the ideas of the miller and the nature of the wheat, until, as far as possible, all the floury part has been scraped from the husk or 'bran,' which is sold for fodder.

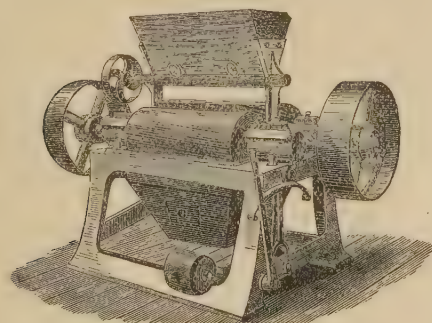


Fig. 1.—Roller Mill.

We are thus left with the mixture of flour and 'middlings' from the four to seven breaking processes. The products from the different breaking processes are generally mixed together and then sifted as before described, in order to separate the flour which is then ready for use from the 'middlings,' which are then put through the process called 'purification.' It may here be mentioned that the making of a large quantity of 'middlings' is the principal difference between the former

'low-grinding' and the present 'high-grinding' system, and is the chief advantage of the latter. By the former process it was sought to reduce the wheat at one grinding as far as possible into flour and bran: it was, however, found to be impossible to keep the two separate, a portion of finely-powdered bran being inevitably mixed with the flour, greatly to the detriment of the latter. By high-grinding the floury part is reduced in the first instance principally to a granular state, and, though bran particles are mixed with the flour granules, they may be almost entirely separated, owing to the difference in their specific gravity, by means of this process of purification. (3) The size of the granules of the middlings varies from that of fine sand to that of a pin's head. The middlings are therefore first separated by sifting into as many sizes as may be thought desirable, and each size is sent to one or more machines called middlings purifiers. These are of two types, called gravity and sieve purifiers. In the first type, which is generally used for the large sizes of middlings, the material is directly acted on by a draught of air. The machine usually takes the form of a series of sloping boards or of revolving discs, by either of which devices the middlings are caused to fall repeatedly in a thin even stream through a current of air produced by a revolving fan. As the specific gravity of the flour granules is greater than that of the bran particles, it is obvious that the current of air may be so regulated as to carry away the particles of bran, leaving the flour granules to fall to the bottom of the machine.

The sieve purifier generally takes the form of an oblong box, or case, of wood; occupying the centre plane of this case a sieve formed of silk-gauze is supported on springs, and is made to oscillate by means of a crank. A revolving fan is placed at the top of the machine, which draws air through the meshes of the sieve, the current of air being so regulated that the branny particles are either carried away by the draught to a suitable receptacle or are kept suspended on the top of the sieve until they are carried over the end of it, while the heavier flour granules fall through the sieve. This type of machine is always used for the smaller sizes of middlings. It is the dust drawn from these machines by the fans that, when mixed in a certain proportion with air and accidentally ignited, has caused several very serious explosions in flour-mills. The middlings, after being thoroughly cleaned (by repetition of the process when necessary), are ground between smooth chilled-iron rollers and the product sifted; the flour thus produced is of fine quality, and is usually called 'patent' flour.

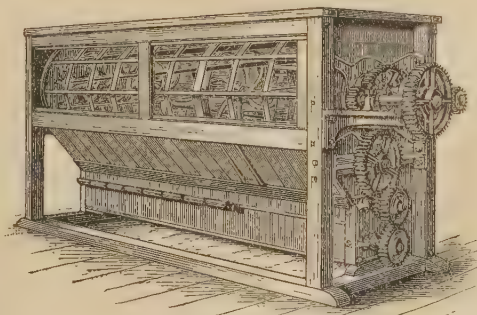


Fig. 2.—Centrifugal Dressing Reel.

Fig. 2 represents one type of cylinder used for sifting (technically, dressing) the products in flour manufacture. These cylinders are of two

kinds, the ordinary reel or cylinder being a frame-work covered round with wire-cloth or silk-gauze and made to rotate, thus setting in motion the enclosed material. The other type is called a centrifugal dressing machine (see fig. 2). In this machine, in addition to the rotating cylinder, there is a frame with long pieces of wood or iron attached, made to revolve independently inside the cylinder. By this means the material is thrown against the circumference of the cylinder, so that a much smaller surface is required than in the ordinary reel to do the same amount of work. The 'Plansichter,' introduced in Budapest in 1888, which, as its name implies, is a horizontal sieve, has a special contrivance for keeping the material in motion and the meshes clear. This machine, with or without modifications, is now largely used in place of cylinders. Almost all modern mills are constructed on what is termed the automatic system, which means that all the conveyance of the material from one point in the mill to another is done by mechanical means; so that of the great bulk of the flour it may be said that it is never stopped or touched on its journey from the time it leaves the wheat sack until it reaches the flour sack. The conveyer generally used to move material in a horizontal direction is a helical screw (sometimes called an Archimedean screw); and to lift to a higher level an elevator is used.

In recent years certain chemical processes have been in use in some mills. One process for bleaching the flour is to pass the flour through air containing a small proportion of dioxide of nitrogen gas, generated either by chemical reaction or by passing the air through an electric flame. Another process is to mix a small quantity, not more than .3 per cent., of phosphate of lime with the flour; this improves what is called 'strength' in flour, i.e. the power when made into dough of rising under the action of a ferment.

Mill (Lat. *mille*, 'a thousand'), in the United States, is the tenth part of a cent, the thousandth part of a dollar. As a coin it has no existence.

MILL, JAMES, was the son of a shoemaker, and was born in Logie-Pert parish, near Montrose, Scotland, 6th April 1773. He studied, with a view to the church, at the university of Edinburgh, where he distinguished himself in Greek and in Moral and Metaphysical Philosophy. He was licensed to preach in 1798; but instead of following out the ministry, he went to London in 1802, where he settled as a literary man. He became editor of the *Literary Journal*, which after a time was discontinued; and wrote for various periodicals, including the *Eclectic* and the *Edinburgh Review*. In 1806 he commenced his *History of British India*, which he carried on along with other literary work, and published in the winter of 1817-18. The impression produced by this masterly history on the Indian authorities was such, that, in 1819, the Court of Directors of the Company appointed him to the high post of Assistant-examiner of Indian Correspondence, notwithstanding the then unpopularity of his well-known radical opinions. The business assigned to his care was the revenue department, which he continued to superintend till four years before his death, when he was appointed head of the examiner's office, where he had the control of all the departments of Indian administration—political, judicial, and financial—managed by the Secret Committee of the Court of Directors. Shortly after his appointment to the India House, he contributed the articles on Government, Education, Jurisprudence, Law of Nations, Liberty of the Press, Colonies, and Prison Discipline to the *Encyclopædia Britannica*. These essays were reprinted in a separate form, and became widely known. The powers of analysis, of

clear statement, and of the thorough-going application of principles, exhibited in these articles, had probably never before been brought to bear on that class of subjects. In 1821-22 he published his *Elements of Political Economy*, a work prepared primarily with a view to the education of his eldest son, John Stuart Mill. In 1829 his *Analysis of the Human Mind* appeared. His last published book was the *Fragment on Mackintosh*, brought out in 1835. He was also a contributor to the *Westminster Review* and to the *London Review*, which merged in the *London and Westminster*.

Not long after he settled in London, he made the acquaintance of Jeremy Bentham, and for a number of years lived during the summer in Bentham's country-house. Although he must have derived much benefit from his intercourse with the great law-reformer, he was not a mere disciple of Bentham, but a man of profound and original thought, as well as of great reading, in all the departments of moral, mental, and political philosophy. His conversation was impressive to a remarkable degree, and he gave a powerful intellectual stimulus to a number of young men, some of whom (including his own son, and Grote, the historian of Greece) afterwards rose to eminence. He took a leading part in the founding of University College, London. He died at Kensington, 23d June 1836.

See the Autobiography of J. S. Mill; Bain, *James Mill* (1882); Leslie Stephen, *English Utilitarians* (1900).

MILL, JOHN STUART, the eldest son of James Mill, was born in London on 20th May 1806. He was educated by his father, by whom he was subjected from his earliest years to a careful and systematic training, which was to fit him to carry on the work and champion the opinions with which the elder Mill was identified. Almost from infancy his intellect was on the strain. He is said to have begun Greek at the age of three, and before he was fourteen he had read extensively in Greek, Latin, mathematics, and English, had begun logic and political economy, and already possessed the intellectual acquirements of a well-educated man. But he was secluded from companions of his own age. As he himself says, he 'never was a boy.' His nearest approach to recreation was the long walks—in reality peripatetic oral examinations—for which he was regularly taken by his father. In 1820 he went to France on a visit to the family of Sir S. Bentham (Jeremy Bentham's brother), and was thus removed for more than a year from his father's immediate influence. His studies were never intermitted. His residence in France not only gave him a keen interest in French politics and social conditions, but stimulated his botanical enthusiasm, and the love for scenery and travel, which became the chief relaxations of his arduous life. After his return home he worked at history and law, and read the English and French philosophers. His first published writings appeared in the *Traveller* newspaper in 1822. In the following year a career was secured for him by an appointment under his father at the India Office, from which he retired as head of his department in 1858, on the transfer of the Company's government to the crown. At the same time he declined a seat in the new India Council offered to him by Lord Derby. During the years 1823-26 he was a member of a small Utilitarian society which met for the purpose of discussion at Jeremy Bentham's house. The name 'Utilitarian' was suggested by an expression in one of Galt's novels, and seized upon by him 'with a boy's fondness for a name and a banner,' to describe himself and others of like opinions. In the Speculative Society, which was founded in 1825, and of which he remained a member till 1829, he met men of a greater variety

of creeds, and formed an intimate friendship with Maurice and Sterling, Liberals of a different type from those he had met at his father's house, and influenced by Coleridge, not by Bentham.

Before he was twenty, Mill was recognised as the champion and future leader of what may be called the Utilitarian School in philosophy and politics, and had become the most frequent contributor to the newly-established organ of the party, the *Westminster Review*. But the 'mental crisis' through which he passed at this time (1826-27) led to a modification of his attitude. Bentham's *Treatise on Legislation*, which he had read four or five years before, formed the keystone of his previous position. It gave him 'a creed, a doctrine, a philosophy; in one among the best senses of the word, a religion; the inculcation and diffusion of which could be made the principal outward purpose of a life.' The crisis under which his enthusiasm for his old creed and opinions broke down was attributed by himself not merely to a dull state of nerves, but to the purely intellectual education which weakened his sympathies at the same time as it taught him to analyse and trace them to their origin. He ultimately emerged from the state of depression by discovering that feeling was not dead within him. The experiences of this period left, he tells us, two very marked effects on his opinions and character. In the first place, they led him to a new theory of life in relation to happiness. The conviction was forced upon him that happiness—although the test of all rules of conduct and the end of life—was only to be obtained by not making it the direct end, but by having one's mind fixed on some such ideal end as the improvement of mankind, or even some art or pursuit. His 'mental crisis' further led him to see the necessity for human well-being of the internal culture of the individual. He ceased to attach almost exclusive importance to the ordering of outward circumstances, and to the forced training of the human being for thought and action. And soon after this time he found in Wordsworth's poems 'the very culture of the feelings' he was in quest of.

The wider appreciation of speculation and literature brought about by this new attitude may be seen in his reviews of Tennyson's poems (1835), and of Carlyle's *French Revolution* (1837), as well as in his article on Coleridge (1840). His article on Bentham (1838) made clear the extent of his divergence from his inherited creed, and gave rise to the 'admiration mixed with fear' with which Grote and others of the school regarded him. In this article can be traced the lines along which, in his subsequent writings, he modified the traditional creed of Bentham and James Mill. Perhaps the reaction from Benthamism would have gone further had it not been for the friendship with Mrs John Taylor (whom he first met in 1830, and whom he married in 1851), which formed the romance of his life. It is indeed hardly possible to estimate her influence so highly as Mill did himself. All his leading opinions were formed before he made her acquaintance, and some of his most important works were completed without her assistance. But she did exert great influence on the expression of his views, and apparently had a steadying effect on his philosophical position.

Mill never forsook, though he modified, the leading principles of the philosophy in which he was educated. He held that knowledge could be analysed into impressions of sense, and that the principle of association was the great constructive force which combined these sensations and their copies, or ideas, into systems of thought, modes of feeling, and habits of acting. His *System of Logic* (1843)—perhaps the most original and important of his works—traces, and gives a

rationale of, the way in which the real, disjointedly given in sensation, is combined into scientific knowledge. Its treatment of the methods of inductive science—in which it owes much to Herschel, Whewell, and Comte—has become classical. His *Examination of Sir W. Hamilton's Philosophy* (1865), and edition of James Mill's *Analysis of the Phenomena of the Human Mind* (1869), contain a polemical defence and exposition of the association-psychology, notable for their clear recognition of the mental elements which that psychology assumes without explanation. His essay on *Utilitarianism* (1861) defends the greatest-happiness theory, but suggests modifications inconsistent with it (see the article ETHICS). He held that government was to be purified and made into a utilitarian instrument by means of representative institutions; but he had less confidence than Bentham and his father had in the effect of reason and argument upon men, disapproved of an equal suffrage, distrusted the ballot, and argued eloquently for individual liberty of thought and action against the tyranny of the majority (*Considerations on Representative Government*, 1861; *Thoughts on Parliamentary Reform*, 1859; *On Liberty*, 1859). His *Principles of Political Economy* (1848) is a systematic treatise, which does not depart in its main teaching from the theory laid down in abstract fashion by Ricardo; but it recognises more clearly the hypothetical character of this theory, and it discusses the social applications of economic doctrines. Mill was M.P. for Westminster from 1865 to 1868. In parliament he voted with the advanced Radical party; and his advocacy of women's suffrage in the debates on the Reform Bill of 1867 led to an active movement for placing the legal and political rights of women on an equality with those of men. Mill died at Avignon, 8th May 1873, and was buried in the cemetery there.

In addition to the works already mentioned, Mill was the author of *Essays on some unsettled Questions of Political Economy* (1844), *Auguste Comte and Positivism* (1865), *England and Ireland* (1868), *Subjection of Women* (1869). After his death were published *Autobiography* (1873; complete edition 1925), and *Three Essays on Religion* (1874). His more important occasional writings are collected in four volumes of *Dissertations and Discussions* (1859-75). For his life and opinions, see biographies by A. Bain (1882) and W. L. Courtney (1889), and a study by C. M. Douglas (1895).

MILL, JOHN, a New Testament critic, was born about 1645, at Shap in Westmorland, entered Queen's College, Oxford, as servitor in 1661, and was successively fellow and tutor of his college, rector of Blechington in Oxfordshire (1681), principal of St Edmund's Hall (1685), and prebendary of Canterbury (1704). He died 23d June 1707, just fourteen days after the publication of his great *Novum Testamentum Græcum*, with its thirty thousand various readings, the labour of thirty years.

Millais, SIR JOHN EVERETT, P.R.A., painter, was born at Southampton, 8th June 1829, the descendant of an ancient Jersey family. In the winter of 1838-39 Millais began to attend the drawing academy of Henry Sass, passing, two years later, into the schools of the Royal Academy. At the age of seventeen he exhibited at the Royal Academy his 'Pizarro seizing the Inca of Peru,' ranked by competent critics of the day as on a level with the best historical subjects then shown. Till now his work had been upon the lines of art generally current in England at the time; but there followed a phase of revolt from accepted standards, a period of search for new paths. He became associated with the knot of young artists known as the Pre-Raphaelite Brotherhood, of whom the other chiefs were Dante Gabriel Rossetti and Holman Hunt; and undoubtedly he was.

markedly influenced by the powerful personalities of both of these men, and by Mr Ruskin their literary ally. From them, in particular, his art received an impetus towards imagination and symbolism, which—as has been proved by the curious absence of such qualities from his later and more independent productions—were to a great extent foreign to his native genius. His marvellous technical skill enabled him to embody in visible artistic form conceptions that were essentially those of others with far greater adequacy than their own less trained hands could possibly have done. His first Pre-Raphaelite picture, a scene from the *Isabella* of Keats, strongly recalling the manner of the early Flemish and Italian masters, figured in the Academy in 1849, where it was followed in 1850 by the striking 'Christ in the House of his Parents,' known as 'The Carpenter's Shop,' in 1851 by 'The Woodman's Daughter,' in 1852 by 'The Huguenot' and 'Ophelia,' and in 1853 by 'The Order of Release' and 'The Proscribed Royalist.'

In 1856 he was elected an Associate of the Royal Academy, and soon afterwards he exhibited three of the richest and most poetic of the productions of his Pre-Raphaelite period—the 'Autumn Leaves' in 1856, the 'Sir Isumbras at the Ford' in 1857, and 'The Vale of Rest' in 1859. In the finer of the works which followed, such as 'Charlie is my Darling' (1864)—the year in which the painter received full academic honours—'The Minuet' (1866), and 'Rosalind and Celia' (1868), the precision and clear definition of Pre-Raphaelite methods still survive; but in the exquisite 'Gambler's Wife' (1869) there became visible a larger and freer method of handling, which is yet more fully established in 'The Boyhood of Raleigh' (1870), a picture which, retaining a measure of the imaginative charm of his earlier subjects, marks the transition of his art into its final and, technically, most masterly phase, displaying all the brilliant and effective colouring, the effortless power of brush-work, and the delicacy of flesh-painting. The interest and value of his later works lay mainly in their splendid technical qualities. In great part they are actual or fancy portraits, varied by a few important landscapes, of which in many ways the finest is 'Chill October' (1871), and by such an occasional figure-piece as 'The North-west Passage' (1873) and 'Effie Deans' (1877). Millais executed a few etchings, and his innumerable illustrations, dating from about 1857 to 1864, and most of them published in *Good Words*, *Once a Week*, and the *Cornhill Magazine*, placed him in the first rank of woodcut designers. He was D.C.L. of Oxford; in 1885 he was created a Baronet; he was elected P.R.A. in February 1896, and died 13th August of the same year.

See Armstrong's *Life and Work of Millais* (1885); Sir W. Richmond, *Leighton, Millais, and William Morris* (1898); M. H. Spielmann, *Millais and his Work* (1898); and *Life and Letters* (1899) by his fourth son, John Guille Millais, who, born in 1869 and educated at Trinity, Cambridge, became a clever animal painter, and wrote and illustrated many books of natural history.

Millau, on the Tarn, 52 miles NW. of Montpellier. In the 16th and 17th centuries it was a stronghold of the Calvinists. Leather and gloves are manufactured, and in wool there is a good trade. Pop. 15,500.

Millay, EDNA ST VINCENT, born 22d February 1892 at Rockland, Maine, studied at Vassar College, and lived in New York. Ere nineteen she revealed a remarkable lyric gift in 'Renascentia,' which gave its title to her first volume of verse (1917). *Figs from Thistles* (1920), *Second April* (1921), and *The Harp-Weaver* (1924) bore out the promise. *Aria da Capo* is a poetic play. She also writes short stories.

Millbank Prison, or THE PENITENTIARY, demolished in 1891, was in Westminster, near Vauxhall Bridge. It was erected at an enormous cost to carry out the plans of the philanthropists Howard and Bentham; the latter's contract with the Treasury was signed in 1794, but the building was not actually commenced till 1812, and not completed till 1821. It had accommodation for 1100 prisoners, and was so constructed that, from a room in the centre, the governor was able to view every one of the cells, in which solitary confinement was rigidly enforced. Convicts condemned to penal servitude used to undergo first a term of solitary confinement in Millbank; but the prison ceased to be a convict establishment in 1886, and was finally closed in November 1890. The Tate Gallery now occupies its site. See books on Millbank by Griffiths (1875-97).

Millboard is the name given to 'board' made of paper material, and varying in thickness from $\frac{1}{8}$ th to $\frac{1}{4}$ th of an inch. It is of a gray colour, as the various kinds of waste substances—old ropes, old sacking, scraps of paper and of cardboard—from which it is usually made are not bleached either separately or when mixed and reduced to a pulp, as in the manufacture of white paper (see PAPER).

Mille, PIERRE, 'the French Kipling,' editor of *Le Temps*, born in 1865 at Choisy-le-Roi, wrote *Barnavaux* (trans. 1915), *Louise and Barnavaux* (1916), and other tales.

Milledgeville, the former capital of Georgia (q.v.), 32 miles ENE. of Macon; pop. 4600.

Millenary Petition. See HAMPTON.

Millennium (Lat., 'a thousand years'), a long indefinite space during which the kingdom of the Messiah will, according to the belief of many Christians, be visibly established on the earth. The idea originated proximately in the Messianic expectations of the Jews; and the Christians' belief in the *Parousia*, or Second Coming of Christ, was developed by the oppression and persecutions to which they were long subjected. The chief basis of the millenarian idea, in Judaism as well as in Christianity, is the ardent hope for a visible divine rule upon earth, and the identification of the church with that of which it is merely a symbol. In the 1st century of the church, chiliasm (the Greek equivalent of millenarianism, from *chilioi*, 'a thousand') was a widespread belief, to which the books of Daniel and the Apocalypse (chaps. xx. and xxi.) gave authority; while various prophetic writings, composed at the end of the 1st and the beginning of the 2d century—such as the *Testament of the Twelve Patriarchs*, the *Christian Sibylline Books*, the *Epistle of Barnabas*—lent it a more vivid colouring and imagery. Not only the heretic Cerinthus, but even orthodox doctors—such as Papias of Hierapolis, Irenæus, and Justin Martyr—delighted themselves with dreams of the glory and magnificence of the millennial kingdom. The *Sibylline Books*, for instance, hold that the earth will be cultivated throughout its length and breadth, that there will be no more seas, no more winters, no more nights; everlasting wells will run honey, milk, and wine. Papias indulges in monstrous representations of the rebuilding of Jerusalem, and of the colossal vine and grapes of the millennial reign.

According to the general opinion, which was as much Christian as Jewish, the millennium was to be preceded by great calamities. The personification of evil appeared in *Antichrist* (q.v.), the precursor of Christ (identified during the 1st century with Nero), who would provoke a frightful war in the land of Magog (Ezek. xxxviii. and xxxix.) against the people Gog, after which the Messiah would appear, heralded by Elias, or Moses, or

Melchizedek, or Isaiah, or Jeremiah, and would bind Satan for a thousand years, annihilate the godless heathen, or make them slaves of the believers, and overturn the Roman empire. From its ruins a new order of things would spring forth, in which the 'dead in Christ' would arise, and along with the surviving saints enjoy an incomparable felicity in the city of the 'New Jerusalem,' which was expected to descend literally from heaven. With the innocence which was the state of man in Paradise there were associated, in the prevalent notions of the millennium, great physical and intellectual pleasures.

The lapse of time, chilling the ardour of the primitive Christian belief in the nearness of the *Parousia*, had without doubt also the tendency to give a more shadowy, and therefore a more spiritual aspect to the kingdom over which the expected Messiah was to reign. The influence of the Alexandrian philosophy contributed to produce the same result. Origen, for example, started the idea that, instead of a final and desperate conflict between Paganism and Christianity, the real progress and victory of Christianity would consist in the gradual spread of the truth throughout the world, and in the voluntary homage paid to it by all secular powers. Yet even in the Egypto-Alexandrian Church millenarianism, in its most literal form, was widely diffused. The Montanists (see MONTANISM) generally were extreme millenarians or chiliasts, and, being considered a heretical sect, contributed largely to bring chiliasm into discredit, or, at all events, their own carnal form of chiliasm, which Tertullian himself attacked. Lactantius, in the beginning of the 4th century, was the last important Church Father who indulged in chiliastic dreams. In the 5th century, St Jerome and St Augustine expressly combated certain fanatics who still hoped for the advent of a millennial kingdom whose pleasures included those of the flesh. From this time the Church formally rejected millenarianism in its sensuous 'visible form,' although the doctrine every now and then made its reappearance, especially as a general popular belief, in the most sudden and obstinate manner. Thus, the expectation of the *Last Day* in the year 1000 A.D. reinvested the doctrine with a transitory importance, though less than is sometimes thought.

At the period of the Reformation, millenarianism once more experienced a partial revival, because it was not a difficult matter to apply some of its symbolism to the papacy: the pope, for example, was Antichrist. Yet the doctrine was not adopted by the great body of the Reformers, but by some fanatical sects, such as the Anabaptists, as also by various theosophists in the next century. During the civil and religious wars in France and England it was also prominent; the Fifth Monarchy Men (q.v.) of Cromwell's time were millenarians of the most exaggerated type. The extravagances of the French Mystics and Quietists culminated in chiliastic views. During the Thirty Years' War enthusiastic and learned chiliasts flourished. Among the foremost chiliastic teachers of modern centuries are to be mentioned Ezechiel Meth and Bishop Comenius in Germany; Professor Jurieu of Sedan, and Poiret; Serarius in Holland; and in England Joseph Mede (*Clav. Apocal.* 1627), while Thomas Burnet and William Whiston endeavoured to give chiliasm a geological foundation. Most of the chief divines of the Westminster Assembly were millenarians; so were Sir Isaac Newton and Bishop Horsley. Bengel revived an earnest interest in the subject among orthodox Protestants. Spenser and Joachim Lange held chiliastic views; and Swedenborg employed apocalyptic images to set forth the transfigured world of the senses. Bengel's millenarianism was adopted by the Swabian theosophist

Oetinger (died 1782), and widely spread throughout Germany by Jung Stilling, Lavater, and Hess. Charles Wesley and Toplady were millenarians.

Modern millenarians or pre-millenialists (as believing in the pre-millennial advent of Christ) differ in many minor points from one another, but agree in holding that the millennial age will be heralded by the personal return of the Lord Jesus, to establish a theocratic kingdom of universal righteousness, during which time sin will remain on earth but be greatly diminished. Immediately on Christ's appearing will take place the resurrection of the righteous dead and the translation of living Christians, who will be rewarded according to their works. The judgment work of Christ will occupy the whole millennial period. The Jews, restored to their own land, will repent and be converted. All the hosts of Antichrist will be destroyed, Satan bound, and the Holy Ghost poured out. At the end of the millennial age Satan released will make a last vain attempt to regain his power, but he and the wicked, who now have their resurrection, will be finally judged and cast into the lake of fire. The earth will be renewed by fire, and be the scene of the everlasting kingdom of Christ over all sanctified mankind. Attempts to fix the date of the advent are generally disapproved. Dates that have been fixed for the beginning of the millennium have been 1785 by Stilling, 1836 by Bengel, 1843 by Miller in America, 1866, 1867, and 1868 by Dr Cumming, and 1890 by the Mormon Church. Some adventists teach the doctrine of Apocatastasis (q.v.), others the final annihilation of the impenitent. See ADVENTISTS (SECOND), and HELL.

Many great German theologians were more or less pronouncedly pre-millenialists; such as Rothe, Hofmann, Nitzsch, Ebrard, Lange, Delitzsch, Christlieb, Luthardt, as also Oosterzee, Gausson, and Godet. The Free Church of Italy and the Plymouth Brethren collectively hold these views. The Irvingites expect the speedy appearance of Christ. Pre-millennial views appear in the works of many eminent Anglicans—such as Archbishop Trench, Bishops Ellicott and Ryle, Canons Fremantle and Hoare, Dean Alford. Amongst Presbyterians Dr John Cumming and Dr Horatius Bonar are conspicuous names.

Millepede, a popular name for the members of one of the orders of Myriapods, of which *Julus* is a good type. See CENTIPEDE, MYRIOPODA.

Millepore. See CORAL.

Miller, HUGH, a distinguished self-taught geologist and author, was born at Cromarty, 10th October 1802. He was descended from a family of sailors, and lost his father by a storm at sea when he was five years of age. From his seventeenth to his thirty-fourth year he worked as a stone-mason, devoting his enforced winter leisure to literary study and research in natural history. In 1824-25 he worked at Niddrie, near Edinburgh. In 1829 he published *Poems written in the Leisure Hours of a Journeyman Mason* (1829), which was followed by *Scenes and Legends of the North of Scotland* (1835). His attention was soon drawn to the ecclesiastical controversies which were agitating Scotland, and his famous *Letter to Lord Brougham* on the 'Auchterarder Case' brought him prominently into notice. In 1834-39 he acted as bank-accountant; in 1839 he was invited to Edinburgh by Dr Candlish and Robert Paul, who had read his famous letter, as editor of the *Witness*, a newspaper started in the interest of the Non-intrusion party in the Church of Scotland; and in 1840 he published in its columns a series of geological articles, which were afterwards collected under the title of *The Old*

Red Sandstone, or New Walks in an Old Field (1841). These articles were very remarkable, from both a scientific and a literary point of view. They contained a minute account of the author's discovery of fossils in a formation believed, until then, to be destitute of them, and were written in a style which harmoniously combined strength, beauty, and polish. He was warmly praised by Murchison, Agassiz, and Buckland. Agassiz 'would give his left hand to possess such powers of description as this man.' Miller's editorial labours during the heat of the Disruption struggle were immense, and educated the people for the climax in 1843. He used the term 'Free Church' before the Disruption. In 1847 he had to vindicate his position as editor in a private pamphlet against clerical interference, and may be said to have come off triumphant. But, after years of hard, earnest, fagging toil, his brain gave way, and he shot himself, 23d December 1856. Miller contributed to Wilson's *Tales of the Borders* (1835) and *Chambers's Journal*. Chalmers said of him that when he did go off he was a great gun, but he required a deal of time to load. Yet he contributed at least a thousand articles to the *Witness*, 'complete journalistic essays, symmetrical in plan, finished in execution, and of sustained and splendid ability. Miller's works, besides those already mentioned, are *First Impressions of England and its People* (1847), the record of a journey to England in 1845; *Footprints of the Creator, or the Asterolepis of Stromness*, in which he combated the evolution theory (1850); *My Schools and Schoolmasters, or the Story of my Education* (1854); and *Testimony of the Rocks* (1857), an attempt to reconcile the Genesis with geology; *Cruise of the Betsey* (1858), being geological investigations among the islands of Scotland; *Sketch Book of Popular Geology*, with preface by Mrs Miller (1859); *Headship of Christ* (1861); *Essays, Historical and Biographical* (1862); *Tales and Sketches* (1863); *Edinburgh and its Neighbourhood* (1863); *Leading Articles* (1870). Besides his autobiography, see Lives by Bayne (1871), and Leask (1896), and Sir A. Geikie's centenary discourse (1902).

Miller, JOAQUIN (1841-1913), the pen-name of Cincinnatus Heine Miller, an American poet, born in Indiana. Removing with his parents to Oregon, he became a miner in California, was with Walker in Nicaragua, and afterwards lived with the Indians till 1860. He then studied law in Oregon, and set up in practice in 1863, after a Democratic paper that he edited had been suppressed for disloyalty. He was a county judge from 1866 to 1870, and then visited Europe; in England his first volume of verse was published. He afterwards settled as a journalist in Washington, and in 1887 in California. In 1890 he revisited England.

Miller, JOE. See JEST-BOOKS.

Miller, WILLIAM. See ADVENTISTS.

Miller, WILLIAM HALLOWS (1801-80), professor of Mineralogy at Cambridge, is especially distinguished for his system of Crystallography (q.v.).

Millerand, ALEXANDRE, born in Paris in 1859, studied law, edited socialist papers, was Minister of Commerce 1899-1902, of Public Works 1909-10, of War 1912-13, 1914-15, Commissaire Général in Alsace-Lorraine 1919, Premier January to September 1920, and President of the Republic (1920-4). He had an important part in the application of the Treaty of Versailles.

Miller's Thumb. See BULLHEAD.

Millet, a grain, of which there are several kinds, the produce of species of *Panicum*, *Setaria*, and allied genera. The genus *Panicum* contains

many species, natives of tropical and warm temperate countries, some of which, as Guinea Grass (q.v.), are amongst the largest fodder grasses. The flowers are in spikes, racemes, or panicles; the glumes very unequal, one of them often very minute; each spikelet containing two florets, one of which is often barren. The genus *Setaria* has a spike-like panicle, with two or more bristles under the glumes of each spikelet.—Common Millet (*Panicum miliaceum*) is an annual grass, three or four feet high, remarkably covered with long hairs, which stand out at right angles. It has a much-branched nodding panicle; the spikelets are oval, and contain only one seed. It is probably a native of Egypt or Asia, but is extensively cultivated in the warmer parts of Europe and other quarters of the world. The grain, which is very nutritious, is only about one-eighth of an inch in length. It is used in the form of groats, or in flour mixed with wheat-flour, which makes a good kind of bread; but bread made of millet alone is brittle and full of cracks. Poultry are extremely fond of millet.—Other species, *P. miliare*, *P. colonum*, and *P. pilosum*, are cultivated in different parts of India, chiefly on light and rather dry soils, yielding very abundant crops. Millet of various species is the staple food-grain of India as a whole, and not rice, as is often thought.—German Millet, or Mohar (*Setaria germanica*), and Italian Millet (*S. italica*)—regarded by many as varieties of one species, and probably originally from the East, although now naturalised in the south of Europe—are cultivated in many of the warmer parts of Europe, in India, and other countries. Italian millet is three or four feet in height; German millet is much lower, and its spike comparatively short, compact, and erect; it is less valuable as a corn-plant. The grains of both are very small, only about half as long as that of Common Millet; but they are extremely prolific, one root producing many stalks, and one spike of Italian millet often yielding two ounces of grain. The produce is estimated as five times that of wheat. The grain of these millets is im-



a, Common Millet (*Panicum miliaceum*); b, German Millet (*Setaria germanica*).

ported into Britain for feeding cage-birds. It is used for soup in the south of Europe. To the same tribe of grasses belong the genera *Paspalum*, *Pennisetum*, *Penicillaria*, *Digitaria*, and *Milium*. *Paspalum exile* is common in Africa; and *P. scrobiculatum* is cultivated on poor soils in India. *Pennisetum typhoideum*, often called Egyptian Millet and Guinea Corn, is cultivated in Africa and India, and the south of Europe.—*Pennisetum cenchroides* causes much inconvenience to the traveller in Central Africa, the little bristles which are attached to its seeds making them stick to the clothes and pierce the skin.—*Digitaria sanguinalis*, or *Panicum sanguinale* (Polish Millet), cultivated in Poland, is used like rice. It is a common grass

in tropical and warm countries and in many parts of Europe; in the south of England it is probably only an introduced weed. The spikes in this genus are compound, and from their appearance give it the names *Digitaria* and *Finger-grass*.—The Millet Grass (*Milium effusum*) of Britain, occasionally found in shady woods, is a very beautiful grass, three or four feet high, with a spreading pale panicle of small flowers. Another species of the same genus (*M. nigricans*) is the *Maiz de Guinea* of Peru, where its seeds are converted into a very white flour.—The name Indian Millet is sometimes given to Durra (q.v.).

Millet, JEAN FRANÇOIS, painter, was born in the village of Gruchy, near Gréville, on the 4th of October 1814. The son of a farmer, he owed much in his childhood to his grandmother, a woman of great piety and individuality, and to her brother, who had been a priest; and he was taught enough Latin to enjoy the Vulgate and Virgil. For a time he aided his father as a farm-labourer; but, having manifested great taste for drawing, he was at length, in 1832, placed under Monchel, a painter in Cherbourg, whom he assisted in the execution of two religious subjects now in the church of the Trinity there, and who induced the municipality of Cherbourg to grant an annuity to aid his pupil in his studies, the sum being afterwards supplemented by the council of La Manche. In 1837 Millet came to Paris, and worked in the studio of Paul Delaroche, learning, however, more from his study of the works of Michelangelo, Poussin, Correggio, and the Venetians. Next he painted and drew in pastels little subjects in the popular style of Boucher and Watteau, selling them to the dealers for a few francs; and in 1840 a portrait which he sent to the salon was accepted and hung. In the same year he returned to Normandy, where he painted portraits and even signboards. In 1841 he was again in Paris; and he struggled hard amid the revolutionary troubles that followed to maintain himself and his family by his art. In 1848 he fought at the barricades of the Quartier Roche-chouart; and in the following year he settled in Barbizon, near the Forest of Fontainebleau, along with Charles Jacque, and there made the acquaintance of Théodore Rousseau. At Barbizon, where he remained for the rest of his days, living much like the peasants around him, he began in good earnest to paint the life of rustic France, entering on his task with a sympathetic power such as no other painter has shown. Here the famous 'Sower' was completed in 1850, mainly, however, from recollections of Normandy. In 1855 his 'Peasants Grafting' won Gautier's praise, and was bought by an American for 4000 francs. It was followed by 'The Gleaners' in 1857, 'The Angelus' (1859), 'Waiting' and 'The Sheep-shearers' (1861), 'The Man with the Hoe' and 'Women Carding' (1863), 'Shepherdess and Flock' (1864), works in which, without any departure from the most absolute truth, he imparted a largeness and a pathetic dignity to his figures of the men and women who labour in the fields, and to their environments of ordinary nature. In addition to paintings, he produced many charcoal drawings of a very high quality, and he etched a few plates. All his life long he struggled against the pressure of poverty, though he was awarded medals and the Legion of Honour (1867). He died at Barbizon, 20th January 1875. Since his death he has been fully recognised as one of the greatest of French painters.

See works on Millet by Piédagnel (1876), Sensier (trans. 1881), Yriarte (1884), Ménard (1890), Roger-Miles (1895), Julia Cartwright (1896), Gensel (1902), Muther (1905); and D. C. Thomson, *The Barbizon School* (1890).

Millom, a town of Cumberland, on the west side of the Duddon estuary, 30 miles SSE. of Whitehaven, with mines and ironworks. Pop. 8700.

Millport. See CUMBRAE.

Millstone. See MILL.

Millstone Grit, a series of grits, sandstones, conglomerates, shales, &c., with coal-seams overlying the Carboniferous Limestone. See CARBONIFEROUS SYSTEM.

Millville, a city of New Jersey, on the Maurice River, 41 miles S. by E. of Philadelphia, with manufactures of cotton and glass; pop. 15,000.

Millwall, or ISLE OF DOGS, a low-lying peninsula on the left bank of the Thames, opposite Greenwich. See LONDON.

Milman, HENRY HART, dean of St Paul's, poet and ecclesiastical historian, was the youngest son of Sir Francis Milman (1746–1821), physician to George III., and was born in London, 10th February 1791. He was educated at Greenwich under Dr Burney, at Eton, and at Brasenose College, Oxford, where in 1812 he won the Newdigate with his *Belvidere Apollo*, the best of all Oxford prize poems. In 1815 he was elected a fellow; in 1816 was ordained priest, and appointed vicar of St Mary's, Reading; from 1821 to 1831 was professor of Poetry at Oxford, where in 1827 he delivered the Bampton Lectures, on *The Character and Conduct of the Apostles considered as an Evidence of Christianity*; in 1835 became rector of St Mary's, Westminster, and a canon of Westminster; and in 1849 was promoted to the deanery of St Paul's. He died at Sunninghill, near Ascot, 24th September 1868, and was buried in St Paul's.

The collected edition of Dr Milman's *Poems and Dramatic Works* (3 vols. 1839) comprises *Fazio, a Tragedy* (1815), which, without his consent, was acted first at Bath, and then in 1818 at Covent Garden, with Charles Kemble and Miss O'Neil in the leading parts; *Samor, Lord of the Bright City, an heroic poem* (1818); *The Fall of Jerusalem* (1820), a beautiful dramatic poem, with some fine sacred lyrics interspersed; three other dramas, *The Martyr of Antioch* (1822), *Belshazzar* (1822), and *Anne Boleyn* (1826); and *Nala and Damayanti, with other Poems translated from the Sanskrit* (1834). Forgotten as a whole, the poems live, and will live, through three or four much prized hymns—'When our heads are bowed with woe,' 'Brother, thou art gone before us,' and 'Ride on, ride on in Majesty.' The complete edition of Dean Milman's *Historical Works* (15 vols. 1866–67) includes his *History of the Jews* (1829), *History of Christianity to the Abolition of Paganism in the Roman Empire* (1840), and *History of Latin Christianity to the Pontificate of Nicholas V.* (1854–56). The last—a complete epic and philosophy of mediæval Christendom—is Milman's masterpiece; it is really a great work, great in all the essentials of history—subject, style, and research. But, though vastly inferior, the *History of the Jews* was in a way more important. For 'it was,' in Dean Stanley's words, 'the first decisive inroad of German theology into England; the first palpable indication that the Bible "could be studied like another book;" that the characters and events of the sacred history could be treated at once critically and reverently.' Milman also edited Gibbon and Horace, and wrote much for the *Quarterly Review*. After his death appeared the delightful *Annals of St Paul's Cathedral* (1868), and *Savonarola, Erasmus, and other Essays* (1870). See the Life of Dean Milman by his son (1900).

Milne, ALAN ALEXANDER, playwright, born in 1882, was educated at Westminster and at Cambridge, where he edited *The Grantha*. He became

a journalist, and in 1906-14 was assistant editor of *Punch*. His humorous comedies such as *Wurzel-Flummery* (1917), *Mr Pim Passes By* (1919), *The Romantic Age* (1920) have a happy fragrance. A book of verse *When We Were Very Young* (1924) was accepted at once among the children's classics.

Milne, JOHN (1859-1913), seismologist, was born at Liverpool, worked in Newfoundland as a mining-engineer, was for twenty years mining-engineer and geologist to the Japanese government, married a Japanese wife, became a supreme authority on earthquakes, and finally established a private seismological observatory at Shide, Isle of Wight.

Milne-Edwards, HENRI, naturalist, was born at Bruges, 23d October 1800. His father was an Englishman. Milne-Edwards studied medicine at Paris, where he took his degree of M.D. in 1823, but devoted himself to natural history. After having for many years taught natural history at the Collège de Henri IV., he was elected in 1838 member of the Académie des Sciences in the place of Cuvier. In 1841 he filled the chair of Entomology at the Jardin des Plantes, and in 1844 became also professor of Zoology and Physiology. He was a member of the Académie de Médecine, and of most of the learned academies of Europe and America, and held several orders—amongst others, since 1861, that of Commander of the Legion of Honour. He published numerous original memoirs of importance in the *Annales des Sciences Naturelles*, a journal he himself assisted in editing for fifty years. His *Éléments de Zoologie* (1834), when reissued in 1851 as *Cours Élémentaire de Zoologie*, had an enormous circulation at home and abroad, and long formed the basis of most minor manuals of zoology published in Europe. His *Histoire Naturelle des Crustacés* (1834-40) and *Histoire Naturelle des Corallaires* (1857-60) were almost equally noteworthy. The *Lectures on the Physiology and Comparative Anatomy of Man and the Animals* (14 vols. 1857-81) have a great permanent value for their immense mass of details and copious references to scattered sources. He had an important share in a splendid quarto of *Anatomical and Zoological Researches on the Coasts of Sicily*. He wrote also on the natural history of the French coasts (1832-45) and on the natural history of the mammalia (1871). His study of the distribution of the lower invertebrates led him to the theory of centres of creation; and to this he adhered throughout life, in spite of the general acceptance of the newer and larger views of Darwin. He died on the 29th July 1885. In some of his later works he was assisted by his distinguished son Alphonse (1835-1900). His elder brother, Frederick William, is considered the father of ethnology in France.

Milner, ALFRED, VISCOUNT, was born 23d March 1854 at Bonn, son of a university lecturer on English at Tübingen, studied at King's College, and concluded a brilliant career at Oxford with a New College fellowship. For a time he was assistant-editor of the *Pall Mall Gazette*; then private secretary to Goschen; in 1889-92 a signally successful under-secretary for Finance in Egypt. In 1892 he had published his valuable book *England in Egypt*. From 1892 he was chairman of the Board of Inland Revenue, until he was appointed governor of Cape Colony, 1897-1901; he was also High Commissioner for British South Africa, 1897-1905, and governor of the Transvaal and Orange River Colony, 1901-5. That he could have averted the South African War has been asserted and denied. He was responsible for the bringing of Chinese labour to South Africa. On his return to Britain he strove for imperialism and colonial preference, and pub-

lished *The Nation and the Empire* (1913). It was he who in 1909 bade the die-hards in the House of Lords reject the budget and 'damn the consequences.' The Great War, however, brought him into very different relations with Mr Lloyd George, in whose Coalition Ministry he was successively minister without portfolio, Secretary for War, and for the Colonies. His last act as Colonial Secretary was to recommend the granting of independence to Egypt (1921). *Questions of the Hour* appeared in 1923. He died 13th May 1925. He had been made G.C.B. and a baron in 1901, viscount in 1902, and a Knight of the Garter in 1921. See Worsfold's *Lord Milner in South Africa* (1906).

Milnes, RICHARD MONCKTON. See HOUGHTON.

Milngavie (pron. *Milguy'*), a town of Dumbar-tonshire, 7 miles NNW. of Glasgow; pop. 4400.

Milo. See MELOS.

Milo, of Crotona, in Magna Græcia, was six times victor for wrestling at the Olympic games, and as often at the Pythian, and commanded the army which defeated the Sybarites in 511. He is said to have carried a live ox upon his shoulders through the stadium of Olympia, and afterwards to have eaten the whole of it in one day. He lost his life in trying with his hands to split a tree, which closed upon him and held him fast until he was devoured by wolves.

Milreis, or CORÔA, a Portuguese gold coin and money of account, containing 1000 reis, superseded by decree of 1911 by the gold *escudo* (4s. 5½d.). The Brazilian milreis has a par value of 2s. 3d.

Miltiades, a celebrated Athenian general, who was tyrant of a colony in the Thracian Chersonesus, took part with Darius Hystaspes against the Scythians, and, when Attica was threatened by the great Persian invasion, was chosen one of the ten generals. He prevailed upon the polemarch Callimachus to give his casting vote in favour of risking a battle, and when his turn came to command drew up his army on the famous field of Marathon. The victory of the Athenians and one thousand Plateans over the Persian host of Datis and Artaphernes is justly counted one of the decisive battles of the world. Miltiades, being entrusted anew with the command of an armament, made an attack on the island of Paros in order to gratify a private enmity, but, failing in the attempt, was on his return to Athens condemned to pay a fine of fifty talents as an indemnity for the expenses of the expedition. Being unable to do this, he was thrown into prison, where he died of a wound received at Paros. The fine was exacted after his death from his son Cimon.

Milton, JOHN, after Shakespeare the greatest English poet, was born in Bread Street, Cheapside, on December 9, 1608. His father, John Milton, was a prosperous scrivener, a Puritan but a musician, and composer of several pieces much admired by his contemporaries. He was descended from a family of yeomen settled in Oxfordshire, and had come to town upon being disinherited for his religious convictions by his father, a Catholic recusant. He appears to have from the first discerned the promise of his son, and to have determined to give him the best education he could. After studying under private tutors, young Milton was admitted about 1620 into St Paul's School, where he distinguished himself not only as a scholar, but as a poet. In February 1625 he entered Christ's College, Cambridge. His academic course was not wholly smooth; he seems to have been chastised—not, as the legend says, flogged—by his tutor, and was certainly rusticated for a short time in 1626. After his return, however, he went through the university course with

credit, graduating as Bachelor at the proper time, and proceeding Master of Arts in July 1632. The condition of the church, over which Laud then ruled supreme, deterred the young Puritan from taking orders; he felt no vocation towards any other profession; and at Horton, in Buckinghamshire, where his father had retired upon the fortune he had acquired in business, he settled quietly down with the distinct purpose of making himself a poet by study and self-discipline. His poetical genius had already been attested by two noble productions, the 'Hymn on the Nativity,' and 'At a Solemn Music,' as well as much Latin verse of the highest quality; but it is remarkable how little stimulus he seems to have felt to occasional composition. During his six years' residence at Horton he produced, so far as known, only two English poems of importance which can be ascribed to direct poetical impulse from within, the *Allegro* and the *Penseroso*. *Comus* was written at the instance of his friend, the musician Henry Lawes, to celebrate Lord Bridgewater's assumption of the wardenship of the Welsh marches, and was performed at Ludlow before a select assemblage in September 1634. *Lycidas* was evoked by the death of his friend, Edward King, shipwrecked on his passage to Ireland in 1637. There is, perhaps, not another instance in literature of a great poet so entirely dependent upon circumstances for inspiration, and, while meditating the highest things, so content to bide his time in calm reliance upon his ability to do what he pleased when he pleased. These four productions of this Horton period were indeed of themselves sufficient to place him in the first rank of English poets. Their most individual characteristic is perhaps chastened exuberance—boundless poetical wealth severely controlled, and splendidly displayed without lavishness or ostentation. *Comus* and *Lycidas* tell us much of the man; in the former we see the scholar's disdain, perhaps slightly tinged with moroseness, for all save intellectual pleasures; in the latter the patriot and the Puritan speaks his bitter scorn of the ruling faction in the church. Perhaps he had spoken too freely; at all events very shortly after the publication of his elegy, about the beginning of 1638, as part of an obituary collection in memory of Edward King, he left England for a tour in Italy.

Milton's visit to Italy is one of the most agreeable chapters of his life. He was cordially received by the Italian literati, especially at Florence, where he made not only pleasant acquaintanceships, but permanent friendships. At Rome, notwithstanding his undaunted profession of Protestantism, he was treated with especial attention, and at Naples the venerable Marquis Manso, half a century earlier the protector of Tasso, gave him hospitality and presents, which Milton requited with an elegant Latin poem. The impression which Milton thus produced upon foreigners is a proof of something imposing and attractive in his personality, for all his solid claims to fame were of course a sealed book to the Italians. His journey home was hastened by news of the outbreak of hostilities between Charles I. and the Scots, and his return was saddened by tidings of the death of his friend Diodati, whom he celebrated in his elegy 'Damon,' the finest and the last of his Latin poems. He settled in St Bride's Churchyard, afterwards in Aldersgate Street, and devoted himself to the education of his sister's children, the two young Philipsses. Unconscious of the long farewell he was about to bid to poetry, he occupied his leisure with schemes for poems mostly dramatic and scriptural, of which numerous skeleton outlines are preserved. The conception of *Paradise Lost* as a mystery or miracle play

gradually dawned upon his mind, and Satan's address to the Sun was actually written about this time. But the Civil War came, and for long silenced Milton's muse, except for an occasional sonnet.

It has been much debated whether the world has lost or gained more by Milton's absorption in politics. The question is somewhat idle; to wish for Milton other than he was is to wish for a succession of *Comuses* rather than a *Paradise Lost*. No man capable of conceiving such a work as Milton's epic could be unaffected by the situation of his country at that tremendous crisis, and with Milton's poetical temperament lively interest in anything signified total occupation by it for the time. The tracts which he now poured forth are as truly lyrical inspirations as any of his poems; by no means masterpieces of reasoning, but dithyrambic ecstasies of love or hate. Three appeared in 1641, two in 1642. All five relate to church government: never was diction so magnificently called forth by a theme so unpromising. In fact, however, the writer's thoughts are much higher and deeper than his subject, and, stripped of what is temporary and accidental in the latter, they appear magnificent idealisations of the possibilities of a far-off future, which to Milton seemed ever at the door. The great drawback to their enjoyment at the present day is the scurrility of their invective, which passed comparatively unperceived amid the excitement of revolution.

In 1643 Milton's activity as a public writer was diverted into a new channel by private affairs, which, however, he so handled as to render of universal concern. In June of this year, after a very short courtship, he married a young lady, Mary Powell, daughter of an Oxfordshire squire, previously known to him as a debtor to his father for money advanced on mortgage. The bride's family were cavaliers, and she would seem to have been as little suited to her husband in every other respect as by her education and connections. The idealising imagination of the poet must in all probability have been at work, and the thoughtless precipitancy of the whole transaction would alone show how greatly in many respects the popular estimate of Milton's character needs revision. The poor girl was naturally shocked at the sudden transfer from a jovial country household to the apartments of an austere scholar, whose intellect and character she was utterly unable to appreciate, and whose principles ran counter to all her prejudices. After a few weeks' trial of matrimony she went back to her friends, under a promise, Milton's nephew says, to return at Michaelmas. She certainly did not return, and early in the following year Milton put forth another edition of his *Doctrine and Discipline of Divorce*, greatly extended, and enriched with erudition and argument. It brought many attacks upon him, mainly from the Presbyterians, from whose views on church and state he had been more and more dissociating himself. He replied to his opponents in three supplementary pamphlets, and a threat of prosecution by a parliamentary committee, which came to nothing, occasioned the production (November 1644) of the most famous of his prose-works, *Areopagitica*, a *Speech for the liberty of Unlicensed Printing*, which has come to be regarded as almost the gospel of freedom of speech, and, if less eloquent than his tracts on church government, nevertheless contains the best known passages of his prose-writings. It must be remembered that even here Milton does not contend against the prosecution of published opinions deemed pernicious, but merely against the right to forbid publication through the instrumentality of a licenser. A few months previously he had composed and

published, at the instance of his friend Samuel Hartlib, a *Tractate of Education*, of little practical pedagogic value, but full of inspiration and suggestion.

Milton was not the man to permit his opinions to remain empty speculations, and in the course of 1645 he was taking serious steps towards carrying the most obnoxious of them into practice by paying his addresses to 'a very handsome and witty gentlewoman,' when the absent wife thought it time to return. Her repentance may probably have been further stimulated by the overthrow of the Royalist cause, which had occasioned the total ruin of her family. Conscious, probably, of his own failings in temper and considerateness, Milton did not prove obdurate; and by September his household was re-established in the Barbican. She further induced him to receive her mother and other members of her impoverished family, persons whom he had little reason to love, and of whose incompatibility he complains in a letter to an Italian friend. Little else can be said of her, except that she brought him three daughters, and died in 1652. He lost the father to whom he owed so much in 1647, a year after the fruits of his education and the partial accomplishment of the purpose of his life had been manifested in a collected edition of his poetical works, English and Latin.

During all this time Milton's calling, apart from his studies and polemics, had been educational; other pupils, mostly sons of friends, had been gradually added to his nephews, and he seemed to the world a schoolmaster. He was now to enter public life. The execution of Charles I., January 30, 1649, was followed within a fortnight by his defence of the deed, *The Tenure of Kings and Magistrates*. Having thus definitively cast in his lot with the ruling party, he was appointed on March 15 to a post which no other man in England was so competent to fill, that of 'Secretary of Foreign Tongues,' whose duty it was to draft diplomatic correspondence with foreign powers, then carried on in Latin. Milton had few equals in that age as a Latinist, whether in prose or verse, and his public letters were an honour to himself and his country, but there is no reason to suppose that he was ever much more than the mouthpiece of the government. His services were more conspicuous in another department, his justification of the king's execution in his reply to Salmasius's *Defensio Regia pro Carolo I.*, a pamphlet whose publication had been a European event. Milton's *Pro Populo Anglicano Defensio* (1651) was pronounced, even by those who condemned it, a great controversial victory. In erudition, Latinity, and, it must be added, scurrility, the combatants were well matched, but Milton spoke from the heart, and Salmasius from a brief. This work, now so little read, made Milton famous all over Europe, and is memorable as the immediate occasion of the loss of his eyesight, deliberately yielded up by him in the cause of his country. By 1652 the impaired vision had wholly failed, and it was necessary to provide him with an assistant in his official duties. His domestic life at this period was tranquil, distinguished chiefly by his second marriage and the loss of his wife (1656-58), and the pleasing intimacy of young friends, recorded in his sonnets. The magnificent sonnet on the massacre of the Vaudois was written in 1655. Several controversial pamphlets with Alexander Morus followed his contest with Salmasius, chiefly remarkable for the fortitude and dignity of his references to his affliction, and for his flattering portraits of the great men of the Commonwealth, especially Cromwell. Always leaning to the more radical side, he had supported Cromwell in all his extra-legal measures, though the disappointment of his early republican

ideal must have cost him many pangs. He retained his secretaryship until the abdication of Richard Cromwell, when the condition of public affairs again made him a pamphleteer. His writings of this period, greatly inferior in splendour of diction to his first productions of the kind, are still most interesting as passionate protests, conclusive of his entire lack of practical statesmanship and his essentially poetical temperament. The Restoration drove him into concealment. Few had more bitterly exasperated the Royalist party; but the new government was not bloodthirsty, and about the beginning of 1661 he found himself settled in Jewin Street (afterwards in Artillery Walk, Bunhill Fields), honourably released from politics with the gratifying consciousness of having done his duty and his best, and free to devote himself entirely to the permanent purpose of his life.

Paradise Lost was probably commenced some time before the Restoration, and completed about 1663—a striking instance of rapid composition, considering the magnitude and perfection of the work, the interruption by political revolution, and the fact that Milton's poetical vein only flowed freely between the autumnal equinox and the vernal. It was chiefly composed at night, and necessarily dictated to some amanuensis, usually one of his daughters. Plague and fire for a time warred against the publication, which at length, after some difficulty on the licenser's part had been surmounted, took place in August 1667. Every one knows that the copyright was sold for five pounds: it is not always remembered that there were contingencies which would have raised his emolument to £20, that he received altogether £10, and that his widow compounded for the remainder for £8. The sale of thirteen hundred copies within twenty months is certainly no discredit to the taste of the age. Milton's claim to a place among the great poets of his country seems to have been admitted from the first, though in the absence of reviews his fame travelled slowly. The year 1671 witnessed the publication of *Paradise Regained*, probably written in 1665-66, and of *Samson Agonistes*, written later still. The former was composed at the suggestion of the Quaker Ellwood, working on the suspicion Milton could not but entertain that he had after all made Satan the hero of *Paradise Lost*. *Samson Agonistes*, dramatic in form, is lyrical in substance, a splendid lament over the author's forlorn old age, and the apostasy, as he deemed it, of his nation. Both pieces evince the continued tendency of his style towards simplicity, which sometimes degenerates into baldness. They are noble pendants to *Paradise Lost*, but the more their relation to this palmary work is studied the more one feels that it and it alone places him among the supreme poets of the world.

Milton's domestic life during this period had not been fortunate. The great cause of sorrow was the undutifulness of his daughters—very ordinary young women, it would seem, who felt no sympathy or admiration to counterbalance their natural impatience of their heavy task as his readers and amanuenses. The blind poet on his part was no doubt often stern and exacting; and on the whole the history of his household is one of sordid sadness up to his marriage (1663) with Elizabeth Minshull, a pretty and domestic woman of twenty-five, the daughter of a Cheshire yeoman. She restored comfort to his house, but failed to conciliate his daughters, who, after being taught embroidery at their father's expense, left to set up for themselves. The accounts we have of him in his later years convey a generally pleasing picture of a not uncheerful retirement solaced by music and the attention of friends. When the poetic impulse had departed he addressed himself vigorously to other

unfulfilled designs of his youth, writing the early history of England and endeavouring to amend men's conceptions of grammar and logic. These writings are indeed of little value; but his Latin *Treatise of Christian Doctrines*, though devoid of all pretensions to eloquence, is a memorable work. His theology had become profoundly modified in the course of his life; he is now an Arian as regards the person of Christ; he is indifferent to all rites and ceremonies; he is as anti-Sabbatarian as Luther; he would even tolerate polygamy. The charm of the treatise consists in its dignified candour, and the absence of all polemic virulence. The tranquillity of evening was indeed closing around him as he penned this last legacy, the MS. of which, confiscated and mislaid, was not to see the light for a hundred and fifty years. Reduced still further in means by losses through the great fire of 1666, but still above want; execrated as a regicide by the majority of his countrymen, but already acclaimed by the discerning as the first poet of his age; worn by attacks of gout, but cheerful and even joyous in the intervals of pain, he closed his chequered life on November 8, 1674. He was interred in St Giles's, Cripplegate.

Milton is one of the poets respecting whose place in literature there has been least question, whether as regards the literature of their own country or that of the world. He stands at the head of those epic poets whose themes have not, like Homer's or Virgil's, been national, and have not, like Dante's, condensed the essence of the belief of ages. He is indebted for this superiority partly to his felicitous choice of the finest subject which yet remained for epical treatment, partly to his exceptional qualifications for treating it, but most of all to the actual superiority of his genius. After Homer there is no poet to whom the sublime is so much a native element, who rises into it with so little apparent effort, and remains in it for so long together. Another circumstance which would alone make him a poet for the world is that in him and in him alone the Hebraic and the Hellenic spirit appear thoroughly at one. His theme and his creed connect him with the Scriptures, but his literary tastes and models are the tastes and models of the Renaissance. As an English poet he fills up the great gap which would otherwise yawn between the age of Shakespeare and the age of Dryden, and, like Wren in architecture, proves that the classical style is not necessarily synonymous with pedantry or inanity. In the artful harmony of blank verse he surpasses every English poet, though he may not have caught the 'wood-notes wild' of Shakespeare and his contemporaries. His magnanimity as a man matched his sublimity as a poet; but he had perhaps more than a usual share of the failings attendant upon the magnanimous character, and at first sight appears arrogant and unamiable. It is not until we consider that the circumstances of his life forced these characteristics into prominence, and that biographers have too commonly thought the softer and more familiar traits unworthy of record; until we remember that the company of this austere idealist was frequented by the young, and that the pleasures of the social hour have been exquisitely sung by him; above all, until we note his almost entire dependence for composition upon external impulse, the rashness of some of his actions and the chivalry of others, that we perceive him to have possessed his full share of the emotional temperament common to poets.

† The principal contemporary authority for Milton's life is his nephew, Edward Phillips. Toland has added some interesting notices. Symmons, Mitford, Todd, and others wrought usefully in their day in collecting and investigating particulars, but their labours were entirely superseded by Professor Masson (7 vols. 1859-94), who left

nothing unexplored, and whose verdict is in most cases decisive. Johnson's short biography, however, must always be read for its literary merit, and as a remarkable instance of insuperable antipathy striving to be just. Milton's Life has been written on a small scale by Mark Pattison ('Men of Letters,' 1880) and by Richard Garnett ('Great Writers,' 1889); and there is Sir Walter Raleigh's *Study* (1900). There is an excellent and comprehensive German biography by Alfred Stern (2 vols. Leip. 1877-79). Addison, Johnson, Channing, Macaulay, Bridges, and Saurat are especially distinguished among Milton's critics. There are editions of Milton's poems by Professor Masson (3 vols. 1874; new ed. 1890), Beeching (1900, 1903), Aldis Wright (1903), and Grierson (vol. i. 1925).

Milwaukee, capital of Milwaukee county, Wisconsin, and the largest city in the state, is situated on the west shore of Lake Michigan, at the common mouth of three improved and navigable rivers, 90 miles north of Chicago. The parked and terraced bluffs have an average height of 80 feet above the water. Milwaukee is beautifully built with light yellow bricks—to which it owes its name of 'the Cream City.' The streets are wide and parked between the roadway and the sidewalk, and are lined on either side by magnificent elms whose branches form an almost continuous arch in the residential parts. The public parks are extensive, and are connected by wide boulevards. A vast system of intercepting sewers is in operation, and the river is flushed by means of a huge tunnel from the lake. Among notable buildings are the Custom-house and Post Office, the County Court, the Chamber of Commerce, the Exposition Building (with a natural history collection), the Layton Art Gallery, the public library, and many fine business houses. Several of the railway depôts are handsome buildings, as is the City Hall.

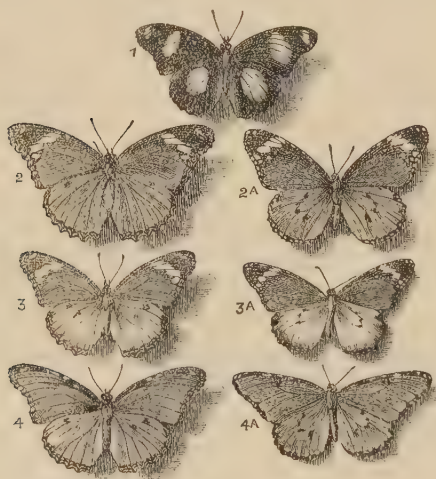
Milwaukee, which is a great railway centre, is essentially a manufacturing city. Its products include grain, flour, lumber, knit goods, pork, foundry and machine-shop products, iron, steel, and brass goods, leather, boots and shoes, and tobacco. There are large flour-mills, enormously capacious elevators, and its shipments of wheat total about 10,000,000 bushels annually. Pork-packing is another great industry. Soft drinks are a product of importance. Milwaukee was founded in 1835, chartered in 1846, and grew prodigiously after 1880. It was visited by a serious fire in 1892, the loss being nearly \$6,000,000. There is active steamer trading on the lakes. Juneau Park is laid out on a bluff overlooking the river. Marquette university is situated here, and near the city is the National Soldiers' Home. Pop. (1870) 71,440; (1900) 285,315; (1920) 457,147.

Mīmāṃsā (from the Sanskrit *man*, 'to investigate'; hence, literally, investigation) is the collective name of two of the six divisions of orthodox Hindu philosophy. They are distinguished as *Pūrva-* and *Uttara-mīmāṃsā*, the latter being more commonly called *Vedānta*, while the former is briefly styled *Mīmāṃsā*. The object of the *Mīmāṃsā* is primarily to lay down a correct interpretation of such Vedic passages as refer to the Brāhmanic ritual, to solve doubts on matters concerning sacrificial acts, and to reconcile discrepancies—according to the *Mīmāṃsā*, always apparent only—of Vedic texts. But in the course of development of the system it has been expanded, especially by the philosophers Prabhākara (c. 600) and Kumārila (c. 700), to include critical discussions of the nature of knowledge and reality. See SANSKRIT LITERATURE, VEDAS.

Mimes, the name given by the ancients to certain dramatic performances, in which, with little attempt at art, scenes of actual life were represented, sometimes in improvised dialogue. The Greek mimes appear to have been invented by the

Greeks of Sicily and Southern Italy. They were a favourite amusement of convivial parties, the guests themselves being generally the performers. Sophron of Syracuse (about 420 B.C.) composed many in the Doric dialect, which were much admired, and which Plato was accustomed to read. Herodas (q.v.) or Herondas belonged to a later time.—The Roman mimes were not borrowed from the Greek, but were of native Italic growth. They were not only far ruder and coarser, but in some respects they were essentially different—the dialogue occupying a smaller place, and mere gesture and mimicry predominating. The humour and satire, however, were often genuine, though rough and even indecent, and they were greatly relished by all classes; the patrician Sulla was fond of them. Their most famous mimic poets were Decimus Laberius and Pub. Syrus.

Mimicry. The fact that insects belonging to very different groups often bear an extremely close superficial resemblance to each other has been known for a long period of time. The names given to various species of British moths are sufficient proofs of this. Such names as *Bombyliiformis*, *Apiformis*, *Bembeciformis*, &c., imply a recognition of the resemblance between these species and others belonging to an entirely different order. The meaning of such likenesses was, however, very imperfectly known until the appearance of H. W. Bates's classical paper in 1862. In this memoir the author shows that the species which has departed from the normal type of its group (the mimicker) is far rarer than the form which it resembles, while the latter (the mimicked)



is abundant and well defended by some special protection, such as the possession of an unpleasant taste or smell or the power of stinging. Bates's observations were conducted in tropical America, where abundant, conspicuous, slow-flying, nauseous butterflies (Ithomiinae and Heliconinae) are closely mimicked by Pierinae (the group containing our common garden white butterflies) and other butterflies, and in many cases by day-flying moths. Subsequent observation has confirmed Bates's suggestion. Wallace found numerous instances of mimicry among the Lepidoptera of India and the Malay Archipelago, and Trimen directed attention to similar facts among South African butterflies. The latter include the most remarkable instance of mimicry yet discovered. The male of an African swallow-tailed butterfly (*Papilio dardanus*) is typical in appearance, and possesses the characteristic 'tails' on the hind-wings: the female, except in Abyssinia and Somaliland, is utterly unlike the

male in the colouring and form of the wings, the 'tails' being entirely absent. While the female is so different from the male of its own species it appears in East Africa in three well-marked forms mimicking three different species of the nauseous genus *Danais*—viz. the black, pale buff-spotted *D. Echeria*, the black and white *D. niavivus*, and the black orange-brown and white *D. chrysippus* (see fig. 2A). In West Africa the local race of *P. dardanus* has a very similar male, and females mimicking *D. chrysippus* and the West African form of *D. niavivus* with the chief white marking less developed than in East Africa. In Uganda and the adjacent areas there is a very interesting addition in the form of a female mimicking one, and in some parts two, Acreine models of the genus *Planema*, black with an orange bar across the fore wing and white across the hind. Different female forms, as well as the non-mimetic males, have been bred in one family reared from the eggs laid by a captured female. While such remarkable changes have occurred on the mainland of Africa, the ancestral form from which these mimetic races have been developed has been preserved comparatively unchanged in the island of Madagascar, as the nearly related *Papilio meriones*, in which the female closely resembles the male and is non-mimetic. Similar races with sexes almost alike have been found in the Comoro Islands (*P. humbloti*) and in Abyssinia (*P. antinorii*). This example strongly enforces a conclusion also arrived at by Bates and Wallace—viz. that the females are far more frequently mimetic than the males. Wallace has explained this as an adaptation to meet the especial dangers incurred by the female during her slow flight when laden with eggs, and her exposure to attack during oviposition: The female butterfly is also more variable in pattern than the male, and therefore more often produces varieties which may lead to a mimetic form.

The examples selected for illustration were lent by Colonel Swinhoe; the figures are about half the natural size. Fig. 1 represents the male of the Indian and African *Hypolimnas misippus*: it is non-mimetic and very unlike the female, being distinctly marked with a large white patch bordered with iridescent blue on each of the four wings. The iridescence on the right wings appears to extend farther than on the left, because it is seen from a different angle. The male remains unchanged in the localities where its female alters in correspondence with the form it mimics. Fig. 2 is the commonest form of female, which mimics the above-mentioned *Danais chrysippus* (fig. 2A), occurring nearly all over the Old World tropics. In certain localities the latter butterfly is represented by a variety with white hind-wings (*Danais alcippus*); see fig. 3A. In other localities *alcippus* is mixed, in varying proportions, with *chrysippus*. There is also a similar variety of the female *Hypolimnas* (the *alcippoides* form) shown in fig. 3. Finally, in Aden and certain African localities there is another variety of the *Danais* (*D. dorippus*) without the black and white marks at the tip of the fore-wing, shown in fig. 4A; while the *Hypolimnas* also develops a similar form of female, seen in fig. 4—the *inaria* form. *H. misippus* is a far more wandering butterfly than *chrysippus*, and its forms of female do not keep true to the localities of the forms of its model because of frequent interbreeding with migrants from other areas.

The butterflies which afford models for mimicry chiefly belong to the two sub-families Danainae (including *Euploea*, *Danais*, and *Hestia*) and Acreinae, in addition to the Ithomiinae and Heliconinae of tropical America. There is some direct and much indirect evidence to show that all mimicked species are specially protected by an

unpleasant taste or smell. Wallace has concisely stated the conditions under which mimicry occurs, as follows: '(1) That the imitative species occur in the same area and occupy the same station as the imitated. (2) That the imitators are always the more defenceless. (3) That the imitators are always less numerous in individuals. (4) That the imitators differ from the bulk of their allies. (5) That the imitation, however minute, is *external* and *visible* only, never extending to internal characters or to such as do not affect the external appearance.' It should be added that the female forms of *H. misippus* referred to above are an exception to (1), that exceptions to (3) are liable to occur as a consequence of fluctuating numbers of model and mimic, and that, as regards (5), the imitation in flight, attitude, &c., implies changes in the deep-seated nervous system of the mimic.

Examples of mimicry are also well known in other orders of insects. The formidable Hymenoptera (including the hornets, wasps, bees, and ants) are frequently resembled by defenceless insects belonging to other orders, such as moths

(Lepidoptera), beetles (Coleoptera), flies (Diptera), &c. The most remarkable example yet described was discovered by W. L. Slater in tropical America. The leaf-cutting ants (*Ecodoma*) are extremely abundant in this part of the world, and present a very characteristic appearance, each homeward-bound ant carrying a piece of leaf vertically in its jaws. Slater found a homopterous insect which faithfully resembled an ant together with its piece of leaf. The latter was suggested by the thin compressed green body of the insect, and its profile was precisely like that of the jagged edge of the fragment of leaf held over the back of the ant.

The mimicking may be separated from the mimicked species by an interval still wider than that between the various orders of insects. Spiders in many parts of the world are defended by resembling the aggressive and justly respected ants. Again, many large caterpillars intimidate their foes by resemblance to snakes. The extraordinary prevalence of mimicry among insects is probably to be explained by their usual defenceless condition, and by their immense fertility and the rate at which

I. Colours which cause an animal to resemble some part of its environment, or to mimic the appearance of some other species (APATETIC COLOURS).		II. Warning and signalling colours which suggest something unpleasant to an enemy, or aid in the escape of other individuals of the same species (SEMATIC COLOURS).	III. Colours displayed in courtship (EPIGAMIC COLOURS). Ex.— <i>Bright colours of male birds.</i>
A. Colours which conceal an animal by causing it to resemble some part of its normal surroundings (protective and aggressive resemblance: CRYPTIC COLOURS).	B. False warning and signalling colours deceptively suggesting something unpleasant to enemies or attractive to prey (protective and aggressive mimicry and alluring colours: PSEUDOSEMATIC COLOURS).		
1. Concealment as a defence against enemies (protective resemblance: PRO-CRYPTIC COLOURS). Ex.— <i>Colours by which palatable insects are concealed</i> (see arts. Butterfly and Caterpillar).	1. Colours which deceptively suggest something unpleasant or dangerous to an enemy (protective mimicry: PSEUDAPOSEMATIC COLOURS). Ex.— <i>Hornet-like moth, snake-like caterpillar.</i>	1. Colours which warn an enemy off by denoting something unpleasant or dangerous (warning colours: APOSEMATIC COLOURS). Ex.— <i>Gaudy colours of nauseous or dangerous insects.</i>	
2. Concealment enabling an enemy to catch its prey (aggressive resemblance: ANTCRYPTIC COLOURS). Ex.— <i>Colours of tiger, lion, &c.</i>	2. Colours which deceptively suggest something attractive to prey, or enable an enemy to approach without exciting suspicion (alluring colours: PSEUDEPSEMATIC COLOURS). Ex.— <i>Mantis (Hymenopus), which attracts the other insects on which it feeds by resembling a pink flower.</i>	2. Colours which enable individuals of the same species quickly to recognise and follow each other (recognition marks: EPISEMATIC COLOURS). Ex.— <i>White tail of rabbit.</i>	

the generations succeed each other—conditions which strongly favour the rapid action of natural selection. Hence it is that other forms of deceptive resemblance are also especially characteristic of insects (see articles BUTTERFLIES and CATERPILLAR in this work). Mimicry is, however, by no means unknown in other animals. Thus, the gaudy colours of the deadly coral snakes (Elaps) of tropical America are mimicked by harmless snakes; and the powerful friar-birds are resembled by defenceless orioles in various Malayan islands. All the instances cited above illustrate protective mimicry—a resemblance which serves to defend the imitator from attack. Aggressive mimicry, in which the resemblance favours the attack of the imitator upon the mimicked species or upon species which accompany the latter, appears to be very doubtful. A stinging model may be attacked by a predaceous mimic, but in such instances it is probable that the resemblance is a protection against insect-eating enemies rather than an aid in the attack.

Mimetic appearances are often combined with other methods of defence; thus, many large caterpillars are well concealed by protective resemblance, and only assume the terrifying snake-like appearance when alarmed. It is of great interest to trace

the relation of mimicry to the other uses of colour in animals. This relationship is shown in the above table. The difference between mimicry and protective resemblance (with which it is often confused) will be seen when A is compared with B.

Deceptive resemblance between specially protected insects is also frequent—e.g. between Danaids and Euploea, or a Heliconine and an Ithomiine. These, however, are examples of common warning (synaposematic) colours rather than true mimicry, which is false warning or pseudaposematic. This resemblance puzzled Bates, and was finally interpreted by Fritz Müller. It is therefore often spoken of as Müllerian mimicry.

The term mimicry has been criticised as seeming to imply conscious volition on the part of the imitator. Such a misapprehension is unlikely to arise in any one who has read the literature of the subject. Authorities are agreed that the resemblance has been gradually produced by the operation of natural selection, which has ensured the persistence of all variations tending in the direction of some well-defended insect avoided by foes.

It is interesting to find that protective resemblance and protective mimicry are employed by the Vegetable Kingdom, although very rarely as com-

pared with the Animal. W. J. Burchell in 1881 observed a little South African Mesembrianthemum which closely resembled the rounded pebbles of its locality, and concluded that for this reason it 'may generally escape the notice of cattle and wild animals.' This observation has been confirmed and extended to other species, some of which resemble angular lichen-covered fragments of rock. The resemblance of the dead-nettle to the stinging-nettle, with which it is so commonly associated, appears to be a good instance of protective mimicry (Burchell, *Travels in the Interior of Southern Africa*).

See H. W. Bates, 'Butterflies of the Amazon' (*Trans. Linn. Soc.*, xxiii.); A. R. Wallace, 'Malayan Butterflies' (*Trans. Linn. Soc.*, xxv.), *Essays on Natural Selection, Tropical Nature, and Darwinism*; R. Trimen, 'South African Butterflies' (*Trans. Linn. Soc.*, xxvi.); Belt, *Naturalist in Nicaragua*; Poulton, *Colours of Animals* (Inter. Science Series), *Essays on Evolution*, with the references given.

Mimosoideæ, a sub-family of Leguminosæ, distinguished by regular flowers and petals valvate in bud. Over 1500 species are known, all natives of warm climates, a few only extending beyond subtropical regions in the southern hemisphere. The genera *Acacia* (q.v.) and *Mimosa* are the best known. To the latter genus belong the Sensitive Plant (q.v.), also a great variety of trees usually of beautiful foliage (though their leaves, as in *Acacias*, may be reduced to phyllodia) and often also of valuable timber. The fruits are often esteemed, but the roots and seeds not unfrequently possess drastic or even poisonous properties. They are also rich in tannin and gums.



Mimulus maculosus—var.
Arlequin.

Mimulus, a genus of plants of the family Scrophulariaceæ, having a prismatic 5-toothed calyx, a somewhat bell-shaped corolla, of which the upper lip is bilid and the lower lip trifid, two long and two short stamens, and a stigma of two lamellæ, which close together upon irritation. The species are mostly herbaceous plants, natives of America. Some of them are very frequent in flower-gardens, and many fine varieties have resulted from cultivation. They sometimes receive the name of *Monkey-flower*. *M. luteus*, a native of Peru and Chile, and there used as a potherb, has become naturalised in Britain. The little yellow-flowered Musk Plant of gardens and window-sills is *M. moschatius*, from Oregon and other north-western parts of America.

Mimusops. See BALATA, BULLET-TREE, SAPO-TACEÆ.

Mina (Gr. *mna*), a Greek weight and money of account, the sixtieth part of a Talent (q.v.) containing 100 Drachmæ (q.v.).

Mina Bird. See MYNA.

Mineans. See SEMITES, SABÆANS.

Minaret, Minar, a tall turret used in Saracenic architecture. It contains a staircase, and is divided into several stories, with balconies from which the muezzins summon the Mohammedans to

prayer—bells not being permitted in their religion—and is terminated with a spire or ornamental finial. The minaret is amongst the most beautiful features of Mohammedan architecture, and is an invariable accompaniment of the Mosque (q.v.). For an illustration, see ARABIAN ARCHITECTURE. In India *Minars*, or pillars of victory, are frequently erected in connection with mosques; some of these are lofty and splendid monuments, that of Kutab, at the Old Delhi (q.v.), being 47 feet in diameter at the base and 238 feet high. The form of the minaret was derived from the Pharos, the ancient lighthouse of Alexandria; and the name is from the Arabic *mandrat*, 'a lighthouse.'

Minas, capital of a wild, mountainous province (area, 4800 sq. m.; pop. 75,000) of the same name in southern Uruguay, 75 miles by rail NE. of Montevideo; a picturesque town; pop. 13,000.

Minas Geraes, the most populous state of Brazil, lies inland from Espirito Santo and south of Bahia, and has an area of 229,000 sq. m. Pop. 6,000,000. Lying wholly in the tableland, its surface is occupied with grass and bush-covered *campos*, rising, however, in the Serra do Espinhaço to 5900 feet. The principal rivers include the navigable São Francisco and the Rio Grande, which unites with the Paranaíba to form the Paraná. Agriculture and stock-raising are the chief industries. Some gold is still got, and diamonds, iron, and lead are mined. The inhabitants include very few whites; among the Indians the Botocudos (q.v.) are met with. Capital, Belo Horizonte (40,000).

Mince-pies, an important item of English Christmas fare, composed of very numerous ingredients (suet, raisins, apples, lemons, currants, figs, almonds, flavoured with nutmeg, cinnamon, ginger, &c.) variously compounded and baked in pastry. Formerly mutton or neat's-tongue was an essential ingredient. The shape of the crust was not originally round, but is said to have been intended to represent the manger in which the Holy Child was laid.

Minch, the channel separating the island of Lewis from the mainland of Scotland. It is 24 to 40 miles wide, and has a rapid current. The *Little Minch*, separating Skye from North Uist and the neighbouring islands in the Outer Hebrides, is 14 to 20 miles wide.

Minchinhampton, a market-town of Gloucestershire, $3\frac{1}{2}$ miles SSE. of Stroud. James Bradley is buried in the churchyard.

Mincio, a tributary of the Po, rises in south Tyrol, and flows as the Sarca 80 miles to Lake Garda, from which it issues as the Mincio, and after a southerly course of 93 miles past Mantua joins the Po from the left. It forms an integral part of the Quadrilateral (q.v.) or system of fortification defending North Italy, and has had several great battles fought in its vicinity, as Castiglione (1796), Solferino (1859), Custoza (1849 and 1866).

Mind. See PSYCHOLOGY.

Mindanao. See PHILIPPINE ISLANDS.

Minden, a Prussian town in Westphalia, on the Weser, 40 miles W. of Hanover. Till 1873 a fortress of the second class, it was already a town in Charlemagne's day, and suffered much in the Thirty Years' War, and again in the Seven Years' War, when, on 1st August 1759, the French were defeated here by an Anglo-Hanoverian army under Ferdinand of Brunswick and Lord George Sackville. It has a fine new bridge (1874), a Gothic town-hall, a Catholic church (till 1811 cathedral), built between the 11th century and 1379, and restored in 1864-85, manufactures of tobacco, beer,

brandy, glass, &c., and a considerable river trade. Pop. (1919) 25,986. See also MÜNDEN.

Mindere'rus Spirit, or SOLUTION OF ACETATE OF AMMONIA, is a valuable diaphoretic, much used in febrile diseases. It is prepared by adding ammonia or the carbonate of ammonia to acetic acid till a neutral liquid is obtained. It is sometimes applied hot on flannel in cases of mumps, while it has also been employed as an eyewash in chronic ophthalmia.

Mine. See MINING, MINES (MILITARY).

Minehead, a watering-place of Somersetshire, on the Bristol Channel, 25 miles NW. of Taunton. Till 1832 it was a parliamentary borough. Pop. of urban district, 6000.

Mineral Kingdom, the inorganic portion of nature. Under this term, however, are not included the inorganic products of organic beings, as sugar, resins, &c., although substances more remotely of vegetable or even animal origin are reckoned among minerals, as naphtha, bitumen, asphalt, &c. To the mineral kingdom belong liquid and gaseous, as well as solid substances; water, atmospheric air, &c. are included in it. All the chemical elements are found in the mineral kingdom, from which vegetable and animal organisms derive them; but many of the compounds which exist in nature belong entirely to the vegetable and animal kingdoms, and are produced by the wonderful chemistry of life.

Mineralogy, the science which treats of minerals, does not embrace all that relates to the mineral kingdom. *Simple minerals* alone, or homogeneous mineral substances, are regarded as the subjects of mineralogy; rocks formed by the aggregation of simple minerals, and their relations to each other, are the subjects of Geology (q.v.). This limitation of the term mineralogy is comparatively recent. Geology or geognosy was formerly included in it. The arrangement and description of simple minerals according to their external characters has been called by Werner and others *Oryctognosy*, but the term has fortunately fallen into disuse. Nor is the study of mere external characters sufficient in mineralogy. Equally important are the internal molecular structure (as revealed by optical methods) and the chemical composition. The external physical characters, such as lustre, hardness, tenacity, &c., are now regarded as *inessential*, since they vary in different specimens of the same mineral. In modern scientific mineralogy the *essential* properties, such as chemical composition, specific gravity, and crystalline form, rank as of first importance.

Some minerals being of great use, and others highly valued for their beauty, have received much attention from the earliest ages. But the ancient naturalists describe few minerals. The first attempt at scientific mineralogy was by George Agricola in the 16th century. The systems of the Swedes Wallerius and Cronstedt, in the later half of the 18th century, were the first worthy of the name. That of Werner followed, and was extensively adopted. The discoveries of Haüy in crystallography, and the progress of chemistry, gave mineralogy a new character; and then sprang up two schools of mineralogists, one resting chiefly on external characters, and the other on chemical composition.

The chemical classification of minerals is rendered difficult by the endless variety of combination and proportion in the elements of which they are composed, the presence of substances not essential to the mineral, and yet more or less affecting its characters, and the frequent impossibility of determining what is to be deemed essential and what accidental. Chemical purity is almost never found

in nature. Even the purest diamond, when burned, leaves some traces of ash; and the various colours of diamond, quartz, and other minerals are due to the presence of substances which are often in so small quantity as not to affect their crystalline forms or other physical properties. Again, some minerals of identical chemical composition differ in their crystallisation, so that an arrangement founded upon it would separate them too widely. There are also many minerals which are often found in an uncrystallised state, and others which are always so. In the arrangement of minerals into natural groups, their chemical composition, although not alone to be regarded, is of the first importance, so that the place of a new mineral in the system can never be determined without analysis; and in determining the nature of a mineral chemical tests, such as the application of acids, are continually resorted to. It is also necessary to know its specific gravity, and how it is acted upon both by a moderate heat and by the blowpipe. An examination of the crystalline forms, with measurement of the angles of the crystals, is often sufficient to distinguish minerals which have otherwise much resemblance. The *cleavage* of crystals is also important—a readiness to split in planes parallel to certain of their faces only, by which the *cleavage form* of the crystal may be ascertained. Minerals not crystallised exhibit important varieties of *structure*, as *laminated*, *fibrous*, *granular*, &c. Certain peculiarities of *form* are also frequently characteristic of uncrystallised minerals, as *mammillary*, *botryoidal*, &c. Minerals exhibit, when broken, very different kinds of *fracture*, as *even*, *conchoidal*, *splintery*, &c. *Opacity*, *translucency*, and *transparency* are more or less characteristic of different kinds: *electric* and *magnetic* properties demand attention; and very important characters are derived from *lustre*, which in some minerals is *metallic*, in others *semi-metallic*, in others *pearly*, *vitreous*, &c. *Colour* is not generally of much importance, but in some minerals it is very characteristic. The colour of the powder formed when a mineral is scratched often differs from that of the solid mass. This is the *streak* of the mineral, and is frequently very characteristic. *Hardness* and *tenacity* are very important, and are of all various degrees. *Ungtuousity* and other peculiarities to be ascertained by the touch are very characteristic of some minerals, and peculiarities of *taste* and *smell* belong to others.

Mineralogy has very important relations with geology, which cannot be studied without regard to the mineral constituents of rocks. The mineral composition of soils greatly affects vegetation and agriculture. The economical uses of minerals are also very important and various. It is enough merely to allude to salt, sulphur, borax, alum, graphite, cryolite, native metals, metallic ores, &c. Naphtha, petroleum, bitumen, asphalt, &c., are of well-known utility; and a high value has always been attached to gems and other ornamental stones. There are special handbooks by Tschermak, Dana, Brush and Penfield, Miers, &c. See GEOLOGY, CRYSTALLOGRAPHY.

Mineral Oil. See BAKU, FUEL, INTERNAL-COMBUSTION ENGINE, NAPHTHA, PARAFFIN, PETROLEUM.

Mineral Tallow, or HATCHETTITE, a remarkable substance found in several places in Britain, Germany, Siberia, &c., soft and flexible, yellowish white, yellow, or greenish yellow, resembling wax or tallow, often flaky like spermaceti, inodorous, melting at about 115° F., and composed of about 86 per cent. carbon and 14 per cent. hydrogen. It is closely related to other solid hydrocarbons, such as ozokerite and native paraffin. Like most hydro-

carbons, such as naphtha, petroleum, asphalt, &c., Hatchettite appears to have resulted from the chemical alteration of organic matter.

Mineral Waters, spring waters which possess qualities in relation to the animal body different from those of ordinary water, have been used as remedial agents from a very early period. The oldest Greek physicians had great faith in their curative power, and the temples erected to Asklepios were usually in close proximity to mineral springs; the warm baths of Calirhoe, near the Dead Sea, are mentioned by Josephus as having been tried by Herod in his sickness. We are indebted to the Romans for the discovery not only of the mineral thermic springs in Italy, but of some of the most important in other parts of Europe, amongst which may be named Aachen, Baden-Baden, Bath, Spa in Belgium, and many others; and Pliny (*Natural History*) mentions a very large number of mineral springs in almost all parts of Europe (see BATH, HYDROTHERAPY). The therapeutic action of mineral waters or spas depends chiefly upon their chemical composition and their temperature, though other circumstances, as situation, elevation, climate, geological formation, mean temperature, &c., have an important bearing upon the success of the treatment.

The best time for undergoing a course of mineral waters is, in the majority of cases, the months of June, July, August, and September. There are, however, exceptions depending upon climate; for example, at Gastein, celebrated for its thermal springs, the weather is changeable and stormy in June and July, but pleasant in May, August, and September. Early rising is usually advisable during a course of mineral waters, and, as a general rule, the water should be drunk before breakfast, at intervals of about a quarter of an hour between each tumbler, moderate exercise being taken in the intervals. In many cases bathing is of even greater importance as a remedial agent than drinking. Baths are generally taken between breakfast and dinner, and should never be taken soon after a full meal. The time during which the patient should remain in the bath varies very much at different spas, and the directions of the local physician should be strictly attended to on this point. As a general rule, the treatment should not be protracted beyond the space of six weeks or two months, but on this point the patient must be solely guided by the physician resident at the spa. Indulgence in the pleasures of the table, and excesses of any kind, may counteract the salutary effects of the waters, while perfect mental relaxation is an important auxiliary to the treatment. Spas are only suitable for patients suffering from *chronic disorders*.

No classification of mineral waters based upon their chemical composition can be strictly exact, because many springs are, as it were, intermediate between tolerably well characterised groups. The following classification is perhaps the most convenient: (1) Alkaline Waters; (2) Bitter Waters; (3) Muriated Waters; (4) Earthy Waters; (5) Indifferent Thermal Waters; (6) Chalybeates; (7) Sulphurous Waters; (8) Arsenical Waters.

(1) The Alkaline Waters are divisible into (a) *Simple Alkaline Effervescent Waters*, of which the chief contents are carbonic acid and bicarbonate of sodium. The most important spas of this class are the thermal springs of Vichy and the cold springs of Fachingen, Geilnau, and Bilin. These waters are useful in certain forms of indigestion, in jaundice arising from catarrh of the hepatic ducts, in gallstones, in renal calculi and gravel, in gout, in chronic catarrh of the respiratory organs, and in abdominal plethora. Vichy (q.v.) may be taken as the representative of this class of springs. (b)

Muriated Alkaline Effervescent Waters, which differ from the preceding sub-group in additionally containing a considerable quantity of chloride of sodium. The most important spas of this kind are the thermal springs of Ems, and the cold springs of Selters and Salzbrunn. They are useful in chronic catarrhal affections of the bronchial tubes, the stomach and intestines, and the larynx; while the Ems waters possess a high reputation in certain chronic diseases of the womb and adjacent organs. (c) *Alkaline Saline Waters*, of which the chief contents are sulphate and bicarbonate of soda, such as the warm springs of Carlsbad and the cold springs of Marienbad, serviceable to patients suffering from abdominal plethora, if unconnected with diseases of the heart or lungs. These waters, especially those of Carlsbad, afford an excellent remedy for the habitual constipation which so frequently arises from sedentary occupations.

(2) The chief contents of the Bitter Waters are the sulphates of magnesia and soda; and the best-known spas of this class are those of Sedlitz, Friedrichshall, and Kissingen; although two valuable English examples are the bitter water of Cherry Rock, near Kingswood, in Gloucestershire, and the Purton Spa, near Swindon, in Wiltshire. These waters act both as purgatives and diuretics.

(3) The Muriated Waters are divisible into (a) *Simple Muriated Waters*, of which the chief contents are a moderate quantity of chloride of sodium or common salt. The chief spas of this class are Wiesbaden and Baden-Baden, which are hot; those of Soden (in Nassau), of Mondorf (near Luxembourg), and of Canstatt (near Stuttgart), which are tepid; and those of Kissingen, Homburg, and Cheltenham, which are cold. The muriated saline springs of Saratoga in the United States are some of them chalybeate, others sulphurous or iodinous; all of them being rich in carbonic acid gas. The Ballston saline spring near Saratoga has a very high proportion of carbonic acid. They are chiefly employed in cases of gout, rheumatism, scrofula, and abdominal plethora. (b) *Muriated Lithia Waters*, of which the chief contents are the chlorides of sodium and lithium. In gout they first aggravate the pain, but then give relief; and in periodic headache they have been found serviceable. (c) *Brines*, whose chief contents are a large amount of chloride of sodium, such as the spas of Droitwich in Worcestershire, Rehme in Westphalia, and Nauheim in Hesse. They are mostly employed for bathing, and are often of much service in scrofula, anæmia, rheumatism, certain forms of paralysis, and catarrh of the mucous membranes. (d) *Iodo-bromated Muriated Waters*, in which, besides a moderate quantity of chloride of sodium, the iodides and bromides of sodium and magnesium are contained in an appreciable quantity. The Kreuznach waters are used both for drinking and bathing, and are of service in tuberculous disease of the glands, in tuberculous ulcers, in chronic inflammation of the uterus and ovaries, &c. The waters of Hall, in Upper Austria, have a high reputation in cases of goitre.

(4) Earthy Waters, of which the chief contents are sulphate and carbonate of lime, as at Wildungen, Leuk, Bath, Lucca, and Pisa. The Wildungen water is a 'capital diuretic, and not only promotes the elimination of gravel and renal calculi, but, by its tonic action on the mucous membrane of the urinary passages, serves to prevent the formation of fresh concretions. It is also much used for chronic catarrh of the bladder, neuralgia of the urethra and neck of the bladder, dysuria, and incontinence of urine.' The baths of Leuk, in which many patients remain nine hours daily (viz. from 4 A.M. to 10 A.M., and from 2 P.M. to 5 P.M.), until an eruption appears, are chiefly

used in chronic skin diseases. The waters of Bath, Pisa, and Lucca, which are thermal, are useful in chronic skin diseases, gout, rheumatism, &c.

(5) Indifferent Thermal Waters, which usually contain a small amount of saline constituents. Of the spas of this class the most important are Gastein (95° to 118°), Teplitz (120°), Wildbad (96°), Warmbrunn (100°), Clifton (86°), and Buxton (82°). Their most striking effects are to stimulate the skin and excite the nervous system. They are especially used in chronic rheumatism and atonic gout; in diseases of the skin, such as prurigo, psoriasis, lichen; in neuralgia and weakness due to rheumatic and gouty exudations, to parturition, or to severe diseases, such as typhoid fever and diphtheria; in hysteria; and in general debility and wasting.

(6) Chalybeate Waters, which are divisible into (a) *Simple Acidulous Chalybeates*, whose chief contents are carbonic acid and bicarbonate of protoxide of iron; and (b) *Saline Acidulous Chalybeates*, whose chief contents are sulphate of soda and bicarbonate of protoxide of iron. The quantity of iron present is very small—from .08 to .15 in 1000 parts. Many of the chalybeate springs, especially in Germany, contain also much carbonic acid; carbonate, sulphate, and chloride of sodium is frequently present, and may help in the cure. Harrogate, Rippoldsau, Homburg, and the Putnam Spring at Saratoga are examples of chalybeate wells which are very seldom thermal. Strathpeffer has both chalybeate and sulphurous springs. Chalybeate waters are valuable in anæmia, enlargement of the spleen, and many female disorders.

(7) Sulphurous Waters, which contain sulphuretted hydrogen or metallic sulphides (sulphurets), or both; thermal as at Aix-la-Chapelle, Baden (near Vienna), Bâges, Eaux-Chaudes, and Bagnères de Luchon; cold as at those of Nenndorf and Harrogate. They are used externally and internally in chronic diseases of the skin, and are of service in swellings of the joints, in old gun-shot wounds, and in chronic gout and rheumatism. In chronic laryngeal and bronchial catarrh they frequently give relief. Mineral mud-baths are often a valuable auxiliary.

Mineral springs are now sometimes classified less by their mineral content than by their high index of radio-activity, due to substances of high instability and soon lost.

See Tichbourne and Prosser James, *Mineral Waters of Europe* (1883); Bradshaw's *Dictionary of Mineral Waters*; for U.S. and Canada, Walton (1875); Weber, *The Spas and Mineral Waters of Europe* (1896); the Report of a Committee on *The Climates and Baths of Great Britain* (2 vols. 1900-1902); Luke, *Spas and Health Resorts of the British Isles* (1919); and the works cited at HEALTH-RESORTS.

Miners' Worm. See ANKYLOSTOMIASIS.

Minerva, a Roman goddess, ultimately identified with the Greek Athena (q.v.). Her name may come from the same root as *mens* ('mind'); and the ancient Latin scholar and critic, Varro, regarded her as the impersonation of divine thought—the plan of the material universe of which Jupiter was the creator and Juno the representative. Hence all that goes on among men, all that constitutes the development of human destiny—itsself but the expression of the divine idea or intention—is under her care. She is the patroness of arts and trades, and was invoked alike by poets, painters, teachers, physicians, and all kinds of craftsmen. She also guides heroes in war; and, in fact, every wise idea, every bold act, and every useful design owes something to the high inspiration of this virgin goddess. Her oldest temple at Rome was that on the Capitol, but she had

another on the Aventine. Her festival was held in March, and lasted five days, 19th to 23d.

Minerva-press, a printing-office in Leadenhall Street, London, from which issued in the later 18th and early 19th century a long series of highly sentimental novels, with remarkably intricate plots and an ample measure of tribulation and tears before the happy dénouement was reached.

Mines, **MILITARY**, are underground passages, usually lined with planks termed *cases*, by means of which explosives are lodged in such a position as to destroy the enemy's works or to gain cover for lodgments from which the besieger may continue his advance. Before the invention of gunpowder, mines were constantly used to effect an entrance into a besieged place or to breach its walls by underpinning them with timber, which was then set on fire. Thus Alexander the Great breached the walls of Gaza. Cæsar found the Gauls so skilled in their use as to be able to arrest the progress of his own miners. Powder mines began to be largely used early in the 16th century. To meet attack by mining, *countermine*s behind the walls near their base, and then long galleries from them under the ditch with *transversals* and *listeners*, were added to the permanent fortifications of the 17th century. These enabled the besieged to ascertain the direction of the besieger's mining approach, and to destroy his galleries by timely explosions. Systems of countermine became very elaborate during the 18th century, radiating from the salients sometimes in several tiers; the length of the galleries for a single front in some cases amounted to 3 miles or more.

When the besieger can no longer advance by surface approaches he has recourse to mining, sinking a vertical *shaft* (about 4' x 2' inside measurement) or an *inclined gallery* (about 5' x 2'), generally from the third parallel, and from it working his way forwards. *Branch-galleries* (3' 6" x 2') are broken out wherever necessary, and specially constructed *frames* fitted throughout as the work progresses. In such a confined space only very small tools can be used, and only one man can work at the head of a gallery at one time, doing about 12 inches an hour. Small trucks and fan-blowers, or other ventilating appliances, are also necessary. At the head of the gallery a chamber is constructed to hold the charge, which is then *tamped*; that is to say, the gallery in rear is filled with earth for a distance greater than the length of the *line of least resistance*, or distance to the nearest surface, and fired by electricity, powder hose, or Bickford's fuse.

Mining tactics require very great coolness, judgment, and resolution, especially on the part of the besieged. He must from his listening galleries estimate the distance of the enemy and avoid exploding his countermine too soon or he will only injure his own galleries. If he ceases to hear the miner's truck running in the enemy's gallery, he will know that tamping has commenced, and that, if within range, the time has come to explode his countermine. The defender is restricted to small charges for fear of making craters in which the besieger can lodge, unless his countermine galleries are very deep, while the besieger can advantageously use very large ones. The chief point in the defender's favour is that he can prepare beforehand a network of galleries, and by using boring tools he can place charges some distance in advance of their heads. If the besieger has been unable to ascertain the disposition and extent of the countermine system by means of plans or spies, he will have to obtain this information by the tedious and uncertain process of pushing out trial galleries. He will then place heavily charged mines on a line as nearly

as possible parallel to the ends of the countermines, but not nearer than 14 yards, the distance at which work is audible to the enemy. These will be fired and lodgments formed in their craters, from which the same tactics are repeated; the countermines when broken into will be occupied, and thus ground be gradually gained, and the defender driven back step by step until the counterscarp is reached. The wall will be broken through by a mine, the ditch crossed, and the breach (if one has been formed by artillery fire) will be reached and occupied. Under the breach the defender will have placed mines which he will spring at the moment of assault. If no breach has been made, the escarp wall will be mined and a breach be formed by blowing it down.

The war experiences of the 19th and 20th centuries have taught nothing new as to military mining. This is not surprising, for the implements of underground warfare have not been altered, though in some respects they have been improved. Modern high explosives are not more than two to two and a quarter times more powerful than gunpowder, when the latter can be thoroughly well tamped, as is usually the case in military mines (see GUN-COTTON and DYNAMITE), and the only considerable advantage possessed by the modern sapper is in the use of electricity to fire his mines, to illuminate his galleries, and to work pumps for draining, and fans for ventilating them. These conduce to the greater certainty, comfort, and safety of his work, but do not alter the fundamental principles of mining, which have remained the same since the latter part of the 17th century. The later experiences have only confirmed those of the past, both as to how and when mining must be undertaken. At the siege of Port Arthur in 1904, during the Russo-Japanese war, a great deal of mining was done as part of the regular siege work which was undertaken by the Japanese, after they had lost some 1500 officers and 40,000 men killed, wounded, and missing, in numerous attempts to carry the defences by assault with the minimum of preparation. Similarly in the trench warfare of 1914-18 mining had to be resorted to very early, but later on a scale of wholly unprecedented magnitude. The case of the Messines Ridge may be regarded as classic. Here, on 7th June 1917, a series of mines, containing a total of about 450 tons of explosives, were exploded simultaneously over a front of over seven miles. This important position was then captured with the minimum of loss. Mining, instead of being an incidental, developed into a special service, employing some 25,000 officers and men. Every resource of science was utilised; geologists were employed to advise as to strata dealt with, especially as to the possible presence of water; while very important instrumental innovations were the *Geophone* and the *Seismomicrophone*, at the least doubling the ability of the ear to hear enemy movements underground. The *geophone* can be used actually to locate the position of such enemy activity (see *Military Mining* (1921) and *The Work of the Royal Engineers in the European War of 1914-19*).

Submarine mines are charges of from 200 lb. to 500 lb. of explosive material, usually gun-cotton (though tri-nitro-toluene is rapidly coming into favour), contained in sheet-iron cases, which are sunk at suitable depths in waters through which it is desired to prevent the passage of hostile ships. They are generally laid in several rows, more or less chequerwise. In laying mines two special difficulties are experienced—the first, in providing that they shall always maintain a suitable depth to be struck by hostile ships in spite of the drag due to currents and tides; the second, that they shall not shift their positions or break loose owing to

rough weather, and become menaces to the user as great as to his enemy.

Submarine mines are of two kinds. *Controlled* mines are fired, by observation from the shore, by means of an electric Fuse (q.v.) in the charge. Their advantages are that friendly vessels can pass over them in safety, while if they drift or break loose they can be easily rendered quite harmless. Their disadvantages are that they are practically useless for defensive purposes at night or in thick weather, need an elaborate electrical and telescopic installation for their control by day, and—except in positions singularly favourable for observation—cannot be employed more than about a mile from shore. *Uncontrolled* mines, which are most frequently used, are of two kinds—*mechanical* (fired by percussion mechanism) and *electro-mechanical* (fired by electric fuse), which, when once laid, will be exploded by a blow given by any ship, whether friend or foe. There are several variants of the uncontrolled mines mentioned above. One of them is connected with the shore by electric cable, and can be rendered at will either harmless or capable of explosion by a blow. It shares a disadvantage of the *controlled* mine in that it requires an elaborate electric installation.

Uncontrolled mines were used to an enormous extent in the Russo-Japanese war, and were responsible for the sinking or disablement of a great number of vessels—in many cases the combatants suffering from their own mines.

Similar mines, but to an enormously greater extent, were employed in the war of 1914-18, large portions of the North Sea being sown with mines by both belligerents, and the experiences with them were the same as in the Russo-Japanese war, but on a vaster scale, while their specific use as a protection against submarines greatly increased their importance. One governing principle would seem to emerge as the result of the latest experience, which is that, while submarine mines can be used with considerable effect by a weak naval power, they must in the long-run favour the stronger one, when operations take place in waters suitable for their use; for, unless protected by war-vessels, mine-fields can be swept without insuperable difficulty. Thus the use of the Straits of Dover by Britain almost without interruption during the whole of the war was rendered possible to a considerable extent by immense mine-fields, which the Germans were unable to sweep owing to their being guarded by superior force. *Sweeping* is carried out by dragging a cable stretched between two vessels, steaming parallel to each other, through the mine-field. Although vessels of shallow draught are used for the purpose, it is a hazardous operation, and the deeds of the mine-sweepers during the war rank high as examples of steady endurance and courage.

Mines, ROYAL SCHOOL OF. See KENSINGTON.

Minghetti, MARCO (1818-86), Cavour's successor, was born in Bologna, studied there, and travelled in France, Germany, and Great Britain. Pius IX. in 1846 made him, now a journalist, minister of Public Works. But under Austrian pressure the pope's reforming zeal was short-lived, and Minghetti entered the Sardinian army, and at Custozza earned a knighthood. An ardent student of economics, a free-trader, and a devoted friend of Cavour, in 1859-60 he was his secretary for foreign affairs. Successively minister of the Interior, of Finance, and premier (1863), he concluded with Napoleon the 'September Convention' in 1864. In 1868 he was Italian minister in London, and thereafter minister of Agriculture. At Rome in 1873-76 he was prime-minister for the

second time, and till his death was still the most prominent member of the Italian parliament. He wrote lectures and essays on Raphael and Dante, *Economia Pubblica* (1859), and *La Chiesa e lo Stato* (1878). See his *Ricordi* (1888).

Mingrelia. See GEORGIA, CAUCASUS.

Minho (Span. *Miño*, anc. *Minius*), a river of Spain and Portugal, rises in the north-east of Galicia, flows south-west through the Spanish provinces of Lugo and Orense, and, after forming the boundary between Portugal and Spain, falls into the Atlantic Ocean. Its total length is 174 miles, and it is navigable for small craft 25 miles above its mouth; a bar at the entrance prevents the passage of large vessels. Area of basin, 157,000 sq. m. Its chief tributary is the Sil, which joins it from the left.

Miniature-painting, or the painting of portraits on a small scale, originated in the practice of embellishing manuscript books (see ILLUMINATION OF MANUSCRIPTS). As the initial letters were written with red lead (Lat. *minium*), the art of illumination was expressed by the Low Latin verb *miniare*, and the term *miniatura* was applied to the small pictures introduced. After the invention of printing and engraving this delicate art entered on a new phase; copies in small dimensions of celebrated pictures came to be in considerable request, and, in particular, there arose such a demand for miniature-portraits that a miniature in popular language came to signify 'a very small portrait.' Soon after their introduction miniature-portraits were executed with very great skill in England. Holbein (c. 1495–1543) painted exquisite miniatures, and having settled in London, his works had great influence in calling forth native talent. The works of Nicholas Hilliard (born at Exeter 1547, died 1619) are justly held in high estimation. Isaac Oliver (1556–1617) was employed by Queen Elizabeth and most of the distinguished characters of the time; his works are remarkable for careful and elaborate execution; and his son, Peter Oliver (1601–47), achieved even a higher reputation. Thomas Flatman (1637–88) painted good miniatures. Samuel Cooper (born at London 1609, died 1672), who was with his brother Alexander a pupil of his uncle, John Hoskins, an artist of reputation (died 1664), carried miniature-painting to high excellence. Cromwell and Milton sat to him; he was employed by Charles II., and obtained the highest patronage at the courts of France and in Holland. Jean Petitot (1607–91) was the first to bring to perfection the art of enamelling as applied to portraiture. There are as many as fifty-eight examples of this great artist in the Jones Collection at the South Kensington Museum. Richard Cosway (1740–1821) was one of the most famous miniaturists of the 18th century. Robert Thorburn (1818–85) first made his name as a miniaturist, and many others might be mentioned; but the last famous miniature-painter was Sir William Ross (1794–1860), who lived to see his art superseded by photography. The number of his miniatures in existence is said to number over 2200. Of late years public interest in the work of the miniaturist has revived, and several exhibitions of miniatures have been held. Prices have advanced, and it is extremely difficult to obtain good examples. The works of Cosway are especially sought after. Photography may be said to have killed the art, although miniatures have continued to be painted; but enthusiasts hope from the interest now taken in historical specimens that the art may yet be revived. As to technical details, the early artists painted on vellum and used body-colours—i.e. colours mixed with white or other opaque pigments, and this practice was

continued till a comparatively late period, when thin leaves of ivory fixed on card-board with gum were substituted. Many of the old miniature-painters worked with oil-colours on small plates of copper or silver. After ivory was substituted for vellum transparent colours were employed on faces, hands, and other delicate portions of the picture, the opaque colours being only used in draperies and the like; but during the 19th century, in which the art was brought to the highest excellence, it became the practice to execute the entire work except the high lights in white drapery with transparent colours.

See Walpole's *Anecdotes*; G. C. Williamson, *Portrait Miniatures from Holbein to Ross* (1898); J. J. Foster, *British Miniature Painters and their Work* (1898); Russell, *Art of Miniature* (4th ed. 1873); Wagner, *Miniature Painting* (Phila. 1876); Dudley Heath, *Miniatures* (Connoisseurs' Library, 1905); J. W. Bradley, *Dictionary of Miniaturists* (3 vols. 1888–89); and J. L. Probert, *History of Miniature Art* (1889).

Minié, CLAUDE ÉTIENNE, inventor of the Minié rifle, was born in Paris in 1814, enlisted in the army as a private soldier, and quitted it as colonel in 1858. He devoted his principal thought to the perfecting of firearms, and in 1849 invented the Minié rifle (see RIFLE). In 1858 the khedive of Egypt appointed him director of a small-arms factory and musketry school in Cairo. He died in 1879.

Minims (*Fratres Minimi*, 'Least Brethren'—so called, in token of still greater humility, by contrast with the *Fratres Minores* or Lesser Brethren of St Francis of Assisi), an order of the Roman Catholic Church, founded by another St Francis, a native of Paula, a small town of Calabria, about the middle of the 15th century. See FRANCESCO DI PAULA.

Mining. In Great Britain a mine is legally distinguished from a quarry by the fact of it being illuminated artificially, the quarry being open to the sky. In its unrestricted sense, however, the art of mining comprehends the processes of getting from the earth (no matter by what methods) all useful minerals, whether solid (coal, stone, metallic ores, &c.), liquid (petroleum, brine), or gaseous (natural gas); it often also includes those surface operations which are essential to render the mineral acceptable to its purchaser (see ORE-DRESSING.)

The liquid and gaseous minerals are both searched for and obtained by means of bore-holes. Deposits of solid minerals are divided into beds, veins, and masses. Bedded deposits include cases apparently so dissimilar as coal-seams and the 'reefs' of quartzose rock worked for gold in the Johannesburg district. These are *stratified* rocks, i.e. they lie parallel to and conformable with other rocks above and below them. Beds were originally flat, but may now be found tilted at any angle, and twisted, torn, and folded in every conceivable way. Many minerals occur in beds, e.g. salt, oil shale, many ironstones, fireclay, rock-phosphate, gypsum, slate, gold in 'placers' or river-deposits, &c. In addition to the reefs of the Transvaal, there are many notable instances of the impregnation of beds by metallic minerals, e.g. copper pyrites in shale at Mansfeld, Germany, and in sandstone at Alderley, Cheshire; native copper (the metal itself) in sandstones, lavas, and conglomerates, Lake Superior; lead in sandstone, at Mechernich, Rhine Province.

A vein is a sheet-like deposit, intimately connected with a dislocation (fault) of the encompassing rocks. It is usually steep (60° to 90° inclination), and variable in constitution and width. A workable vein is commonly 2 to 6 feet wide, but, if sufficiently rich, one only a few inches in width may be wrought. At the Homestake Gold Mine,

Dakota, owing to a number of ore-bodies running together, a composite vein 500 feet has been formed. *Lode* and *vein* are often used as synonymous terms, but it is preferable to give to the former word a wider significance than to the latter; a lode may be said to be any unstratified sheet-like deposit containing valuable minerals, no matter what may have been its mode of origin. A mass conforms neither to the definition of a vein nor to that of a bed. It is usually very irregularly shaped, a typical case being that of the iron-ore masses of the Furness district, North Lancashire, which are huge pockets of hæmatite lying in limestone.

The mining of a bed differs in many respects from the mining of a lode. For instance, the commonest manner of approach of a bed is by a vertical shaft, which passes through barren strata until the bed is reached; on the other hand, a lode, lying at a high angle, is often reached from one or more drivages (inclined shafts), commencing on the *outcrop* of the lode (i.e. where the lode comes to the surface), and following the deposit to the dip. The latter system does not permit of rapid hoisting, it being only suitable for small outputs, while in the former hoisting (winding) at speeds which, in the middle of the shaft, may attain or exceed 60 miles an hour, is not uncommon. But it must be observed that in mining most beds (whether of coal, fireclay, &c., or of Witwatersrand gold-ore) the value per ton of the product is small, and profitable working depends upon raising large quantities. The need for a heavy output from a winding shaft, and of a steady and economical delivery of mineral to the bottom of that shaft, has led to great improvements in the operations of winding and underground mechanical haulage in coal and similar mines. The framework which supports the small mine-wagons (*tubs*, *trams*, or *hutches*) as they are being raised or lowered in a vertical shaft is known as a *cage*. It may have from one to six decks or platforms, two being the usual number; a large cage, fully loaded, may weigh 20 tons. To expedite the operation of changing loaded for empty tubs (or *vice versa*), the *simultaneous decking* of cages is frequently carried out at large collieries; when a multiple-decked cage reaches the top or bottom of a shaft, it comes to rest opposite as many platforms as there are decks, and the changing of all the decks simultaneously is carried out, sometimes by mechanical means, in a few seconds. The tubs which then remain on the platforms at pit-head or pit-bottom are dealt with while the cage is making its next journey. Colliery winding-shafts are generally provided with two cages. The largest shafts in the world are those of the Witwatersrand, in several of which six cages are in operation. These latter shafts are rectangular; those at most collieries are round, though many in Scotland are rectangular, and a few in Wales, Scotland, and America are oval in shape.

Owing to the risk of fire, the structure over a shaft-mouth (*headgear*, *poppit-frame*) is no longer being made of wood at British mines; steel lattice-work is the favourite type, but increasing numbers of these frames at home and abroad are being constructed of reinforced concrete—a material which is economical, rigid, fireproof, and not addicted to corrosion. Moreover, concrete lends itself to the formation of a shaft-housing, or covered heapstead, as a part of the same structure as the headgear. The tendency is to get under cover as much as possible of the surface arrangements (decking, tipping, picking, screening, &c.), and to eliminate wood, even for gantries.

The most striking difference between the up-to-date colliery and an old one is not so much the increase in scale of the undertaking as the greater

spaciousness and neatness of the former, both above and below ground; things are planned with a scientific directness, and often with an effective simplicity, which did not obtain in the 19th century; at every turn labour-saving devices and machinery are used; and electrical power is everywhere.

The typical metalliferous mine, working a lode, differs from a colliery in that it is dealing with a comparatively small output of a much greater value per ton. Due allowance being made for some exceptions, such factors as rapid winding and mechanical haulage do not need to be considered. In an unproved vein, an inclined shaft following the vein serves as an exploratory passage by which that very variable deposit may be examined. Subsequently, when the vein has been proved to be of a value to warrant the great expenditure, a vertical shaft or, alternatively, a straight inclined shaft situated altogether in the barren 'country' on one side or the other of the vein, may be sunk, and the vein approached from the shaft by *cross-cuts*. Cross-cuts are driven at vertical intervals, usually ranging from 60 to 250 feet. When a cross-cut reaches the vein a *level* is driven to the left hand and to the right hand, and in the vein itself. Vertical shafts are sunk to the deeper and flatter parts of Witwatersrand gold-reefs; when the reef is reached, one or more inclined shafts are set down in the reef or parallel to it. The hoisting-engines for the vertical shafts are at the surface; those for the inclined shafts are in this instance placed underground.

Metalliferous deposits are often found in hilly country. A vein outcropping on a mountain slope can be cheaply and conveniently reached by level drifts (*adits*) entering from the hillside, and shafts may not be required. Most of the seams of coal approachable by adits or day-levels have been exhausted in Britain; but coal-adits are common in the United States and elsewhere. Several anthracite mines in the western part of the South Wales basin and some oil-shale mines in Scotland are approached by 'slopes' or inclined shafts, but the method is uncommon elsewhere in British coalfields.

Collieries are provided with at least two shafts or other openings; one shaft is termed the *downcast*, as it conveys fresh air into the mine; the other the *upcast*, as it carries the vitiated air from the mine. Both these shafts have to be fitted with the means for raising or lowering persons, so that, should one be damaged, the other is available. A large mine, especially if there is much pumping of water to be done, may have three and even four shafts. A group of mines may be connected together underground; this method, though common on the Continent, is, however, infrequent in Britain. Though many mines raise coal from both upcast and downcast shafts, one shaft is often the chief or the only one at which mineral is wound. In Britain the principal winding-shaft is the downcast, and in the United States and Canada the upcast. The main reason for this difference of practice is to be sought in the less equable climate of the latter countries. Were they to wind at the downcast, much trouble—amounting sometimes to actual stoppage of the operations—would be experienced in winter owing to the formation of ice in that shaft. The upcast, on the other hand, is traversed by the warm air from the workings.

Circular shafts range from about 9 feet to 23 feet in diameter. Modern shafts for large undertakings are generally over 18 feet in diameter. The cost of sinking and equipping such a shaft may reach £150,000, while that figure will probably be exceeded if exceptional difficulties are encountered in sinking.

The deepest mine workings in the world are those of the Morro Velho Gold Mine, Brazil, which extend to over 6400 feet from the surface. Some of the deeper mines of the Lake Superior copper-bearing area are but little behind this figure. The record will be broken in the Transvaal, where the gold-reefs are to be worked at 7000 feet.

The deepest vertical shaft in Britain is that at the New Moss Colliery, near Manchester; it attains a depth of 2820 feet. Owing to the practice of following the seams to the dip from the shafts, the lowest parts of the workings are often considerably deeper than the shafts; for instance, at the Pendleton Colliery, near Manchester, the deepest mine in Britain, coal is being wrought at depths over 3500 feet, though the shaft is only about half that depth. The coal mines in the neighbourhood of Mons, Belgium, are exceptionally deep; the deepest of these—probably the deepest colliery in the world—is that called *Produits de Flénu*; the shaft is 3773 feet.

The depth to which mining can be carried out will be limited much more by the temperature of the rocks than by engineering difficulties. The salient factor in deep mining, then, is the natural rise of temperature of the rocks as the depth increases. The average rate of increase of temperature in Great Britain is about 1° F. for each 67 feet of depth, but wide local variations from that mean are known to exist. It is noteworthy that the very deep metalliferous mines to which reference is made above are all in districts of low *temperature gradient*, i.e. they are situated where temperature increases unusually slowly with depth. The temperature gradient at Morro Velho is 1° F. per 140 feet; at the Calumet and Hecla Mine, Lake Superior, 1° F. per 200 feet (approximately); while in the Johannesburg area it appears to be about 1° F. per 120 feet of depth. Notwithstanding this fortunate natural advantage, the lowest workings at Morro Velho proved to be excessively hot, until the air-temperature was reduced, first by improving the ventilation and then by installing refrigerating plant at a cost of £90,000. By means of the latter a part of the air entering the mine is artificially cooled.

The operation of searching for mineral deposits is called *prospecting*. Though the modern prospector takes advantage of the help afforded by geology and mineralogy, it has to be admitted that a great many famous deposits have been discovered by chance. Thus, the observation of pellets picked up by birds led to veins of gold-ore being found in Lower Hungary, while the rich silver mines of Potosi are said to have been discovered by an Indian goatherd, who, taking hold of a bush to prevent his falling, pulled it up by the roots, thereby disclosing an outcrop of silver ore. The great silver-lead deposits at Broken Hill, New South Wales, were found accidentally by a party who were looking for fresh pasturage for their sheep. The discovery which prefaced the famous Californian gold rush of 1849 was made by J. W. Marshall while cutting a small mill-race. Sometimes a valuable deposit has been found while searching for something else; for example, the great bed of rock-salt underlying the Cleveland district of North Yorkshire—a bed about 90 feet thick and extending over 20 square miles—was encountered while drilling for water. In some regions, and particularly in Africa, the prospector is on the look-out for old workings—a certain indication of mineral wealth. These ancient mines are widely spread, and occur in most unexpected places. The best known are the old gold workings in Rhodesia. Whatever race was responsible for them was highly skilled in the arts of mining and prospecting. That it was a foreign race, occupying the country for the sake of its

mineral wealth, and in face of the opposition of the natives, appears clear from the existence of a succession of ruins of fortified posts and towns, extending in a line—the trade-route of those days—from the mines to the eastern coast of Africa. Rhodesia may, indeed, be the Ophir ('Place of Gold') of the Old Testament. Ancient mines, regarding whose history we have no clue, occur in Nigeria and the Philippines; others, wrought by the Egyptians, are scattered about north-east Africa. The Egyptians, like the majority of the great races of antiquity, were skilful miners, and it is of interest that the oldest map in the world—a papyrus of about 1300 B.C., preserved at Turin—depicts the workings of gold-bearing veins in a mountainous district of the Arabian desert.

Coal, which occurs in definite and well-known geological positions, is searched for by *boring*. Bore-holes are also used by the metalliferous miner to prove the continuation of a lode, whether laterally or in depth, and to search for parallel veins—for veins not infrequently occur in sets or series, occupying fissures which are roughly parallel. Bore-holes can be drilled in any direction from the vertically down to the vertically up; the latter is useful now and then underground. For prospecting purposes, however, the down-right hole, drilled from the surface, is usual. There are many boring systems. In oil-mining two are principally used. The first and older (the *cable system*) consists in raising and dropping a string of tools, of which the bottommost is the bit or chisel. These tools or rods are attached together by conical screws; they are to give weight and guidance to the bit, while one of them (the *jars*) is useful in releasing a bit that has stuck in the hole. Originally the bit used in this system of boring was a cutting-chisel, but nowadays the narrow edge has been replaced by a very obtuse one, of which the faces lie at an angle of about 150°; the weight has been increased and the bit converted into a pounding rather than a cutting tool. The string of tools is operated by a cable extending, up the bore-hole, to a pulley at the top of a tall derrick (wood or steel) standing over the hole, and down again to a drum (the *bull-wheel*) upon which the excess is coiled. The cable is generally of manila for shallow holes and of steel for deep ones. The cable and tools can be withdrawn from the hole by setting the bull-wheel in rotation. When drilling, the cable is connected to one end of a horizontal oscillating beam (*walking beam*) by means of a combined feed-screw and grip called the *temper screw*; the motion of the beam is thus transmitted to the cable and tools. The cable system, which has been developed to a high degree of perfection in America, is the chief example of the *percussive* method of boring. The second method, which we owe to the oil-miner, is the *hydraulic rotary system*—a system in which a fish-tailed cutting-bit is rotated at the bottom of a column of hollow steel rods extending to the surface. When drilling is proceeding, a stream of thin mud is pumped down the hollow rods, and issues through an opening in the bit into the bottom of the hole; the stream then rises up the hole to the surface. The purpose of the mud-laden water is twofold. First, it removes and carries up the chippings cut by the bit, and, secondly, by penetrating into the walls of the bore-hole, the mud prevents an early collapse of the hole when drilling in soft material. The latter method is as yet unsurpassed for drilling in soft ground, and, under favourable conditions, a rate of progress often exceeding 100 feet per day is secured. About 45 horse-power is consumed by the hydraulic rotary drill and mud-pump. The cable system usually requires about 35 horse-power. All oil-wells are carefully lined with water-tight steel tubes. New

oil-wells now average about 2500 feet, but several holes exceeding 5000 feet have been drilled by the cable system.

The two boring methods described are not suitable in prospecting for coal or ores. For that purpose three rotary systems, the diamond, chilled-shot, and Davis-Calyx systems, are considerably employed. They resemble each other in that some form of cutting *crown* is rotated at the bottom of the hole by means of a column of hollow rods, down which water is pumped to keep the crown clear of the fine *débris* it creates. Each method, again, cuts a ring or annulus instead of chopping, as does a chisel, over the complete area of the circle. As the work proceeds, a column of rock, termed the *core*, rises within the hollow crown, exactly as a small cylinder of cork forms within a cork-borer. From time to time the core is broken off and brought to the surface for examination; these cores are invaluable in investigating a new district. The chief difference between the three methods lies in the character of the cutting-crown. The crown of the diamond drill consists of a hollow steel cylinder set with a number of diamonds (black stones or 'bort'), which are selected for the purpose because the diamond is the hardest of minerals. A diamond crown makes progress by the stones cutting into and abrading the rock. The chilled-shot crown is a simple steel cylinder; the abrasive material this time consists of numbers of hardened iron shot, $\frac{3}{16}$ th to $\frac{1}{4}$ th inch in diameter, which are fed down the hollow column of rods; being caught under the crown and carried round with it, the shot cuts its way forward. Chilled-shot drilling is cheaper than diamond drilling, and hard rocks can be bored through by means of it. The Davis-Calyx crown is furnished round its edge with teeth, and its action is more akin to cutting than to abrasion or scouring; it is unsuitable for drilling in hard ground, but it provides a cheap and rapid method of boring through softer rocks like shale. A simple type of toothed steel crown, flushed with thin mud instead of clean water, has come into use for oil-wells in California. It is of interest that in the earliest method of drilling yielding cores, a method invented by J. Ryan and employed before 1810, a steel tube armed with teeth was adopted. The deepest bore-hole put down in Britain was completed in 1907 at Cameron Bridge, Fife-shire. It was drilled by the diamond method, and reached a depth of 4535 feet. Starting at rock-head with a diameter of 7 $\frac{1}{2}$ inches, it finished, after nearly five years of work, with a diameter of 1 $\frac{1}{2}$ inch. The cores obtained from the bottommost portion of the hole were but little thicker than a common lead-pencil.

The great majority of mine-shafts are sunk by means of explosives, the *débris* being raised to the surface in buckets (*hoppits*, *kibbles*, *kettles*) holding from 1 to 5 tons; the water is raised by pumps suspended from ropes or chains; and the walls or sides are lined or cased with timber, brickwork, or concrete. Excessive inflows of water constitute the principal difficulty of sinking, and certain strata, like the magnesian limestone overlying portions of the coalfields of Yorkshire and Durham, have an evil reputation to the shaft-sinker because of the water they contain. Probably the greatest volume of water ever successfully dealt with in shaft-sinking by means of direct pumping was at the Horden Colliery, Co. Durham; the water came from the magnesian limestone, and at one time 10,000 gallons (45 tons) per minute were raised in one shaft by four suspended bucket-pumps, each of 30 inches diameter. After a water-bearing belt of rock has been sunk through, it is standard practice to dam it off by lining the shaft with a water-tight casing of cast-iron, known by

the name of *tubbing*. Tubbing is built in rings, each about 2 $\frac{1}{2}$ feet high, and each consisting of a number of segments cast with flanges and strengthening gussets. In the original or English system of tubbing the flanges are turned outwards, or away from the centre of the shaft, and the segments are tightened in position by driving large numbers of wooden wedges behind them, strips of wood being placed between the vertical and horizontal joints as a packing, which becomes water-tight under pressure. In the continental system, on the other hand, the flanges are internal, i.e. they project towards the centre of the shaft; strips of lead are laid in every joint, and the joints are made tight by the aid of bolts passing through the flanges. Among other technical advantages, continental tubbing can be built downwards from a hanging-ring, which is itself water-tight; tubbing so constructed is spoken of as *under-hung*. Sinking through watery strata has been facilitated and cheapened by the process known as *cementation*; it consists in forcing cement slurry through bore-holes drilled round the shaft and in advance of the sinking. Properly applied, the cement is most effectual in filling and sealing the water-channels in the strata. Cementation strengthens the ground round the shaft, and often renders tubbing unnecessary. It may also be employed when sinking or driving through loose, running sand. Another special process of sinking through watery ground or running sand is by freezing the water in an annulus, 4 or 6 feet thick, surrounding the section to be excavated. One or two rings of bore-holes are drilled round the shaft to the base of the watery stratum; they are completely lined with tubes and sealed at the bottoms; a smaller inner tube is then fitted within each bore-hole and reaching nearly to the bottom, thus allowing of a freezing liquid (usually a solution of calcium or magnesium chloride) to be circulated by a pump down the inner tube and up the outer one. The liquid is cooled at the surface by means of a refrigerating plant. When the ice barrier is complete, the shaft may be sunk without needing pumps and cast-iron tubbing built into place.

Previous to the introduction of blasting in mines, the cutting of galleries through hard rock was particularly laborious. It was done by means of three tools of great antiquity—the hammer, gad or wedge, and pick. The process of *fire-setting* was much resorted to in metalliferous mines in those days. It was probably an invention of ancient Egypt; at any rate, it was used by the Egyptians in their gold-mines. It consisted in building a fire of faggots against the face of rock to be broken down. The fire cracked and loosened the rock, rendering it amenable to attack by pick and wedge. Fire-setting actually remained in regular use in certain lead-mines of Germany until well into the 19th century—two hundred years after the introduction of blasting. Until comparatively recent times the sole explosive employed in blasting was common black powder. A good deal of powder is still utilised in quarries, such as slate quarries, where it is undesirable to shatter the rock, and in breaking down coal, where again it is necessary to obtain the mineral in as large pieces as possible. Its use in collieries is limited to those mines where there is negligible risk of the shots igniting firedamp or coal-dust, and even then is only allowed when made up into cartridges. The best powder-cartridge is 2 ounces in weight; it is made of gunpowder, compressed into the shape of a short cylinder, and is pierced axially for the admission of the fuse required to fire it. Ordinary fuse is of a diameter rather less than that of a lead pencil, and, like the pencil, it has a core running centrally

through it. The core is of fine black powder; it is protected by successive layers of jute tape, and, in the better kinds of fuse, by a water-proofing layer. It is made to burn at the rate of 2 feet per minute; hence 4 feet of fuse (a usual length in shot-firing) allows the miner two minutes to reach a place of safety after lighting the fuse. Gunpowder, or any other mining or quarrying explosive, is fired at the inner end of a *shot-hole* (generally from 2 to 6 feet in length), which is packed-up (*tamped*), after inserting the charge and fuse, with clay. The clay, known in this connection as *stemming*, is to prevent the charge blowing-out after the manner of a cannon; it is necessary to ensure that the explosive does useful work. In soft rocks, e.g. coal or shale, shot-holes are drilled by hand. A simple rotary type of drill is used; it automatically feeds forward $\frac{1}{8}$ inch for every complete revolution. Hand labour is still a good deal employed in drilling these holes in hard rock, such as that so generally encountered in metal-mines. The method in the latter case is percussive, the drill—an octagonal piece of steel provided at one end with a carefully-tempered chisel edge—being struck by a hammer. Between blows the drill is rotated to cause it to cut a hole of circular section. Immense improvement has of late years been effected in percussive rock-drills driven by compressed air, and their use is widespread to-day, particularly in metal-mines. They are divisible into two classes—i.e. the hammer-drill and the piston-drill. In the former, a rapidly reciprocating piston, working within a cylinder, strikes upon the end of the drill-steel; it acts, indeed, exactly as does the hammer in percussive hand-drilling. In the second type the drill-steel and piston are attached together, and therefore reciprocate together. In both types means are provided for the automatic rotation of the drill-steel. Many drills of either class are supported, when in use, upon a steel bar or stand rigidly set between roof and floor, or horizontally between the walls of the working place; the pistons of such drills are generally from $2\frac{1}{4}$ to $3\frac{1}{4}$ inches in diameter, though lighter ones are employed in metal-mine *stopes* (working places). The most familiar type of hammer-drill is the *jack-hammer*, a light form having a piston diameter of about $1\frac{1}{2}$ inch; it is generally supported by hand, but special stands are now provided to facilitate the drilling of upward-trending holes by the jack-hammer. Heavier drills usually run at 180 to 250 double-strokes per minute, but the jack-hammer strikes about 2500 times per minute. Compressed air for drilling purposes is supplied at pressures between 40 and 100 lb. per square inch. Higher pressures imply smaller drills for the same duty; the advantage is, however, gained at the expense of a heavier cost in repairs. A lengthy and drastic trial of light stoping drills was carried out in 1908 at Johannesburg. The two drills which shared the first prize in the competition (Holman $2\frac{1}{4}$ inches and Siskol drills) respectively drilled, in the very hard Rand quartz-ore, at the rates of 0.742 and 0.818 inch per minute, the time being taken as the whole period the drills were set up, including stoppages. The cost for the two drills was 9.77d. and 9.90d. respectively per foot drilled.

The discovery of nitro-glycerine by Sobrero in 1847, followed twenty years later by Nobel's invention of the first practical nitro-glycerine explosive (dynamite), marks a new era in mining—the era of the high explosive. Technically, a high explosive is one requiring to be fired by *detonation*. Most of the high explosives are much more powerful than gunpowder, and have a shattering rather than a rending action. Some, however, are more gentle in their effect, having been intended for breaking

down coal. An immense number of high explosives is now known; the most popular, e.g. *blasting gelatine*, *gelignite*, and *dynamite*, have nitro-glycerine as the explosive base; others, e.g., *ammonal*, have nitrate of ammonia as the main ingredient. To explode a charge of high explosive, a *detonator* is fired in the charge. A detonator is a copper cylinder closed at one end and resembling a very long percussion cap. The cylinder is almost half full of fulminate of mercury. No. 6 detonator—one of the commonest sizes—contains 1 gram of fulminate. The detonator is attached to a powder-fuse; it is then inserted in the charge; the cartridge, so prepared, is pushed to the back of the shot-hole; the hole is stemmed with clay, and the fuse lighted. The firing of the fulminate explodes the charge. *Electric detonators* are used on a large scale in British coal-mines; they are fired by means of a hand-worked magneto (*shot-firing machine*) and a length of double-core cable. Electric-firing is safer and surer than firing by means of the powder-fuse. It is compulsory in certain classes of mines and in pits in process of being sunk. A special group of explosives, known as *permitted explosives*, has come into being to satisfy the coal-miner's need for explosives which do not produce flame. These are rigorously tested before they are placed on the 'permitted list,' and their use is compulsory in any part of a mine where there is the least risk of an explosion of coal-dust or firedamp.

Relatively, metal-mines are much greater users of explosives than coal-mines. The copper-mines of the Butte district, Montana, between them use 7 million pounds weight of dynamite per annum. When a porous cartridge of carbonaceous material—e.g. charcoal—is saturated with liquid oxygen it forms a powerful explosive. Liquid oxygen explosives were used considerably in Germany during the Great War for mining and quarrying, though they are unsuitable for gassy collieries. The liquid oxygen (temperature -185°C.) is carried in double-walled vacuum vessels, resembling thermos flasks, but made of metal or porcelain.

However they be hedged in by regulations, explosives will always be dangerous, and the colliery manager studies to reduce their use to a minimum. The pressure of the roof may, in favourable circumstances, be directed to the breaking down of coal, and by a proper control of roof-pressure a few collieries do not require to fire shots in coal from one year-end to the other. Wedges are also applied. Many attempts to get a substitute for an explosive charge have been made. Hydraulic pressure and the expansive force generated when lime is wetted have, for example, found transitory favour, but these means have been given up for technical reasons.

Before coal is broken down by explosives, or by the roof pressure or other means, it is *undercut*. An undercut is a slot cut in the lowest part of the bed. Undercutting or holing constitutes the miner's hardest task; in doing it, he lies on his side or sits in a crouching position, a light pick (*holing pick*) being the tool employed. The use of *coal-cutting machines* (which are principally holing machines) has developed greatly of late years, and Britain bids fair to rival America in their application. They are driven by compressed air or by electricity. They make a neat, low slot in the coal, or in fireclay below the coal. The average depth of a machine-cut is about 3 feet 9 inches, but some machines reach under to a depth of 6 feet, and very exceptionally to 7 feet. The machines, which draw themselves along the 'face' by means of a steel rope or chain, generally operate during the afternoon and night shifts, the coal being broken down and removed during the morning

shift. They commonly cut a distance of 120 or 150 yards per day, but this distance does not represent their full capacity. With the majority of these machines the actual undercutting is done by means of an endless chain provided with detachable teeth or 'picks'; the chain projects under the coal, and is driven by gearing from the engine or motor. The cutting implement in another type is a large, flat, rotating disc furnished with teeth round its periphery; while a third variety undercuts by means of a straight, tapered bar of nickel steel fitted with a larger number of small teeth, and made to revolve rapidly. Certain other machines are designed to undercut in narrow places—i.e. in roads 12 or 15 feet wide driven in solid coal; while yet another form, only employed in thick seams, bores out a complete road, circular in section, and 5 feet 6 inches in diameter.

The actual methods of working coal, though subject to almost endless variation in details, are amenable to classification under two heads, viz. *bord-and-pillar*—also known as *pillar-and-stall*, *stoop-and-room* (Scotland), *pillar-and-entry* (America)—and *long-wall*. The former is the commoner in America, but the latter is preferred in Britain. In *bord-and-pillar* working a section of the seam is first cut up into pillars by driving roads at right angles to each other. The pillars are either square or rectangular, with sides varying between 15 and 80 yards in length. The pillars are then removed by working them off in slices, and the roof is allowed to collapse. The *bord-and-pillar* method still proves the cheaper if the seam is thick, the coal free from streaks or layers of dirt, and the roof strong. On the other hand, the *long-wall* system is preferable for thin seams or for those yielding a lot of rubbish in working. *Long-wall* consists in removing the coal in a single operation by working it on long 'faces' or 'walls.' As a face is advanced and the coal removed, the roof subsides and breaks over the area (the *gob* or *waste*) left behind. Roads, supported at the two sides by thick walls of stone and rubbish (*pack-walls*), are maintained through the waste for access to the faces and for the removal of coal. The *long-wall* system especially lends itself to undercutting by machines. It also permits of the installation, at machine-cut or other faces, of *conveyers* to carry the coal wrought at the faces to points where the conveyers discharge into mine trams or 'tubs.' The *long-wall face conveyor* is a familiar machine in British mines, and has effected a saving in working costs, and an increased production per person employed. At the Newbattle Colliery, Midlothian, the whole of the coal is cut by machinery, and is transported along the faces to the road ends by conveyers.

It has been described how, in metal-mines operating on a steep lode, levels are driven in the lode at vertical intervals ranging between 60 and 250 feet. The levels are connected by a large number of passages running to the full rise or dip of the lode. If these passages are driven upwards they are called *rises* (*raises*, America); if driven downwards they are known as *winzes*. The passages in question serve first as a means of exploring the lode between adjacent levels; secondly, as a means of access to, and of ventilation of, working places which, later on, are wrought in connection with them; thirdly, they become useful in the discharge of ore and water from those working places. By a series of levels and winzes (or rises) then the lode is divided up into large rectangular blocks. The extraction of these blocks, or of such portions as are sufficiently rich, is called *stopping*. A stope may be carried upwards (*overhand stope*) from a level, taking out the ore as it proceeds, or it may be carried downwards (*underhand stope*).

Though both modes of stopping are practised, the former is the commoner. If the lode is thin, a good deal of waste rock will have to be broken down in the operation of stopping; the waste is left behind, and serves a useful purpose in supporting the sides of the stope. When working a wider deposit no such supply of waste is forthcoming from the stope itself, and filling material is often imported from other parts of the mine or brought down from the surface.

No operation in mining consumes so much power as that of pumping water. Pumping by wooden or iron rods descending the shaft is still practised in both coal and metal mines. The rods, which are given a slow up-and-down motion by a surface engine, operate a pump, or, in deep shafts, a series of pumps, situated in the shaft. The usual method, however, now consists in placing the pumps underground and driving them electrically. Many reciprocating underground pumps are used; but the mine pump *par excellence* is the turbine pump. It consists of a number of wheel-like *impellers* provided with vanes or blades. Several of these impellers are carried on a single shaft. The water enters at the centre of the first, is thrown out centrifugally by the blades, is guided to enter at the centre of the second wheel, and so on, being finally discharged into the pipe conveying the water up the shaft. Turbine pumps are suitable for an electric drive; they can deal with large volumes and can raise water to a height which may exceed 1000 feet.

The health and efficiency of the underground worker depends more upon effectual ventilation than upon any other factor. Primarily, mine ventilation is needed to remove injurious gases from the working places; in addition, deep mines are largely dependent upon a copious ventilation for the reduction of temperature and of the percentage of watery vapour in the air. In the early days of mining, mines were ventilated altogether by *natural ventilation*, so called. Natural ventilation is caused by a difference in the temperatures of the air underground and at the surface. Though natural ventilation is often yet a potent influence, especially in deep hot mines, it is never nowadays allowed to act alone in coal mines, though great numbers of metalliferous mines depend upon it still. Ventilating fans are now universally used at collieries as the main means of creating a ventilating current. They are used in all sizes and capacities, from those yielding 1000 or 1500 cubic feet per minute (installed below ground for such a purpose as the airing of an 'end'), to machines consuming many hundreds of horse-power and delivering, in exceptional cases, 400,000 or 500,000 cubic feet of air per minute.

Large fans, or primary ventilators, are installed at the surface; in this country the majority of them are suction fans, connected with the upcast shaft. In America, on the other hand, the greater proportion are forcing fans, and connected with the downcast shaft.

The efflux of firedamp in the roads and workings imposes upon the coal-miner an imperative need for efficient ventilation; and it may be of note that in some gassy mines the weight of air drawn through the workings is six or eight times as much as the weight of coal raised from the mine per day. In many districts the metal-miner has begun to recognise that an efficient ventilation is as important to him as to the coal-miner. Though he seldom has firedamp as a stimulant, he has other dangerous gases to cope with, especially the products of explosives which he employs on so large a scale. He is learning that the economic loss, through the efficiency of workers being reduced by bad ventilation, is greater than the cost of good ventilation.

Ventilation by large exhausting fans, following coal-mining practice, is common in the gold-mines of the Transvaal. In the mines of the great copper region of Butte, Montana, hundreds of fans (mostly small ones placed underground) are in use, and the volume of air caused to circulate by mechanical means is rapidly increasing.

The conveyance of steam underground being almost obsolete, the two principal varieties of power employed in mines are electricity and compressed air. Though the usual practice is to generate the power required at each individual mine, the tendency is to a greater and greater extent to centralise power-plant, and to supply groups of mines from a single electric power-station. In other cases mines purchase their electric power from a supply company or municipality. The aggregate horse-power of electric motors at British mines amounted in 1922 to over 1,200,000. By reason of the great efficiency of transmission, alternating current is preferred to direct current electricity. Electric power is used for a wide variety of purposes, e.g. pumping, haulage, winding, coal-cutting, lighting, and fan-driving. Compressed air is uneconomical to transmit more than a short distance from the compressor, but it has advantages which cause it to be retained. First, it is safer than electricity to use in places where there is danger of ignitions of coal-dust or firedamp; secondly, it is much more suitable for operating rock-drills.

For the history of the miner's safety-lamp, see **SAFETY-LAMP**. The modern safety-lamp is of two classes: the *flame lamp* and the *electric lamp*. The flame lamp burns oil or benzine; the wick is generally flat and $\frac{1}{2}$ inch broad. Fig. 1 shows, in half-sectional elevation, the well-known 'Marsaut' type, with two concentric gauzes, D and C; a

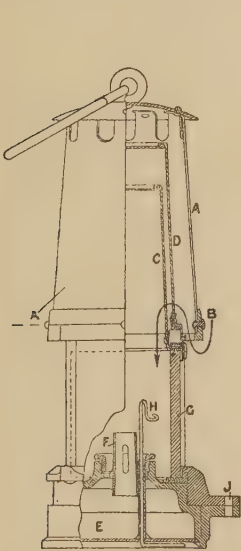


Fig. 1. — Double-gauze Marsaut Safety-lamp.

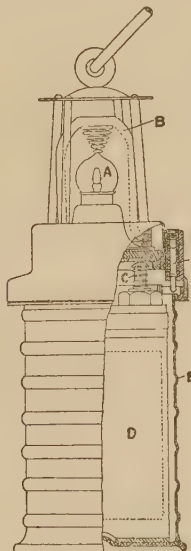


Fig. 2. — An Electric Safety-lamp.

riveted sheet-steel bonnet, A; a stout glass, G; oil-vessel, E; wick-tube, F; and pricker for adjusting the flame, H. Fresh air enters the lamp through holes under the base of the Bonnet, in the manner shown by the arrow, B. To lock the lamp, a lead rivet is put through the hole, J, and squeezed end-wise by special nippers; it can only be removed by cutting it, so that opening the lamp by an unauthorised person is detected when the lamp is

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returned to the lamp-cabin at the end of the shift. Should the lamp be assembled without its gauzes, the fact cannot pass unnoticed, for in that condition the glass cannot be tightened. A safety-lamp is examined by a person appointed for the purpose before the user passes into the mine. Fig. 2 illustrates a familiar form of electric hand-lamp. A is the small incandescent glow-lamp; B, a strong dome-shaped cover-glass; D, the 2-volt accumulator; C, one of the terminals of the accumulator, pressed by a spring against an insulated plate, which in turn is connected to one end of the lamp-filament (the other terminal is similarly connected); E, the stout stamped-steel case holding the battery; while F is a magnetic lock—a secure form which is much used for all classes of safety-lamp. The locking-catch engages as soon as the lamp-top is attached, and can only be disengaged by means of a strong electro-magnet, which draws up the plunger, F. Electric head-lamps are used on an enormous scale in America, and are coming into favour in Britain. They consist of a battery slung to the man's belt, a well-protected incandescent lamp carried in front of the cap, and a protected flexible cable connecting the two. They give a man the free use of both hands.

The Hailwood combustion-tube lamp is an important type. It is a double-gauze flame lamp, with an inner metal chimney. The chimney supports, at its lower end, a short glass surrounding the flame. The additional glass and chimney have the same effect as the glass chimney of an ordinary oil table-lamp; it improves combustion by keeping apart the fresh air passing to the flame and the vitiated air passing from it. The 'combustion tube' improves the illuminating power by at least 40 per cent. All safety-lamps are subjected to stringent official tests as to their security in the presence of gas and as to their mechanical strength before being approved for use in Britain. Flame lamps must give at least 0.3 candle-power for a period of 10 hours; most modern kinds give about 1 candle-power, while a few exceed that figure. Electric hand-lamps must give at least 1 candle-power. The standard gauze for flame safety-lamps is that introduced by Davy; it is of charcoal iron wire, of 28 S.W.G. (0.0148-inch diameter), and has 28 apertures per linear inch. Official tests have, however, shown that the same degree of safety is obtained, together with a considerable improvement in illuminating power, by adopting more open gauze, and a gauze with 20 meshes to the linear inch made of 27 S.W.G. (0.0164-inch diameter) wire is recommended.

The majority of flame lamps are fitted with a device which enables them to be lighted electrically after the lamp has been assembled and locked. As electric lamps do not give any indication of the presence of harmful gas, it is necessary to employ along with them a few flame lamps to serve as gas-indicators.

Of the 584,761 flame safety-lamps used in British mines in 1923, 402,682 were of the Marsaut type, and 176,344 of the combustion-tube type. In that year 327,929 electric safety-lamps were employed.

A recent development of lighting at coal-faces is by means of ordinary incandescent electric lamps, of either the exhausted or gas-filled type, current being supplied by means of flexible cables from the power-system. The improvement in illumination is enormous, and to the miner a better light means increased safety, reduced eye-strain, and a higher output.

The two agents responsible for explosions in coal-mines are firedamp and coal-dust. Firedamp is principally marsh-gas or methane. Marsh-gas mixed with air is explosive between the limits 5.4 and 14.3 per cent. The most violent explosion

occurs when 9·6 per cent. of the gas is present. It is necessary for safety to detect much less than 5·4 per cent. In a pit using safety-lamps, men are not allowed to work in air containing more than 2·5 per cent., while in those mines using naked lights the equivalent figure is 1·25 per cent. Because of its low density, firedamp tends to lurk in cavities in the roof. The flame safety-lamp reveals the presence of the gas. If the lamp be slowly raised into such a cavity the flame will draw out (*spire*) if firedamp be present. To ascertain the proportion of the gas occurring, say, at a face of work, the flame is pulled down until it loses its luminosity; if firedamp be present, a faint blue halo (*blue cap*) appears over the flame. The size of the halo indicates, to the skilled eye, the percentage of inflammable gas. Fine dry coal-dust is very explosive. It may be fired by a shot or by the explosion of a firedamp accumulation. Almost all large-scale colliery explosions are due to coal-dust. The greatest dust explosion in the history of mining occurred in 1906 at the Courrières mine, near Lens, North France; 1100 men and boys lost their lives, and four pits (connected underground) were devastated. The biggest disaster of the kind in British annals was in 1913 at Senghenydd Colliery, South Wales; 439 persons were killed. The most efficacious method of preventing dust explosions is periodically to cover the roof, walls, and floor of dusty roads with fine inert stone-dust (e.g. ground-shale or limestone) so that at all times the dangerous coal-dust is diluted with at least an equal weight of inert dust. This operation, known as *stone-dusting*, is much practised.

Mining is, and must always remain, a dangerous industry. It is, however, satisfactory to report that in the matter of safety a steady improvement is evident over the period during which accurate statistics have been kept. The average annual death-rate from accidents (surface and underground) at British coal-mines was, per 1000 persons engaged, 2·24 for the decennial period 1873-82, 1·39 for that of 1893-1902, and 1·15 for 1913-22. When the fatal accidents are analysed, it becomes evident that the most marked improvement has been in reference to deaths from explosions, which annually accounted for 0·65 per 1000 in 1873-82, but only 0·10 in 1913-22. The chief causes of accident underground are falls of roof or coal, and in this connection very little improvement is discernible since 1893. The number of non-fatal accidents occurring yearly from falls of ground is large. In 1922 over 63,000 persons were disabled for more than seven days owing to this cause alone.

Mines of coal, stratified ironstone, fireclay, and oil-shale are regulated by the Coal Mines Act of 1911, and by a number of short supplementary acts concerning safety measures and hours of labour; in addition there are numerous ancillary regulations dealing with safety-lamps, rescue apparatus, explosives, electricity in mines, stone-dusting, conditions for granting certificates of competency for officials, &c. Metalliferous mines in Britain (including under that designation all mines not under the Coal Mines Act) are under the control of the Metalliferous Mines Regulation Acts of 1872 and 1875, while quarries over 20 feet deep are controlled by the Quarries Act of 1894.

The miner is liable to certain special diseases, of which the most important is miners' consumption or *fibroid phthisis*. The disease is caused by constantly breathing extremely fine particles of gritty dust, produced when drilling or shot-firing or handling quartz-ore, sandstone, granite, or ganister. Respirators are little or no use as a preventive, since the particles most effectual in setting up the disease are of the order of $\frac{1}{1000}$ inch in diameter, and no respirator permitting breathing can stop

such minute pieces. The best precaution is thoroughly to wet any quartzose material before handling, and to direct a copious stream of water into, or on the mouth of, a shot-hole which is being drilled. Miners' anæmia (*Ankylostomiasis*; q.v.) is caused by a parasitic worm which clings—sometimes in enormous numbers—to the inner lining of the intestines. Though endemic in South Europe and other warm countries, the ailment has fortunately not made headway in Britain or North America. An outbreak of the disease in Cornwall early in the century was, thanks to prompt precautionary and remedial measures, quickly stamped out. It never spread in our coal-mines, though it was at one time a scourge in the collieries of Germany and Poland. Miners' *nystagmus* is an involuntary oscillation of the eyeballs, resulting from their overstrain. It is considered to be the result of an insufficient illumination, though other factors may eventually be found to have an influence. *Nystagmus* is rapidly increasing in coal-mines; compensation was paid in respect of over 4000 new cases occurring in 1922.

In England and Ireland the crown has the right to all mines of gold and silver; but where these metals are found in mines of tin, copper, iron, or other base metal, then the crown has only the right to take the ore at a price fixed by statute. In Scotland gold-mines belong to the crown without limitation, and silver-mines when three-halfpence of silver can be extracted from the pound of lead. As a general rule, in the United States as well as in Britain, whoever is the owner of freehold land has a right to all the mines underneath the surface, for his absolute ownership extends to the centre of the earth; but under special grants and contracts it is not uncommon for one person to be owner of the surface of the land and another to be owner of the mines beneath; or several persons may be owners of different kinds of mines lying one above the other in the different strata. On the public lands of the United States, a title or license may be obtained by any citizen from the general land office at Washington, at the rate of \$5 per acre of surface pre-empted; no royalty is paid, but the claim must be worked in accordance both with local regulations and with the general mining laws, which prescribe as one condition the performance of a certain amount of work annually. If this condition is not fulfilled, the mine may be 'denounced,' and any other person secure the claim.

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Minister, a public functionary who has the chief direction of any department in a state, the ministry being the body of ministers to whom the sovereign or chief-magistrate commits the executive government (see CABINET, PARLIAMENT, TREASURY).—Minister is also a term for a delegate or representative of a sovereign at a foreign court (see AMBASSADOR).—Christian preachers and priests are ministers of the word of God or of Jesus Christ in Catholic usage. The word minister was adopted by French-speaking Protestants for their clergy, and was formerly so used by Anglicans for theirs, as it still is by Presbyterians and many Nonconformists.

Minium, or RED LEAD. See LEAD.

Miniver. See FURS.

Mink (*Putorius*), a name applied to several carnivores very closely allied to weasel, polecat, and stoat or ermine, and with essentially similar characteristics. The body measures from 12 to 18 inches in length, not including the bushy tail. The colour of the valuable fur is chestnut-brown. The Siberian Vison (*P. sibiricus*), the European Vison (*P. lutreola*), and the American Mink proper (*P. vison*) are very nearly related, if indeed they are not simply varieties of one circumpolar species. They all live by rivers and lakes, in which they swim and dive, feeding chiefly on fishes, frogs, mussels, and the like; though not refusing any small mammals which come in their way. They are keen-scented, bold, and persistent, but are readily tamed when caught young. See FURS.

Minkopis, a name sometimes given to the negro inhabitants of the Andaman Islands (q.v.).

Minneapolis, the largest city of Minnesota, adjoins the capital, St Paul, and stands on both sides of the Mississippi, here crossed by many bridges—the Franklin Avenue bridge notable for its great concrete arch. The Falls of St Anthony, with a perpendicular descent of 16 feet, afford a water-power which has been a chief source of the city's prosperity. The streets are wide and handsome, and there are beautiful public parks. Among the most notable buildings are the Masonic Temple, the Post-office, the Bank of Commerce, the Auditorium, the Chamber of Commerce, and the Lumber Exchange. The court-house and town-hall, completed in 1902, is a magnificent building. There are twenty public parks. The public and private schools are numerous, with many secondary and special institutions; while the state university here has some 650 professors and lecturers and 12,000 students of both sexes. The lumber and flour mills of Minneapolis are among the largest in the country, the city being the greatest primary wheat market of the world. In the flour-mills stones were early discarded, the Hungarian or 'roller' process (see MILL) being employed. Linseed-oil and oil-cake are made. The railway facilities of Minneapolis are very great, and the growth of the city has been remarkably rapid. Pop. (1870) 13,066; (1880) 46,887; (1890) 164,738; (1900) 202,718; (1910) 301,408; (1920) 380,582.—Five miles SE. are the Falls of Minnehaha ('Laughing Water'), celebrated in Longfellow's *Hiawatha*.

Minnesinger, the collective name given to the lyric poets of Germany who flourished during a period marked approximately by the years 1170 and 1250. For the most part the singers were of knightly birth and belonged to the inferior nobility, though men of the very highest rank, reigning princes and even emperors, wrote these lyric effusions, and a few were of burgher birth. They get their name from the principal theme that inspired them, *minne* = 'love,' the love of fair women. Thus they were so far akin to the troubadours of Provence and France. The movement, however, though it certainly received suggestions from the singers beyond the Rhine, was essentially of native origin. The difference between the two schools is most clearly seen in the spirit of their work. The German singers wrote of love in a more refined and delicate spirit, and with a greater reverence for woman, than the troubadours. The best of them treated of the inner life of the soul, the feelings and emotions of the heart, rather than of the gallantries and adventures of a sensual love; they move in the world of imagination and idealism, shunning the real world and its gross pleasures; the shy, speechless, reverent attitude of ingenuous youth that characterised

them was closely akin to the reverent homage paid to the purest and holiest of women, the Virgin Mother of Christ. Yet they did not altogether lose touch of the world. They loved to sing the praises of nature, especially of spring, the perennial inspirer of poets' hearts and tongues. Often, too, there is a decided strain of sadness and melancholy, always touches of true naïveté, and frequently of arch humour, and on occasion the sterner note of moral indignation and contempt of the follies and vices of the time. Thus, the best of the minnesinger, like Walther von der Vogelweide, the most illustrious of them all, Heinrich von Ofterdingen, Wolfram von Eschenbach, Hartmann von Ane, Gottfried von Strassburg, Heinrich von Veldeke (the earliest), and others, were distinguished on the one hand from the poets of the monasteries, who celebrated the deeds of martyr and saint, and on the other hand from the wandering gleemen, whose subjects were suited to the coarse and ignorant peasantry who formed their usual audiences. But it is not in subject only, and their spirit of treating it, that the minnesinger differ from all their contemporaries; they also paid great attention to poetical form, striving after melodious and sonorous language, regularity of verse-structure, and smoothness and correctness of versification, in all which they attained a high degree of skill. Their art was, however, wider than the poet's at the present day: they not only wrote the text but composed the air to which the text was to be sung, for all their lyrics were written with the express purpose of being sung to the accompaniment of viol or harp. One class alone was exempted from musical accompaniment—viz. short didactic or sententious poems called *sprüche* = 'sayings,' which were recited. As it was incumbent upon a 'singer' to invent his own combination of text and melody, and was considered dishonourable for him to appropriate those of his predecessors or contemporaries, their poems are remarkable for a great variety of forms, poetic and musical. This in course of time, when the fresh inspiration of the movement began to wane, was the fruitful cause of much artificial writing, and eventually of the decay of the art. But there were still deeper causes of decay inherent in it. The less refined of the 'singers' were unable to keep the levels of exalted sentiment of their superiors, and degenerated into false sentimentality, lifeless conventionality, and above all a gross and vulgar sensualism. The minnesinger wrote principally in the Swabian dialect of Middle High German. Their use of this language was due to the great encouragement they received from the Hohenstaufen emperors. Next to these rulers their chief patrons were the dukes of Austria, and especially Hermann of Thuringia, at whose court of Eisenach the semi-mythical Wartburgkrieg occurred (c. 1207). This was a poetical contest between the chief minnesinger as to the merits of the patrons of the art: Heinrich of Ofterdingen was outsung by Walther von der Vogelweide, and Heinrich's ally, the magician Klingsor of Hungary, by Wolfram von Eschenbach.

When men of knightly birth began to neglect the writing of lyric poetry, and the minnesinger were no longer held in honour in the halls of the great, the art took refuge with the burghers and craftsmen of the cities. But with the exception of Hans Sachs of Nürnberg, those *Meistersinger*, as they called themselves, possessed little real poetic feeling. They formed themselves into guilds and wrote poems, as they plied their trade, by purely mechanical rules, and bound themselves by a multitude of puerile restrictions and pedantic regulations. Their subjects were painfully commonplace, and their treatment destitute of all artistic feeling. Yet these singers' guilds flourished from the 13th to

the 16th century; the last, at Ulm, was dissolved in 1839. Wagner's *Meistersinger* perpetuates their memory.

The lyrics of 160 Minnesinger were published by Von der Hagen in 1838 (4 vols.); and selections from 97 (of the 300 or more of whom specimens survive) by Karl Bartsch (1901). Modern versions have been made by Tieck (1803), Simrock (1857), and others; and English translations by Nicholson in *Old German Love Songs* (1906), and Jethro Bithell in *The Minnesingers* (1909). See Lyon, *Minne- und Meister-sang* (1882); Lachmann and Haupt, *Des Minnesangs Frühling* (ed. by Vogt, 1882); F. Pfaff, *Der Minnesang* (1892).

Minnesota, one of the north-central states of the American Union, ranking seventeenth amongst the states in respect of population. With an Indian name meaning 'sky-tinted water,' it lies around the headwaters of the Mississippi River, and extends from 43° 30' to 49° N. lat., and from 91° to 97° W. long. It is bounded on the N. by Manitoba and Ontario, E. by Lake Superior and Wisconsin, S. by Iowa, and W. by North and South Dakota. Its area is 84,682 sq. m., or nearly as large as Great Britain. In Minnesota are the remote sources of the great rivers Mississippi, Red River of the North, and St Lawrence, whose waters, flowing in different directions, reach respectively the Gulf of Mexico, Hudson Bay, and the Atlantic Ocean. Within the state the Minnesota River is the largest tributary of the Mississippi. Between the St Croix River and Red River of the North are hundreds of clear lakes, the largest of which are Red Lake (530 sq. m.), Mille Lacs, and Leech Lake. About two-thirds of the state is prairie, but in the northern portion there are extensive pine-forests, and in the north-east great marshes, bearing a scanty growth of tamarack and fir. The minerals include iron (in which it stands first in the Union), slate, granite, and other rocks, and the red pipestone. The climate is bracing in winter, dry and equable; the annual mean temperature is about 45°. The rainfall is adequate and well distributed over the year.

Minnesota is an agricultural and till lately especially a wheat-producing state; its manufacturing as yet are principally flour and lumber mills. The principal crop is no longer wheat but corn. Oats and hay and forage are the next important crops. The Mississippi is navigable as high as St Paul and Minneapolis; the lakes, with Duluth for a port, open a waterway to the Atlantic; and there are over 10,000 miles of railway.

Education is well cared for. There are a number of state normal schools, and a state university at Minneapolis, besides Macalester College (Presbyterian) and Hamline University (Methodist) at St Paul, Carleton College (Congregationalist) at Northfield, St John's University (Roman Catholic) at Collegeville, and many other colleges. The percentage of illiterates is one of the lowest in the United States. Foreign-born whites, chiefly Scandinavians and Germans, make up about 20 per cent. of the whole population.

History.—Minnesota was visited by French explorers in 1659–60, and the portion west of the Mississippi was part of the province of Louisiana purchased by the United States from France in 1803. Fort Snelling, at the mouth of the Minnesota River, was built and occupied in 1821. In 1837 the Chippeway Indians surrendered all the land east of the Mississippi; immigration then began, and Minnesota became a territory in 1849, a state in 1858. It claims the distinction of having, through its governor, offered the first regiment for the defence of the Union; and during the civil war, out of 40,000 citizens able to bear arms, it sent 24,000 into the army. In August 1862 occurred a terrible massacre by the Indians, who attacked

the frontier settlements, and in ten days killed some 800 men, women, and children. As a consequence the Sioux and Winnebagoes were removed from the state, and their hunting-grounds are now occupied by farms and prosperous towns. The principal cities are St Paul, the capital (234,698), Minneapolis (380,582), and Duluth (98,917). Pop. (1860) 172,023; (1890) 1,301,826; (1900) 1,751,394; (1910) 2,075,708; (1920) 2,387,125, including 8809 negroes and 8761 Indians.

Minniwaukeeon, or **DEVIL'S LAKE**, a salt lake in North Dakota (q.v.).

Minnow (*Phoxinus phoxinus*), a small freshwater fish closely related to chub and dace. It is covered with small scales, from eighty to over a hundred in a longitudinal series. It occurs in most parts of Britain except the northern Highlands, and in most parts of Europe except the Iberian Peninsula. Its length is usually 3 or 4 inches, but specimens of 6 or 7 inches are recorded. The coloration is very variable, but often silvery-gray combined with green, gold, brown, and black. The favourite habitat is in clear streams with sandy or gravelly bottom. Migrations in search of food or away from foul water are common, a shoal following adventurous leaders. Gregariousness and curiosity are characteristics. In summer the minnows frequent shallows; in winter they seek deep water and hide under stones or below the banks. The food consists chiefly of insect-larvæ, worms, freshwater crustaceans and molluscs, and the eggs and small fry of other fishes. Minnows are themselves preyed on by larger fishes; hence their use as bait for trout, perch, pike, and eels. They are palatable as food, and are sometimes served as 'whitebait.' The spawning is in May and June, and at that time the males show whitish tubercles on their black head and a scarlet belly. The eggs are laid in gravelly shallows and adhere to stones; the development is rapid. After fertilising the eggs the males seem to have a resting period of several days, lying close together in shoals. Recovering themselves, they resume the characteristic activity of the species. See C. Tate Regan's *Fresh-water Fishes of the British Isles* (1911).

Minoan Culture. See CRETE.

Minor is, in Scots law, the term describing a person who, if a male, is between the ages of 14 and 21; and if a female, is between 12 and 21. In England the technical term is an Infant (q.v.).

Minor. See SCALE.

Minor Barons. See BARON.

Minorca (Span. *Menorca*), the second largest of the Balearic Isles (q.v.), lies 25 miles NE. of Majorca. It is 28 miles long, by an average of 10 wide, and has an area of 284 sq. m. Pop. 42,000. Its coast is rocky and inaccessible, but broken by numerous inlets, and its surface low, undulating, and stony. Its productions and climate are similar to those of Majorca, though the soil is less fertile. The chief towns are Port Mahon (q.v.) and Ciutadella (9600). The island is remarkable for its great number of ancient megalithic remains (called talayots) and its stalactite caves (at Prella). See BYNG (JOHN).

Minorites. See FRANCISCANS.

Minority. See REPRESENTATION.

Minos, the name of two mythological kings of Crete (q.v.). The first is said to have been the son of Zeus and Europa, the brother of Rhadamanthus, the father of Deucalion and Ariadne, and, after his death, a judge of the shades in Hades.—The second, grandson of the former, was son of Lycastus and Ida, and, with Zeus's help, author of the Laws of Minos. Homer and Hesiod know only one Minos, son and friend of Zeus and king of Knossos, where

in 1900-5 Evans laid bare the vast substructure of what may have been his palace.

Minotaur, one of the most repulsive conceptions of Greek Mythology, the offspring of Pasiphaë and a bull, for which she had conceived a passion, gratified through the contrivance of Poseidon. The queen placed herself in an artificial cow made by Dædalus, and so became the mother of the monster, half-man half-bull, a man with a bull's head. Minos, the husband of Pasiphaë, shut him up in a Knossian Labyrinth, and there fed him with the seven youths and seven maidens whom Athens was obliged to supply at fixed periods as a tribute, till Theseus, with the help of Ariadne (q.v.), slew the monster.

Minquiers. See CHANNEL ISLANDS, JERSEY.

Minsk, capital of White Russia, on an affluent of the Beresina, 331 miles by rail ENE. of Warsaw. Pop. about 130,000, many of whom are Jews. The town existed in the 11th century, was Lithuanian in the 13th and Polish in the 15th, and was annexed by Russia in 1793. It is claimed by Lithuania. A university was founded by the Soviet government.

Minster (Lat. *monasterium*, 'a monastery'), the church of an abbey or priory; but often applied, like the German *Münster*, to cathedral churches without any monastic connection, as especially to York Minster.

Mint (*Mentha*), a genus of plants, of the natural order Labiate, with small, funnel-shaped, quadrid, generally red corolla, and four straight stamens. The species are perennial herbaceous plants, varying considerably in appearance, but all with creeping root-stocks. The flowers are whorled, the whorls often grouped in spikes or heads. The species are widely distributed over the world. Some of them are very common in Britain, as Water Mint (*M. aquatica*), which grows in wet grounds and ditches, and Corn-mint (*M. arvensis*), which abounds as a weed in cornfields and gardens. All the species contain an aromatic essential oil, in virtue of which they are more or less medicinal. The most important species are Spearmint, Peppermint, and Pennyroyal.—Spearmint or Green Mint (*M. viridis*) is a native of almost all the temperate parts of the globe; it has erect smooth stems, from one foot to two feet high, with the whorls of flowers in loose cylindrical or oblong spikes at the top; the leaves lanceolate, acute, smooth, serrated, destitute of stalk, or nearly so. It has a very agreeable odour.—Peppermint (*M. piperita*), a plant of equally wide distribution in the temperate parts of the world, is very similar to spearmint, but has the leaves stalked, and the flowers in short spikes, the lower whorls somewhat



Spearmint (*Mentha viridis*).

distant from the rest. It is very readily recognised by the peculiar pungency of its odour and of its taste.—Pennyroyal (*M. Pulegium*), also very cosmopolitan, has a much-branched prostrate stem, which sends down new roots as it extends in length; the leaves ovate, stalked; the flowers in distant globose whorls. Its smell resembles that

of the other mints.—All these species, in a wild state, grow in ditches or wet places. All of them are cultivated in gardens; and peppermint largely for medicinal use and for flavouring lozenges. They are naturalised in America, where, however, the common species is *M. canadensis*, the Wild or Horse-mint. *Mint Sauce* is generally made of spearmint, which is also used for flavouring soups, &c. A kind of mint with lemon-scented leaves, called Bergamot Mint (*M. citrata*), is found in some parts of Europe, and is cultivated in gardens. Varieties of peppermint and Horse-mint (*M. longifolia*), with *crisped* leaves, are much cultivated in Germany under the name of Curled Mint (*Krause-minze*): the leaves are dried and used as a domestic medicine, and in poultices and baths. All kinds of mint are easily propagated by parting the roots or by cuttings. It is said that mice have a great aversion to mint, and that a few leaves of it will keep them at a distance. Peppermint, pennyroyal, and spearmint are used in medicine. The pharmacopœias contain an *aqua*, *spiritus*, and *oleum* of each of them; the official part being the herb, which should be collected when in flower. *Peppermint* is a powerful diffusible stimulant, and, as such, is antispasmodic and stomachic, and is much employed in the treatment of gastrodynia and flatulent colic. It is also extensively used in mixtures, for covering the taste of drugs. *Pennyroyal* and *spearmint* are similar in their action, but inferior for all purposes to peppermint.

Mint (Lat. *moneta*), an establishment for making coins or metallic money (see MONEY). The early history of the art being traced under the head Numismatics, the present article is mostly confined to a sketch of the constitution of the British mint, and of the modern processes of coining as there followed.

In Canute's laws, an officer called a 'reeve' is referred to as having some jurisdiction over the mint, and certain names which, in addition to that of the sovereign, appear on the Anglo-Saxon coins seem to have been those of the moneyers, an important class of functionaries, who were, until the operations of coinage were undertaken by the state in 1851, responsible for the manufacture of the coin. Besides the sovereign, barons, bishops, and the greater monasteries had the control of mints, where they exercised the right of coinage, a privilege enjoyed by the archbishops of Canterbury in the reign of Henry VIII., and by Wolsey as Bishop of Durham and Archbishop of York. After the Norman Conquest the officers of the Royal mint became to a certain extent subject to the authority of the exchequer. Both in Saxon and Norman times there existed, under control of the principal mint in London, a number of provincial mints in different towns of England; there were no fewer than thirty-eight in the time of Ethelred. The officers of the mint were formed into a corporation by a charter of Edward III.; they consisted of the warden, master, comptroller, assay-master, workers, coiners, and subordinates. Coining at the Scottish mint in Edinburgh began in the reign of David I. (1124-53), and ceased with the Union; but the office of governor of the mint was not incorporated with the English one till 1817. The early Scottish coinage followed very closely the English model and the English types of coin; after the war of independence there was a series of new denominations.

The seignorage for coining at one time formed no inconsiderable item in the revenues of the crown. It was a deduction made from the bullion coined, and comprehended both a charge for defraying the expense of coinage and the sovereign's profit in virtue of his prerogative. By 18 Car. II. chap. 5

the seignorage on gold was abolished, and it has never since been exacted. The 'shere' or 'remedy,' as it is now called, is an allowance for the unavoidable imperfection of the coin in regard to both standard weight and fineness.

The function of the mint, so far as concerns the standard gold coinage, is to receive gold in ingots from individuals, and return an equivalent weight in sovereigns. But, in point of fact, gold is now exclusively coined for the Bank of England; for, although any one has the right to import gold into the mint for coinage, receiving an equivalent weight of sovereigns at the rate of £3, 17s. 10½d. per oz. standard, after a sufficient delay to allow of the gold he imports being converted into coin, he can at once receive payment on presenting his bullion at the Bank of England at the slightly lower rate of £3, 17s. 9d., and the additional 1½d. offered by the mint is not found sufficient to compensate for the necessary delay which occurs.

Silver, which was formerly a legal tender to any amount, has, by 56 Geo. III. chap. 68, ceased to be so. That act provided that each troy pound of standard silver should be coined into sixty-six shillings, and, since this exceeds the price at which the metal in its uncoined state can be purchased, it follows that the coinage of silver is a source of profit to the state. When the price fell to 42½d., this profit, or seignorage, amounted to no less than 54 per cent.; but in 1908-12 the price of silver averaged only about 24d. or 25d. In 1924 the average price was 34d. But in 1920 the price rose as high as 89½d., and in consequence a Coinage Act was passed reducing the fineness from 925 to 500. It should, however, be borne in mind that this 'token' coinage is only a legal tender to a limited amount (forty shillings), whereas gold coin is legal tender to any amount. The profit derived from the bronze token coinage is proportionately even greater. The seignorage, which was formerly retained by the master of the mint to defray the expense of coinage, has since 1837 been paid to the credit of the Consolidated Fund.

A new mint was erected on Tower Hill in 1810. In 1815 some alterations were made in its constitution; and in 1851 a complete change was introduced in the whole system of administration. The control of the mint was then vested in a master, a deputy-master, and a comptroller. The mastership, which had, in the early part of the 19th century, become a political appointment held by an adherent of the government, was restored to the position of a permanent office, the master being the ostensible executive head of the establishment. The operative department was entrusted to the assayer, the melter, and the refiner. The moneyers, who had from early times enjoyed extensive privileges and exemptions, and were contractors with the crown for the execution of the coinage, were abolished, and the contracts with the crown were entered into by the master of the mint, who also made subordinate contracts for the actual manufacture of the coin. In 1869 the mastership was added to the duties of the Chancellor of the Exchequer, and the offices of deputy-master and comptroller were amalgamated. Mints were established at Sydney, Melbourne, and Perth to coin the gold so largely found in Australia, in 1853, 1869, and 1899 respectively. In 1908 a branch mint was established at Ottawa for striking sovereigns, and also gold, silver, and bronze coins of special design for the government of Canada. A similar branch was set up in 1922 at Pretoria to strike sovereigns and to supply local currency for the Union of South Africa. Coins for circulation in British India are supplied by the mints at Calcutta and Bombay.

Processes of Coining.—Down to the middle of the 16th century little or no improvement seems to have been made in the art of coining from the time of its invention. The metal was simply hammered into slips, which were afterwards cut up into squares of one size, and then forged round. The required impression was given to these by placing them in turn between two dies, and striking them with a hammer. As it was not easy by this method to place the dies exactly above each other, or to apply proper force, coins so made were always faulty, and had the edges unfinished, which rendered them liable to be clipped. The first great step was the application of the screw-press to the process of coining by the celebrated artist, Benvenuto Cellini. The plan was expensive at first, and not till 1662 did it altogether supersede the hammer in the English mint. In 1910-11 gas-fired furnaces were introduced for melting purposes in place of those heated by coke fuel. The chief steps in coining as now practised are as follows: The gold or silver to be coined is sent to the mint, for the most part in the form of *ingots* or castings; those of gold weighing about 400 ounces, while the silver ingots are much larger. Before melting, each ingot is weighed and tested as to its purity by Assaying (q.v.). For melting the gold, pots or crucibles of plumbago are used, made to contain each about 2600 ounces. The pots being heated in furnaces to a bright red heat, the charge of gold is introduced along with the amount of copper which calculation, based on the weight of the gold and its composition as ascertained by assay, proves to be necessary in order to bring it to the standard, which in Great Britain is 22 parts of pure gold to 2 of copper (see ALLOY). The metal, when melted, is poured into iron moulds, which form it into bars 26½ inches long, 1½ inch broad, and five-eighths of an inch thick, if for sovereigns; and somewhat narrower if for half-sovereigns. For melting silver (the alloy of which is adjusted to the standard of 222 parts of silver to 18 of copper) larger plumbago crucibles capable of containing upwards of 6000 ounces are used, and the metal is cast into bars similar to those of gold.

The copper, or rather bronze, coinage, first issued in 1860, is formed of an alloy consisting of 95 parts of copper, 4 of tin, and 1 of zinc. The coins are only about half the weight of their old copper representatives. The processes of casting and coining the bronze are essentially the same as in the case of gold and silver.

The operation of *rolling* follows that of casting. It consists in repeatedly passing the bars between pairs of rollers with hardened steel surfaces, driven by electric power; the rollers being brought closer and closer as the thickness becomes reduced. At a certain stage, as the bars become longer, they are cut into convenient lengths; and, to reduce the hardness induced by the pressure, they are annealed. The finishing rollers are so exquisitely adjusted that the *fillets* (as the thinned bars are called) do not vary in thickness in any part more than the ten-thousandth part of an inch. The fillets were further adjusted in the British mint by the 'draw-bench' (discontinued in 1905), in which they were drawn between steel blocks, as in wire-drawing. The fillets thus prepared are passed to the tryer, who, with a machine-punch, cuts a trial-blank from each, and weighs it in a balance, judging by experience whether the variation found to exist from the strict legal weight is such as to justify his passing the fillet into work.

The *blanks* of which the coins are to be made are cut out by means of punching-machines of simple construction, in which two or more short steel plungers are forced by an eccentric through the fillet, and enter holes in the bed of the machine;

the fillet is then advanced automatically and the operation repeated. The scrap left after the blanks are cut out, called *scissel*, is sent back to be remelted.

To ensure their being properly marked on the edge, the blanks are pressed edgewise in a machine between two grooves, one in a fixed steel block, and the other in the face of a revolving steel disc, whereby the edge is raised and the blanks are brought to a uniform diameter. After this they are annealed to soften them, before they can be struck with dies; except in the case of gold they are also dipped into hot dilute sulphuric acid to remove oxide of copper from the surface. Subsequently they are washed with water, and dried in hot sawdust.

We now come to the press-room, where the blanks receive the impression which makes them perfect coins. The screw coining-presses which were erected in the mint in 1810 were superseded in 1882 by lever presses of what is known as the Uhlhorn pattern. Of these no less than eighteen now exist in the mint. It is not necessary to give any detailed account of their mode of action, but it may be explained that the lower die (see DIE-SINKING) is fixed, and, after the blank has been automatically laid on it, a steel collar which is milled on the inside rises so as to surround this blank, and, while it is thus enclosed, the upper die descends upon it, considerable pressure being applied through a lever acting on a toggle joint. It will thus be seen that at the moment at which the pressure is applied the blank is completely enclosed, the result being that all the details which exist on the two dies and the 'milling' on the collar are reproduced in the comparatively soft metal of the blank. The upper die then immediately rises, the collar descends, and the now finished coin is automatically pushed on one side to give place to another blank. In cases where letters are put on the edge of a coin, a collar divided into segments working on centre pins is used. On the proper pressure being applied, the segments close round and impress the letters on the edge of the coin. It is possible to strike coins at the rate of no less than 120 per minute, but it is found that the best results are obtained when the number does not exceed 90 per minute.

After being examined with a view to remove any faulty pieces, the finished coins are now passed on to be weighed in the automatic balances, since the act regulating the coinage (33 Vict. chap. 10) provides that no gold or silver coin shall be issued from the mint which varies by more than a specified and very small amount from the exact legal standard weight. These very beautiful instruments, which were introduced in 1844 by William Cotton, governor of the Bank of England, but have since been much modified and improved, are each capable of weighing about twenty-three coins per minute within $\frac{1}{1000}$ th of a grain, and distributing them into three separate compartments, respectively for those which are too heavy, too light, or within the limits of weight allowed by law. The first two classes are returned to be melted, while the third class, having been rung on iron anvils with a view to eliminate such as are 'dumb,' are, so far as their manufacture is concerned, ready to be issued to the public. It is first necessary, however, that sample coins be taken for assay, as a final guarantee that they are within the limits as regards standard fineness allowed by the coinage act.

The gold coin is delivered to the importer (generally the Bank of England) as soon as finished, the weight of coin being the equivalent of that of the bullion imported, without making any deduction for loss in the operations of coinage or for the cost of alloying metal. Silver coin, however, is made

up in bags of £100 nominal value, and stored in the mint until required by the Bank of England, Scotland, or Ireland for distribution in those countries, or by the government of a British colony in which imperial silver coin circulates. In the same way bronze coin is made up in bags of £5 nominal value and kept in store.

The following table gives the full legal weight in grains of all Imperial coins of gold, silver, and bronze:

Denomination.	Weight in Grains.	Denomination.	Weight in Grains.
GOLD.		SILVER.	
Five pounds	616.3724	Sixpence	43.6363
Two pounds	246.5489	Fourpence (Maundy) ..	29.0909
Sovereign	123.2744	Threepence	21.8182
Half-sovereign	61.6372	Twopence (Maundy) ..	14.5454
SILVER.		Penny (Maundy)	7.2727
Crown	436.3636	BRONZE.	
Double florin	349.0909	Penny	145.8333
Half-crown	218.1818	Halfpenny	87.5000
Florin	174.5454	Farthing	43.7500
Shilling	87.2727		

It will be noticed that in the case of both gold and silver the values are in proportion to the weights of the coins, but that this is not the case as regards bronze: whereas a ton of pence is nominally worth £448, the same weight of halfpence or farthings is only valued at £373, 6s. 8d.

Coins are also struck in the London mint for many of the colonies and oversea dominions, as well as foreign governments. These include special coinages for Cyprus, Guernsey, Jersey, Malta; Ceylon, Hong-kong, Mauritius, Straits Settlements; East Africa and West Africa; British Guiana and West Indies, British Honduras, Jamaica, Newfoundland; and the Commonwealth of Australia. The colonial coins are issued in various metals, including gold, silver of 925, 900, and 800 fineness, bronze, and nickel-bronze, the nominal value being based upon the local unit of currency. The mint produces also the various naval and military medals with their bars and clasps, as well as the medals of learned and scientific societies. In 1911 the preparation of plates for printing British postage stamps, and of dies for inland revenue stamps, was transferred to this department.

In the United States a mint was established at Philadelphia in 1792; and next century additional mints were set up at San Francisco, New Orleans, and Carson City, besides eight assay-offices.

Minto, SIR GILBERT ELLIOT, first EARL OF, was born at Edinburgh, 23d April 1751. As a boy he spent two years at a school at Fontainebleau under the eye of David Hume, and, after passing through the universities of Edinburgh and Oxford, in 1769 entered Lincoln's Inn, and was called to the bar in 1774. Two years later he entered parliament as a supporter of Lord North, but from 1782 attached himself to Fox and Burke. In 1794-96 he was viceroy of Corsica. He was created Baron Minto in 1797, and went out to India as governor-general in 1806. He showed great vigour in his measures for establishing order and securing the frontiers by treaties, like that of Amritsar with Ranjit Sing. He captured Mauritius, Bourbon, and Java; returning, as Earl of Minto, only to die 21st June 1814. See his *Life and Letters* (1874-80).—His great-grandson, the fourth Earl (1847-1914), was governor-general of Canada in 1898-1904, and as viceroy of India in 1905-10 had to cope with 'unrest' in Bengal and elsewhere. See *Life* by Buchan (1924).

Minucius Felix, an early Latin apologist, whose name survives through his *Octavius* (trans. Freese, 1919), a dialogue held on the beach at Ostia, between the pagan Cæcilius Natalis and the Christian Octavius Januarius. The latter succeeds in convincing his opponent. His Christianity shows no trace of such distinctive dogmas as that of the

resurrection. Cyprian's *De Idolorum Vanitate* borrows from *Octavius*; as also does Tertullian's *Apologeticus*, according to most scholars.

Minuet, the air of a graceful dance, originally from Poitou, in France, performed in a slow tempo. The music is in $\frac{3}{4}$ -time, with a trio.

Minusinsk, a town of Siberia, on the Yenesei, about 200 miles SSW. of Krasnoyarsk. For remarkable archaeological finds, see **ART**.

Minute. See **DAY**, **DEGREE**.

Minute Men, in the American Revolution, were the militia, who were prepared for service at a minute's notice.

Minyas, in Greek Mythology, the son of Chryses, the eponymous hero of the *Minyæ*, from whom were descended most of the Argonauts. He built the city of Orchomenus. His three daughters, Clymene, Iris, and Alcithoë, or Leuconoë, Leucippe, Alcithoë, were changed into bats for having made light of the mysteries of Dionysus.

Miocene System (Gr., 'less recent'). The name was applied by Lyell to that division of the Tertiary strata which contains a smaller proportion of recent species of Mollusca than the Pliocene System (q.v.), and a larger proportion than the Eocene. Of late years the lower part of the Miocene has been separated from that system, and now ranks as a separate system (see **OLIGOCENE**). No true Miocene deposits occur in Britain. Marine accumulations of this age are sparingly developed in Belgium (Black Crag), and cover considerable areas in the low grounds of Touraine (*Faluns de la Touraine*) in the west of France. In the Rhine valley Miocene beds extend from the Taunus southwards (Mainz Basin). These beds are chiefly of fresh-water origin—the lower portion being marine. A more important Miocene area is met with in the Vienna Basin. Here the lower series of beds is marine, while the overlying strata are less distinctly so, many of the fossils indicating brackish-water conditions. Another interesting development of Miocene occurs in Switzerland and South Bavaria—the beds being partly marine and partly of fresh-water origin. These are the more important European areas. In North America marine Miocene strata occur sparingly on the Atlantic borders of the eastern states; while fresh-water deposits of the same age are widely spread in the western states and territories. Miocene beds have been met with far within the Arctic Circle, in Greenland and Spitsbergen.

Life of the Period.—The flora of the earlier stages of the Miocene of central Europe is indicative of somewhat tropical conditions, the nearest representatives of many of the more characteristic plants being now confined to India and Australia. Palms seem at that time to have flourished over a large part of Europe, and with these were associated conifers (*Sequoia*, *Libocedrus*), evergreen oak, fig, laurel, cinnamon, various proteaceous plants (*Banksia*, *Dryandra*), olive, magnolia, maple, myrtle, mimosa, acacia, &c. Later on the climate became more temperate, for we meet with species of birch, alder, oak, beech, chestnut, plum, willow, poplar, &c. Among the more notable terrestrial animals of the Miocene were *Dinotherium*, *Mastodon*, *Anchitherium*, *Hyotherium*, species of rhinoceros, tapir, fox; a gigantic form of ant-eater (*Macrotherium*); *Helladotherium*, allied to the giraffe; *Machairodus*, a lion-like, sabre-toothed carnivore; various antelopes and deer with small horns and antlers; opossums, apes, and monkeys. The molluscs of the marine Miocene are all modern types—those of the older strata having a tropical or subtropical facies, while the shells in the younger strata seem, like the plants, to indicate milder climatic conditions.

In Miocene times the British area was probably dry land, and the same appears to have been the case with all northern Europe. The sea, however, overflowed the low grounds of Belgium and extended into north-west Germany. It is not unlikely, indeed, that most of the Low Countries, Hanover, and Sleswick-Holstein, were at that time submerged. In like manner the sea covered wide areas in the north-west and west of France, extending into the heart of the country now drained by the Loire and its affluents the Cher and the Indre, and stretching across the old district of Aquitania to the Mediterranean. Spain and Portugal then formed an island, considerable tracts in the south and east of Spain being submerged. From the Gulf of Lions a long arm of the sea passed up the valley of the Rhone, and swept north-east through northern Switzerland, sending a branch into the Mainz basin, and then traversing Bavaria, across which it continued to the wide sea which then occupied all the great plains of Hungary. Northern and eastern Italy were at the same time under water, as was also the case with many parts of eastern Europe and Asia Minor. Southern Europe was thus in the Miocene period an extensive archipelago, in which the plateaus of Spain and central France, the Alps, the Carpathians, &c. existed as islands. The most continuous land-mass was in the north of Europe: and if the Miocene of the Arctic regions, with its abundant flora, be of the same age as the Miocene of Europe, then we may infer that a vast area of the North Atlantic existed as dry land, across which migrations of the flora took place. Considerable movements of elevation seem to have occurred in Europe before the close of Miocene times, causing the sea to disappear from wide regions which it had formerly occupied. Thus, the Mainz basin and the sea that occupied much of northern Switzerland, &c. were replaced by fresh-water lakes, while the wide sea of the Vienna basin was much reduced in size, and eventually became freshened—the conditions resembling those that characterise the Black Sea.

Miquelon, **GREAT** and **LITTLE**, two islands connected by a long, narrow, sandy isthmus, off the south-west coast of Newfoundland, forming with St Pierre the sole remaining colony of France in northern America. Fishing is nearly the sole occupation, and dried and fresh cod and cod-liver oil are exported. Area of the Miquelon group, 83 square miles; pop. 500.

Mir, the Russian commune, consisting of the inhabitants of one or more villages, who are as a community owners of the surrounding land, and redistribute the same to the members from time to time. See **LAND LAWS**, **RUSSIA**, **VILLAGE COMMUNITIES**.

Mirabeau, **VICTOR RIQUETI**, **MARQUIS DE**, father of the great statesman of the French Revolution, was born, October 5, 1715, at Pertuis in Provence, of a family that claimed a noble Florentine descent, but was really sprung from a wealthy bourgeois family of Digne and Marseilles that had acquired in 1570 the domain of Mirabeau by purchase, and the title in 1685. He was an able but eccentric and exceedingly hot-headed and self-willed man, and he showed himself a senseless and brutal tyrant in the treatment of his family. It is said that he procured at one time or other no fewer than fifty-four *lettres de cachet* against his wife and children, and he strove to curb the extraordinary genius of his greatest son by a course of unnatural severity, which ended with shattering all the ties of kindred and driving him into the most defiant and reckless excesses. Yet he was himself a theoretical philanthropist and active promoter of physiocratic ideas, and in this cause

published a series of books, as *Ami des Hommes* (1755) and *La Philosophie rurale* (1763), whose vigorous phrasing often foreshadows the stronger hand of his son. He died 13th July 1789.

See Loménie, *Les Mirabeau* (1878-89); Oncken, *Der ältere Mirabeau* (1886); Ripert, *Le Marquis de Mirabeau* (1901).

HONORÉ GABRIEL RIQUETI, COMTE DE MIRABEAU, the greatest figure in the French Revolution, and perhaps the ablest statesman that France has yet produced, was born at Bignon in Provence, 9th March 1749, of a family that had been for three generations famous for stormy passions and great abilities. Within his vigorous frame and massive intellect were concentrated all the good and all the evil of his race; his unusually ugly face, scarred with smallpox and crowned with an immense mane of black hair, bore unmistakably the stamp of power, and from boyhood he possessed a marvellous personal fascination which subdued all men and women to his will. His education was left to take care of itself, and at seventeen he entered as a lieutenant the Berri regiment of cavalry, and lived a life of such recklessness at the little garrison-town of Saintes that his imperious father imprisoned him in 1768 on the Isle of Rhé, near La Rochelle, and next sent him with the French legion of Lorraine to Corsica, where his conduct earned him the confidence of his chiefs and the affection of his men. But his father refusing to purchase him a company, he left the service in 1770, and settled down to practise the physiocrat system on an estate in Limousin. Two years later his father married him to the only daughter of the Marquis de Marignan, a sprightly and pretty, but vain and shallow woman, with whom he broke out into lavish expenditure, and lived unhappily. On account of his debts his father confined him, in May 1773, in the town of Manosque, next in the Château d'If, near Marseilles, and at last in 1775 in the castle of Joux, near Pontarlier. Here he formed an intrigue with Sophie de Ruffey, the young wife of the gray-haired legal president, the Marquis de Monnier, and fled with her to Switzerland and thence to Amsterdam, where for eight months he made his bread by laborious hack-work for the Dutch booksellers, among other tasks translating from the English Watson's Life of Philip II. His *Essai sur le Despotisme*, begun at Manosque and now completed, made a sensation by its audacity and vigour. Meantime the parliament of Besançon sentenced him to the penalty of death, in contumacious absence, for abduction and robbery, and caused a paper effigy of him to be beheaded. The search made for him at the instigation of his father at length proved successful, and in May 1777 he was handed over by the States-general and flung into the frowning castle of Vincennes, where, in a close imprisonment of three years and a half, and after he had worked off his grosser feelings in writing the indecent *Erotica Biblion* and *Ma Conversion*, he worked out his own salvation by study and meditation, and the writing of his famous *Essai sur les Lettres de Cachet et les Prisons d'État* (2 vols. 1782). His too glowing letters from the prison to Sophie were discovered later by Manuel in the archives of police at Paris, and published under the title of *Lettres originales de Mirabeau, écrites du Donjon de Vincennes* (4 vols. 1792). In December 1780 Mirabeau was released, and he at once began by a bold process to labour for his restoration to society. At length, September 1782, after eloquent pleadings that drew upon him all eyes in France, he succeeded in getting his sentence annulled. Next year he lost his suit at Aix for the restitution of his conjugal rights, but did something by the attempt to rehabilitate his reputation. Now also

he broke off the illicit relation with his mistress, who had not remained true to him, and whose later disappointments in love drove her to the refuge of suicide in September 1789.

Again flung upon his own resources, deeply drowned in debt, and thriftless and extravagant by temperament, Mirabeau made for some years a shifty living by his pen, writing and compiling innumerable books and pamphlets against speculation, stock-jobbing, and other political and social evils of the time, and flitting restlessly from France to Prussia, to Holland, and to England. His grosser passions had not yet burned themselves out, and his life was stained by countless unworthy *liaisons*, amid which one woman alone—the Dutch Madame de Nehra—stands out as an elevating influence. In England he was intimate with Sir Gilbert Elliot, afterwards first Earl of Minto, Lord Lansdowne, and Romilly, and his close observation of English politics taught him the good of moderation, compromise, and opportunism. In 1786 he was sent by the French government on a secret mission to Berlin, and there from Major Mauvillon he obtained the materials for his work, *Sur la Monarchie Prussienne sous Frédéric le Grand* (4 vols. 1787). When the States-general was convened he offered himself as a candidate to the nobles of Provence, and was rejected, whereupon he turned to the *tiers état* and was returned enthusiastically for both Marseilles and Aix. He chose to sit for the latter, and, badly received though he was at first, soon showed himself a born leader of men, as well as the one really practical statesman in the Assembly. On the 17th June, on the motion of Sieyès, the *tiers état* constituted itself as the National Assembly, and on the 23d Mirabeau made his memorable answer to the royal messenger, the Marquis de Dreux-Brézé, who had come from the king to command the deputies to separate: 'If you have orders to remove us from this hall, you must also get authority to use force, for we shall yield to nothing but to bayonets.'

Mirabeau's political sagacity and foresight quickly made him a great force in the Assembly, while his audacity and volcanic eloquence made him at once the darling of the mob and the terror of the court. Meantime he extended his influence by unceasing diligence in journalistic work, and for his *États-Généraux*, *Lettres à mes Conmectants*, and *Courrier de Provence*, drew on the knowledge and abilities of a host of coadjutors, such as the Genevese Duroveray and Étienne Dumont. Moved by his instinctive dread of anarchy, he proposed the establishment of a citizen-guard, out of which grew the National Guard, but he trembled at the 'nocturnal orgies' of August 4, 1789, when in the breathless legislation of a single night were swept away together serfdom, feudal jurisdiction, manorial ground-rents, tithes, game-laws, saleable offices, fees, clerical robing dues, municipal and provincial privileges, privileges of rank, exemptions from taxes, and plurality of offices and livings. None of his contemporaries equalled him in breadth of view, temperance in judgment, and freedom from prejudice—no actor in the great drama save himself saw that 'the notion of equality is only a fit of the revolutionary fever.' He saw clearly the fatuity of such schemes as the foolish Lafayette's theatrical declaration of the rights of man, pointing out that such a thing might well enough be done after the work of constructing the constitution had been accomplished. Mirabeau was not personally responsible for the furious *émeute* of October 5 and 6, which brought the king to Paris, for indeed hatred of anarchy was his most deeply-rooted political principle. As early as May 1789 he had tried in vain to come to terms with Necker and Lafayette, yet his character was too magnanimous

to desire revenge for the rebuffs with which his overtures had been received. He formed a warm friendship with the Count de la Marck, a particular friend of Marie Antoinette, and in conjunction with him he drew up his first memoir for the guidance of the court, just after the transference of the king and Assembly to Paris. In this admirable paper he set forth the necessity for a new constitution, the initiative to come from the king; that all that had been passed must be ratified, and a responsible ministry appointed after the pattern of the English parliamentary usage; and that the king must leave Paris for some such loyal city as Rouen, and throw himself frankly upon France. He suggested a ministry, with Necker and Lafayette as its prominent members, himself to have a seat but no portfolio. But the infatuated queen detested and distrusted the great tribune, and the Assembly, mad with suspicion and fear, passed a suicidal self-denying ordinance (November 7, 1789) that no member should take office under the crown while holding his seat, or for six months after. Mirabeau's hopes were thus blasted for the time, yet he worked on with unabated energy. He surrounded himself with a group of able and enthusiastic friends who provided him with his facts, and even wrote for him his speeches and articles, content to efface themselves to enhance a beloved master's glory. Never was there so marvellous a collaboration of unpaid enthusiasm: Dumont wrote the political speeches; Clavière, the financial; the Abbé Lamourette, those on the civil constitution of the clergy. Pellenc, the private secretary, constantly accumulated facts; the Genevese Keybaz wrote the speeches on the assignats, and on the right of making war and peace. The orator took freely these materials so generously prepared for him, fused them in the alembic of his own marvellous genius, and stamped them afresh with the impress of his own individuality.

In the spring of 1790 communication opened anew with the court, and fresh appeals were made to Lafayette. If Mirabeau was a bitter enemy of feudalism he was a devoted friend of order, and saw the necessity of a strong executive as its foundation, but he was constantly mortified to find himself mistrusted and misunderstood. His past rose up in judgment against him, and he could not gain the full confidence either of the respectable classes or of the court—as he himself said bitterly to Dumont, 'The sins which I committed in my youth are giving me their full punishment now.' The court provided money to pay his debts, which were scheduled at 208,000 livres—among them the bill for his wedding-clothes—and agreed to allow him 100 louis a month, with 300 livres for De Comps, his copyist, whereupon Mirabeau broke out into indiscreet extravagance. He risked all his popularity by successfully opposing Barnave's motion that the right of peace and war should rest not with the king but the Assembly. On the 3d July the queen gave him an interview in the gardens at Saint-Cloud, and at its close Mirabeau, with the fine chivalry of his nature, as he bent to kiss her hand, assured her with the words, 'Madame, the monarchy is saved.' But as the popular movement progressed his dream of placing the king at the head of the revolution became more and more a dream, and he was cut to the heart to find, as he did by the winter of 1790, that the court did not yet grant him its full confidence, but listened also to other counsellors than himself, and that it would not accept his plan of an appeal to the provinces. He inspired Montmorin in his management of foreign affairs, and showed himself a really great financier in his measures to avert national bankruptcy, while he continued to interchange notes of advice with the

court. His secret aim was now to undermine the popularity and influence of the Assembly, and compel it to dissolve. Neither counter-revolution nor foreign intervention were within his schemes, but the advent of a new assembly, which he hoped to guide to a moderate conception of liberty and to wise concessions to the throne. He suggested the establishment of a bureau of correspondence with the provinces, a publishing committee to buttress the cause of order with the throne as its centre, a plan for gaining over the chief members of the present Assembly in preparation for its dissolution, and an organised system of ascertaining the opinions of journalists and leading politicians. But the queen would not commit herself to the tribune, and Mirabeau's heart sank within him as he saw slip from his grasp his great dream of establishing a responsible parliamentary government in France. This summer his health and eyesight gave way alarmingly, but he refused to abate his giant labours. In December 1790 he was elected president of the Jacobin Club; as well as an administrator of the Seine department, and in the January following one of its eight directors; but by Lafayette's influence he was defeated in his candidature for the office of its procureur-general-syndic, as well as for the presidency. He was chosen, however, commandant of the battalion of National Guards of his district, and on 30th January 1791 was at last elected president of the Assembly for the fortnight. He overthrew the proposed law against emigration, and that same evening at the Jacobin Club bore down all opposition by his irresistible eloquence. He opposed the motion of Sieyès (22d March) that in the event of the king's death the regent should be elected by the Assembly, as an abandonment of the hereditary principle, and carried his point. But his health was fast sinking. On the last day of his life he said, 'I carry with me the ruin of the monarchy. After my death factions will dispute about the fragments.' On the morning of 2d April 1791, after a night of agony, when speech had gone, he wrote on a slate, 'Sleep—I wish only to sleep,' and a few moments after his heart had ceased to beat. He was buried in the Panthéon amid universal mourning. Another National Assembly, the Convention, two and a half years afterwards, when the papers revealing the secret relations of Mirabeau and the court were discovered in the king's iron chest, ordered the body to be disinterred from the Panthéon and cast into the churchyard of Sainte-Catherine.

English historians have generally with Carlyle looked on Mirabeau as the strong man who, had he lived, might have saved the state and checked the cataclysm of the Revolution. Recent French critics with other than English political experiences and prepossessions have refused to ignore his venality and crooked ways, and to assume that his scheme of a constitutional monarchy was practicable. Emphatically they knew he was *felix opportunitate mortis*. 'Just as at his death all factions agreed in praising him because all had points of agreement with him, so now all critics make their reservations because he went too far for some of them and not far enough for others.' Many of them, admitting that he was a man of great ability, perhaps a man of genius, hold that 'if he had lived he would have been exposed as a double-dealer who had taken bribes for his double-dealing, and would have been swept away, like so many other moderate men, by the revolutionary torrent.'

His writings were collected by Blanchard (10 vols. 1822). See the *Mémoires Biographiques, Littéraires, et Politiques de Mirabeau écrits par Lui-même, par son Père, son Oncle, et son Fils Adoptif* (8 vols. 1834; trans. 1835-36); Dumont, *Souvenirs sur Mirabeau* (1832); A. Stern, *Das Leben Mirabeaus* (2 vols. 1889); De Bacourt,

Correspondance entre le Comte de Mirabeau et le Comte de la Marck (1851); Loménie, *Les Mirabeau* (1878-91); Mézières, *Vie de Mirabeau* (1892, new ed. 1908); Reynald, *Mirabeau et la Constituante* (1873). The view of Mirabeau presented by Carlyle both in his *Essays* and in his *French Revolution* should be corrected by Willert's *Mirabeau* (1898), Warwick's *Mirabeau and the French Revolution* (1905), and *Mirabeau* by Louis Barthou (trans. 1913). See also books in French by Rousse (1891); in German by Erdmannsdörffer (1900); and in English by Trowbridge (1907), Tallentyre (1908), and Fling (1908 *et seq.*).

ANDRÉ BONIFACE RIQUETI, VICOMTE DE MIRABEAU, brother of the preceding, was born 30th November 1754 at Bignon, and from an early age was notorious for his ill-regulated life and for a thirst that earned him the nickname of 'Barrel Mirabeau.' It was, as he said, the only vice his brother had left him. He fought with distinction in the American war, and at the outbreak of the Revolution was returned to the States-general by the nobility of Limoges. Here he showed himself a fierce aristocrat in policy, and after the death of his brother he quitted France, and raised on the Rhine the 'Hussards de la Mort,' a legion of embittered *émigrés*, with whom he began in 1792 a bloody partisan warfare against his country. He was run through by accident, 15th September of the same year, at Freiburg im Breisgau.

Miracle (Lat. *miraculum*, 'a wonderful event'). The term is generally applied to extraordinary and altogether inexplicable actions produced by great personalities in the interests, generally speaking, of religion. Hence in the Old Testament the name is bestowed upon the supernatural effects produced by Moses (e.g. the parting of the Red Sea, the manna, &c.) and Elisha (e.g. the raising the dead boy to life) and other religious teachers. In the New Testament it is given to the wonderful works wrought by Jesus and his apostles.

In modern times the question as to the possibility of miracle has been the subject of constant debate. The discussion began with Hume's attack. 'A miracle,' says Hume, 'is a violation of the laws of nature; and as a firm and unalterable experience has established these laws, the proof against a miracle, from the very nature of the fact, is as entire as any argument can possibly be. The consequence is that no testimony is sufficient to establish a miracle unless the testimony be of such a kind that its falsehood would be more miraculous than the fact which it endeavours to establish.' The whole argument rests upon the assumption that 'a miracle is a violation of the laws of nature.' This definition, however, really begs the whole question, and is certainly at variance with the interpretations put upon miracles by many leading theologians. Augustine, for instance, strenuously contested this conception of miracle. 'God,' he says, 'does nothing against nature. When we say that he does so, we mean that he does something against nature as we know it, in its familiar ordinary way, but against the highest laws of nature he no more acts than he acts against himself' (*Contra Faustum*, xxvi. 3). A similar position was taken up in modern times by the Duke of Argyll. 'Miracles,' he argues, 'may be wrought by the selection and use of laws of which man knows, and can know, nothing, and which, if he did know, he could not employ.'

The debate on miracles falls into two parts. In part it is concerned with the question of metaphysical presuppositions, and in part it is concerned with the validity of the testimony available. Most theological problems are fought out beyond the frontiers of theology, and the question of miracles is a case in point. There are, it must be admitted, certain interpretations of the universe which rule miracles out of court at once. Materialism, which

explains everything by the action of material forces alone, has, of course, absolutely no room for the admission of a non-material agency into its scheme of things. Nor has Pantheism, which is, after all, only a spiritualised form of materialism. The Deistic interpretation is equally fatal to a belief in miracle, because it holds that after the first act of creation God retired from the universe and left it to work out its own fate. It is only those who believe in the existence of a God—and a God who is both transcendent and immanent in the life of the world—who can admit into their metaphysical explanation of the universe the possibility of miraculous intervention; in fact, on such a theory it is difficult to exclude the idea without destroying the whole conception of the personality of God. If freedom of action be a necessary element in personality, it seems impossible to deprive God of this prerogative without at the same time robbing him of personality. The assumption that God must always act according to uniform and invariable laws makes him the slave of his own system, and leaves him, as Lecky puts it, 'the only dormant spirit in the universe.' Moreover, there are clear indications that the action of God in governing the evolution of the world has, at times at any rate, assumed new forms. At the start of the process for instance—at the point where the inorganic passes into the organic—at the juncture where animal instinct becomes human reason and conscience, God seems to have broken with new power and force into the life of the universe. The very conception of Providence, too, assumes freedom on the part of God to vary his action in the interests of the development of human character. Prayer, too, is an empty form unless the assumption of the possibility of Divine intervention be maintained. In fact, the presuppositions of prayer are exactly the same as the presuppositions of miracle, and any theory which destroys the possibility of the one is fatal also to the other. But the question for us to-day turns not so much upon the *a priori* possibility of miracle, as upon the validity of the evidence. Huxley, for instance, once said: 'I have not the slightest objection to offer *a priori* to all the propositions in the three creeds. The mysteries of the Church are child's play compared with the mysteries of nature. The doctrine of the Trinity is not more puzzling than the necessary antinomies of physical speculation. . . . It would be a great error, therefore, to suppose that the agnostic rejects theology because of its puzzles and wonders. He rejects it simply because in his judgment there would be no evidence sufficient to warrant the theological propositions, even if they related to the commonest and most obvious everyday propositions.'

The question of evidence raises the whole issue as to the historical value of the gospel narrative (see GOSPELS). It is impossible, of course, to assume the infallibility of the record. The same scientific tests must be applied to the gospels as to any other historical narrative. Nor can it be assumed that every incident is equally well authenticated. The evidence for the healing miracles is infinitely stronger, for instance, than for the miracle of turning the water into wine at the marriage-feast at Cana, and that for the following reasons. (1) The latter is only found in our latest stratum of evidence, i.e. the fourth gospel, which was not written till seventy years after the event recorded is supposed to have happened. (2) The former appear in all the synoptics, and must, therefore, have come from the original sources out of which our present gospels are known to have been composed. (3) Numerous illustrations are given of the former class of miracles, while the latter stands alone, and is unique.

In weighing the evidence the ultimate question which we have to face is, Have we any first-hand testimony to the miracles in the New Testament? Now, such evidence cannot be obtained from the gospels, since neither Mark nor Luke was a disciple of Jesus; and the authorship of Matthew and John is a matter of dispute, and cannot be demonstrated beyond the possibility of doubt. But, none the less, it may be claimed that first-hand evidence is to be found in the New Testament. We have, firstly, two definite statements by Paul in his epistles. In Romans, xv. 18-19, he says: 'I will not dare to speak of any things save those which Christ wrought through me . . . in the power of signs and wonders;' and in 2 Corinthians, xii. 12, he makes a most explicit statement: 'Truly the signs of an apostle were wrought among you in all patience, by signs and wonders and mighty work.' There can be no doubt that these two statements represent the actual words of Paul, for they come from epistles the authenticity of which has never been challenged except by the Dutch school of criticism headed by van Manen, which is thoroughly discredited to-day. There is absolutely no doubt either that Paul definitely claims miraculous powers, because he uses the well-known technical expressions for miracle. Nor is it likely that Paul is making an unjustifiable claim, since he was surrounded by critics who would have been only too eager to pounce upon any untrue statement in his epistles. It may also be claimed that the account of Paul's healing of Publius' father in Malta rests upon first-hand evidence, since it occurs in one of the We-sections of Acts (xxviii. 7-10), and the writer was present on the occasion.

In the light of this evidence it seems to be quite clear that miracles were worked in the apostolic age, and, if this is so, there is a strong presumption in favour of the healing miracles in the gospel narrative. It must, however, be admitted that the account of many of them is affected by the mistaken belief which attributed most forms of disease to demonic possession (see section on Miracles in article on JESUS CHRIST).

The best modern books on Miracles are Bruce, *The Miraculous Elements in the Gospels*; Wendland, *Miracles and Christianity*; A. C. Headlam, *The Miracles of the New Testament*; Illingworth, *The Gospel Miracles*; J. M. Thompson, *Miracles in the New Testament*; E. O. Davies, *The Miracles of Jesus*; Mozley, *Eight Lectures on Miracles*; Bernard, article on 'Miracles' in *Hastings's Bible Dictionary*; Duke of Argyll, *The Reign of Law*; Newman, *Two Essays on Miracles*. On the negative side see Hume, *Enquiry Concerning the Human Understanding*, x.; Matthew Arnold, *Literature and Dogma*. See CANONISATION, STIGMATISATION, LOURDES, KNOCK, &c., also CONVULSIONARIES, SPIRITUALISM, CHRISTIAN SCIENCE, and on the evidences generally, APOLOGETICS.

Miracle Plays. See MYSTERIES.

Miræus, AUBERT (1573-1640), ecclesiastical historian, born at Brussels, educated at Douai and Louvain, was dean of Antwerp Cathedral from 1624. His larger works include a history of the Christian world, containing chronicles of Eusebius, St Jerome, and others (1608), a life of his teacher Justus Lipsius (1604), and books of ecclesiastical biography and geography.

Mirage. The density of the air generally diminishes with the height; rays of light proceeding obliquely upwards from an object then become more and more nearly horizontal, but generally pass away into space. Assume the density to diminish with the height with unusual rapidity, as when the air is cooler the nearer it is to the earth; the obliquely ascending rays may become quite horizontal and then bend down towards the earth, reaching it at a distant point. The observer at that point sees distant objects at an unusual

elevation, or sees above the true horizon erect images of objects which may or may not be beyond the horizon. This is what the sailors generally call looming, and it causes us sometimes to see distant coasts with unusual distinctness, or to see from a mountain top a double horizon, such as is regularly seen in the autumn mornings from the Colorado foot-hills across the prairies. If the layer of air near the earth, say 50 or 100 feet thick, be uniformly dense, as in the cold air over a frozen sea, and a warmer stratum lie above it in which the density rapidly diminishes, so that the rays are brought back to the earth as above, we find, on tracing the path of the rays reaching the observer from the top and the bottom of the distant object respectively, that these rays have crossed one another in the hot stratum; the observer therefore seems to see the object suspended in the air, magnified and upside down; and this may happen while the observer sees the object itself by direct vision through the lower air. An intermediate stratum between a cold ground-stratum and a warm upper stratum gives rise to more than one image, inverted or erect, or both, according to positions. In the mirage of the Sahara and other arid deserts the conditions are reversed; the air is hottest nearest the hot sand; skylight rays descending become bent upwards; the eye receives an impression resembling that produced by the reflection of skylight from water; the illusion is rendered more perfect by the flickering due to convection currents, which causes an appearance like a breeze playing over the illusory water.

The phenomena of mirage are frequently very strange and complicated, the images being often much distorted and magnified, and in some instances occurring at a considerable distance from the object, as in the case of a tower or church seen over the sea, or a vessel over dry land, &c. Looming is very frequently observed at sea, and a most remarkable case of this sort occurred on the 26th of July 1798, at Hastings. From this place the French coast is 50 miles distant; yet from the seaside the whole coast of France from Calais to near Dieppe was distinctly visible, and continued so for three hours. In the Arctic regions it is no uncommon occurrence for whale-fishers to discover the proximity of other ships by means of their images seen elevated in the air, though the ships themselves may be below the horizon. Generally, when the ship is above the horizon, only one image, and that inverted, is found; but when it is wholly or in great part below the horizon, double images, one erect and the other inverted, are frequently seen. The faithfulness and distinctness of these images at times may be imagined from the fact that Captain Scoresby, while cruising off the coast of Greenland in 1822, discovered the propinquity of his father's ship from its inverted image in the sky. Another remarkable instance of mirage occurred in May 1854, when from the deck of H.M. screw-steamer *Archer*, then cruising off Oesel, in the Baltic, the whole English fleet of nineteen sail, then nearly 30 miles distant, was seen as if suspended in the air upside down. Beside such phenomena as these, the celebrated *Fata Morgana* (q.v.) of the Straits of Messina sinks into insignificance. The *Spectre of the Brocken* is a magnified shadow of persons, &c., on the summit of the mountain, seen at sundown and sunrise thrown on mist banks on the side of the mountain opposite to the sun, with or without rainbow colours. This is rather a *glory* than a mirage proper (see HALOS). Its varieties are indeed numberless, and we refer those who wish for further information to Brewster's *Optics*, to Biot's *Traité de Physique*, and to R. W. Wood's *Physical Optics*, and for the mathematical theory of the mirage to

Tait on *Mirage*, *Trans. Roy. Soc. Edin.*, 1881. See also REFLECTION and REFRACTION.

Miraj, an Indian state in the southern Mahratta country. The capital, Miraj, near the Kistna River, has a pop. of 21,000.

Miramar, a palace standing on the rocky shore of the Adriatic near Grignano, 6 miles NW. of Trieste, was the home of Archduke Maximilian, afterwards Emperor of Mexico. See also MAJORCA.

Miramichi, the second river (220 miles) of New Brunswick, entering the Gulf of St Lawrence through Miramichi Bay, is navigable to 2 miles above Newcastle, the principal town on its banks.

Miranda, or SA DE MIRANDA, FRANCISCO DE (1495-1558), a Portuguese poet, founder of the school of which Camoens is the most brilliant representative. His earlier efforts were written in Spanish; his sonnets were the first written in Portuguese; his most characteristic works, his epistles in verse, are all in Portuguese but one. His works appeared at Lisbon in 1595: a better edition in 1614; a scholarly one, by Vasancellos, at Halle in 1885.

Mirbeau, OCTAVE (HENRI-MARIE), French writer, born in 1850 at Trévières (Calvados). Educated at Vannes, he entered upon a political career but turned to journalism, and, in the vein of Zola, wrote numerous novels and dramas. He died in Paris in 1917. Of his novels may be mentioned *Le Calvaire* (1886), *L'Abbé Jules* (1888), *Sébastien Roch* (1890), *Le Jardin des Supplices* (1898). His best drama, *Les Affaires sont les Affaires*, was written in 1903, and was adapted by Sydney Grundy.

Miran'dola, a town of Northern Italy, 19 miles by rail NNE. of Modena. It has a fine cathedral and an old castle. Pop. 20,000. See PICO.

Mirecourt, a town in the department of Vosges, 236 miles by rail ESE. of Paris, with manufactures of lace and musical instruments; pop. 6000.

Mirfield, a manufacturing town in the West Riding of Yorkshire, 3 miles W. by S. of Dewsbury, and $4\frac{1}{2}$ NE. of Huddersfield. It has a town-hall (1868), a parish church (restored 1871), and manufactures of woollen cloths, carpets, blankets, &c. Pop. 12,000.

Mirror, a reflecting surface, usually made of glass lined at the back with a brilliant metal, so as strongly to reflect the image of any object placed before it. When mirrors were invented is not known, but the use of a reflecting surface would become apparent to the first person who saw his own image reflected from water; and probably for ages after the civilisation of man commenced the still waters of ponds and lakes were the only mirrors; but we read in the Pentateuch of mirrors of brass being used by the Hebrews. Mirrors of bronze were in very common use amongst the ancient Egyptians, Greeks, and Romans, and many specimens are preserved in museums. Praxiteles taught the use of silver in the manufacture of mirrors in the year 328 B.C. Mirrors of glass were first made at Venice in 1300; and judging from those still in existence—of which one may be seen at Holyrood Palace, in the apartments of Queen Mary—they were very rude contrivances, in comparison with modern ones. It was not until 1673 that the making of mirrors was introduced into England. It is now a very important manufacture; and mirrors can be produced of any size to which plate-glass can be cast. In the old mercurial process, after the plate of glass was polished on both sides, it was laid on a perfectly level table of great strength and solidity, usually of smooth stone, made like a billiard-table with raised edges; a sheet or sheets of tinfoil sufficient to cover the upper surface of the glass were then put on, and

rubbed down smooth, after which the whole was covered with quicksilver, which immediately formed an amalgam with the tin. The superfluous mercury was then run off, a woollen cloth spread over the whole surface, and square iron weights applied. After a day and night weights and cloth were removed, and the glass removed to a wooden table, admitting of gradually increasing inclination until the unamalgamated quicksilver had perfectly drained away, and only the film of amalgam remained coating the glass, and perfectly adherent to it. Since the latter part of the 19th century, mirrors are usually made by silvering glass with an ammoniacal solution of a silver salt to which tartaric acid and sugar-candy have been added.

Heat is reflected like light; so that a concave mirror may be used to bring rays of heat to a focus. In this way combustible substances may be set on fire at a distance from the reflector whence they receive their heat. Thus used, a mirror is called a *Burning Mirror*.

The mirror is one of the most characteristic features of Japanese life and legend. It is usually of bronze, convex, polished by mercurial amalgam, and engraved on the back. In a few specimens the mirror may be used as a mirror in the ordinary way, but bright light reflected from its polished surface on to a screen gives bright-lined images corresponding to the figures on the back. This property of the so-called *Magic Mirror of Japan* is (according to Professors Ayrton and Perry) due to inequalities of curvature associated with inequalities of thickness, the thicker portions being the flatter.

Mirza (a contraction of *Emir Zadah*, 'son of the prince'), a Persian title, equivalent to 'Prince' when it follows the surname, and merely the common title of honour (like our 'Mr') when it is prefixed to it.

Mirzapur, a town and district in the United Provinces of British India. The town stands on the right bank of the Ganges, 45 miles by rail SW. of Benares. It has manufactures of shellac, carpets, brass-wares, and cotton-spinning. Pop. 55,000. The district has an area of 4368 sq. m., and a pop., almost all Hindus, of 724,000.

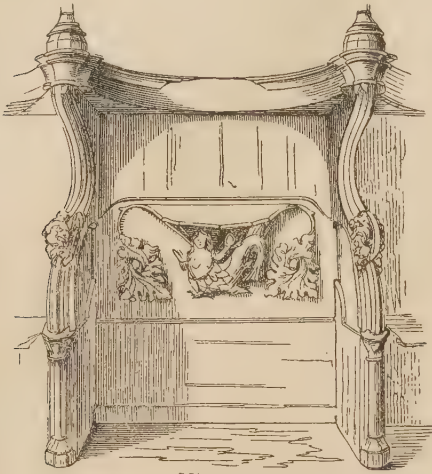
Miscarriage. See ABORTION.

Misdemeanour, in the law of England and Ireland, means a crime not involving forfeiture of property on conviction. Every crime is either treason, felony, or misdemeanour; and in creating new offences the legislature determines how they are to be classed. The distinction between felony and misdemeanour is not logically drawn, and it would disappear if the criminal law were codified on a rational plan. See Stephen's *Hist. of Crim. Law*.

Miseno, a promontory forming the western side of the Bay of Pozzuoli (*Sinus Cumanus*), 10 miles SW. of Naples. On it are ruins of the ancient city of Misenum, which Augustus made one of the principal stations of the Roman fleet.

Miserere, the name by which, in Catholic usage, the 50th Psalm of the Vulgate (51st in Authorised Version) is commonly known. It is one of the so-called 'Penitential Psalms,' which are said after Lauds on the Fridays in Lent, except Good Friday. It has been commonly understood to have been composed by David in the depth of his remorse for the double crime which the prophet Nathan rebuked in the well-known parable (2 Sam. xii.). Another opinion, however—plainly stated by Theodore of Mopsuestia (died 428), and adopted by many moderns—attributes this psalm to some of the psalm-writers of the Captivity; whilst others, again, hold that the last two verses only were added after the return from the Exile.

Miserere, a projection on the under side of the seats of the stalls of mediæval churches and chapels, &c. They are usually ornamented with



Miserere.

carved work, and are so shaped that when the seats proper are folded up they form a small seat at a higher level, sufficient to afford some support to a person resting upon it. Aged and infirm ecclesiastics were allowed to use these during long services.



Frate della Misericordia.

Misericordia, or MISERICORDE ('mercy'), a narrow-bladed dagger used by a knight in giving the *coup de grâce* or finishing stroke to a wounded foe.—Misericordia is also the name of a society (of laymen) in Florence, founded in the 13th century, who tend the poor sick, carry victims of accident or disease to the hospitals, and the dead to their burial. Members of all classes of the community, including the highest, are enrolled in this charitable institution; and their sombre and forbidding costume—a dark monastic dress, with the cowl pulled down over the face so that

the eyes merely peep through little holes—is not assumed because the Frati della Misericordia are penitents, but to check demonstrations of gratitude to the individual brethren.

Mishmee Bitter. See COPTIS.

Mishna (from Heb. *shana*, 'to learn'; erroneously held to designate Repetition) comprises the body of the 'Oral Law,' or the juridico-political, civil, and religious code of the Jews; and forms, as such, a kind of complement to the Mosaic or Written Law, which it explains, amplifies, and immutably fixes. It was not, however, on the authority of the schools and the masters alone that these explanations, and the new ordinances to which they gave rise, depended, but rather on certain distinct and well-authenticated traditions, traced to Mount Sinai itself. The Mishna (to which the Toseftas and Boraithas form supplements) was finally redacted, after some earlier incomplete collections, by Jehudah Hanassi, in 220 A.D., at Tiberias. It is mostly written in New Hebrew, and is divided into six portions (Sedarim): 1. Zeraim (Seeds), on Agriculture; 2. Moed (Feast), on the Sabbath, Festivals, and Fasts; 3. Nashim (Women),

on Marriage, Divorce, &c. (embracing also the laws on the Nazirship and Vows; 4. Nezikim (Damages), chiefly civil and penal law (also containing the ethical treatise Aboth); 5. Kadashim (Sacred Things), Sacrifices, &c.; description of the Temple of Jerusalem, &c.; 6. Taharoth (Purifications), on pure and impure things and persons. See also TALMUD.

Misiones, an Argentine territory, lies between the Uruguay and the Paraná, and is bounded on all sides but the SW. by Brazil and Paraguay. Area, 11,500 sq. m.; pop. 70,000—though before the expulsion of the Jesuits (1767) it exceeded 100,000. There are three low mountain-chains radiating from the centre. The greater portion of the surface is covered with forest, producing building and dye-woods, oranges, medicinal herbs, and *yerba maté*. Maize is largely grown, and sugar-cane to some extent. Capital, Posadas (pop. 16,000), on the Paraná.

Miskolcz, a town of Hungary, 113 miles by rail NE. of Budapest; pop. 57,000.

Mispickel. See ARSENOPYRITES.

Misprision. See TREASON.

Misrepresentation, a false statement affecting the validity of a contract or transfer of property. Wilful misrepresentation is the same as Fraud (q.v.). Innocent misrepresentation affects the formation of a contract in cases where one party has to rely on statements made by the other. An insurance company grants a policy in reliance on the statements made by the insured; a purchaser of land must rely on statements made by the vendor; an applicant for shares in a company relies on the truth of the prospectus. In these cases even unintentional misrepresentation will prevent the party responsible for it from enforcing the agreement against the party who had been misled. There are also cases in which a party is taken to warrant the truth of his statement; in these cases even an innocent misstatement may give the other party a right to be discharged altogether, or a right to claim damages for breach of warranty.

Missal, the volume containing the service of the Mass for the entire year. The name began to supersede the older word sacramentary from about the middle of the 8th century, but at first other books had to be used in conjunction, and the earliest missal complete in itself is not earlier in date than 900. Anciently missals differing in form were in use throughout the church, but with a view to restoring uniformity the pope, in virtue of a decree of the Council of Trent, in 1570 ordered that all churches should thenceforth adopt the Roman Missal, except such as had for a period of 200 years enjoyed an uninterrupted use of a service-book of their own. Under this exemption certain local missals continued to be used in England (the Sarum Missal), in France (the Gallican), in Germany, and even in Italy; but eventually the Roman form came almost universally to be adopted. Since 1570 the Roman Missal has been at various times revised—in 1604 by Clement VIII., in 1634 by Urban VIII., in 1884 by Leo XIII. It first appeared in printed form in 1474 at Milan. The missals of the oriental rites differ from that of the Roman Church, each having for the most part its own proper form.

Missions are organised efforts for the spread of a religion. Relative to the country conducting the work such efforts are characteristically undertaken abroad, and it is in the sense of foreign missions that the term missions is here employed. Christianity may be regarded as the typically missionary religion; but Buddhism, Mohammedanism, Zoroastrianism are also missionary faiths.

Christian Missions.—In the history of Christianity there have been but three distinctively

missionary periods: (a) the apostolic and immediately post-apostolic, (b) the mediæval, (c) the modern; between these times missionary activities have either ceased or been prosecuted without energy or discretion.

(a) *The Apostolic and immediately post-Apostolic Period.*—It is certain that Christianity made great progress during the lifetime of the apostles. From the 'Acts of the Apostles' it is manifest that within a few years of the resurrection of Christ the gospel obtained a footing in most countries to the east and the north of the Mediterranean; while from other authentic sources we learn that in the same brief period it was successfully introduced into Egypt and the other African regions on the southern shores of that sea. In contributing to this result, the labours of those Hellenistic Jews and proselytes of whose conversion to the faith we read in the second chapter of the Acts does not seem to have been sufficiently highly estimated. Of these Hellenistic Jews and proselytes three thousand were baptised. They had come from numerous Asiatic, African, and European lands and from the remote isles of the sea, and thenceforth they constituted a 'native agency' for conveying the message of the gospel into their several countries, and for telling of 'Jesus Christ and Him crucified' in the vernacular speech. But they needed training for this work, and remained for a time under the teaching and fellowship of the apostles. As the result of 'the persecution which arose about Stephen,' 'they were all scattered abroad, except the apostles,' and 'they that were scattered abroad went everywhere, preaching the word.' It must have been through the labours of these evangelists that Christian churches were founded in many places remote from Jerusalem—as, for example, at Damascus. In missionary zeal Paul has not been surpassed in any age, and his separation of Christianity from Judaism established the necessary pre-condition of all Christian missionary enterprise.

As to the personal labours of the apostles we have no reliable information outside the book of the Acts. There are innumerable churches that claim the honour of apostolic foundation; but their claims rest on traditions which cannot be traced beyond the 13th, the 12th, or, at most, the 11th century. There are, indeed, two exceptions—that relating to the foundation of a church in the kingdom of Edessa by Thaddæus, and that which ascribes the introduction of the gospel into India to the apostle Thomas. The authorities for these are apocryphal 'acts,' which are certainly of an early date, but which cannot be regarded as trustworthy documents. A greater amount of probability than is usually assigned to it appears to belong to the apostolic origin of the Syrian Church in southern India (see THOMAS, ST.).

We have no sufficient data from which to estimate the rate of the progress of Christianity during the apostolic age. From such data as are available statisticians have estimated the number of Christians existing at the death of the apostle John, or at the close of the first Christian century, at numbers varying from less than a quarter of a million to more than half a million. Whether within these figures or outwith them, the number was certainly large. The testimony of Tertullian to this effect would not be of much value if it stood alone. But from it, remarkably confirmed as it is by the unexceptionable testimony of the younger Pliny, it cannot but be inferred that within a century of the resurrection of Christ the gospel had been preached over a great part of the Roman world, and that at least in some provinces, as in Bithynia, it was threatening to supersede the worship of the gods of the empire.

(b) *The Mediæval Period.*—Apart from missions in the technical sense of the term, it is certain that various causes contributed to the wide diffusion of a knowledge of the gospel. Setting aside some altogether untrustworthy legends and traditions, we find no reason to believe that Christianity was first introduced into the British Islands by apostles or apostolic men, or by missionaries specially set apart for the work; and yet it is certain that before the time of Constantine there were churches of considerable extent both in the southern and the northern sections of Britain. The most probable supposition is that these churches owe their origin to the intercourse of Britain with Rome, which began with Cæsar's invasion, and soon attained large dimensions. Soldiers and civilians came from Rome to Britain, some of whom were Christians, while others brought with them Christian slaves. British merchants went to Rome as traders, British chieftains as diplomatists, British ladies as hostages. There is some reason to believe that one of the last class was a friend of Paul during his imprisonment there. But if the British Church did not owe its origin to missionaries in the strict sense of the term, it was destined to become the greatest missionary church throughout the earlier of the mediæval centuries. If Patrick really was a Briton, as seems demonstrable, he was the great leader of British missionary enterprise. He found Ireland entirely heathen, but he lived to see it professedly Christian, and a centre of scholarship not only for the neighbouring Britain, but also for the continent of Europe. The debt that Ireland owed to Scotland for the mission of Patrick she repaid a century later by the mission of Columba and his associates at Iona to the northern Picts and the Albanian Scots. If the Scottish Patrick might fitly be called the apostle of Ireland, and the Irish Columba in some sort the apostle of Scotland, Aidan, one of the Iona 'family,' is entitled in like sort to be regarded as the apostle of Northumbria; and St Cuthbert was a spiritual descendant of Aidan. Moreover, the Irish-Scottish missionaries were the great evangelists of a large part of the European continent. Ebrard has shown the magnitude and the importance of the work undertaken and accomplished by Columbanus and Gallus and a host of others, 'numerous as swarms of bees,' who, in the midst of countless difficulties, introduced agriculture and civilisation, learning and religion, into France and Switzerland and Italy and Germany, of which last country the English Boniface became the 'apostle.' Not that the externals of Christianity were non-existent at an earlier time. In France, for example, the Irish-Scottish missionaries had to do with the religion introduced by the Romans; but the pure faith was now represented by a corrupt clergy ministering to dissolute nobles and neglecting an enslaved people. They had to do also with the recent invaders, who were partly heathen and partly Arian, but it was less from these than from the orthodox that opposition was encountered.

What the Irish and Scots did for Europe in the earlier middle ages the Nestorians about the same time attempted, with no less zeal, though with less success, for Asia. Condemned as a heretic by a council held at Ephesus in the 5th century, Nestorius (q.v.) was banished from Constantinople to Egypt. From that time onwards, for five centuries, the Nestorians carried on extensive and not unsuccessful missionary operations in central Asia, and founded churches, some of which exist in a languishing condition to this day, whilst others recognised papal authority in the later mediæval centuries. The Nestorian Tatar Church seems to have subsisted under a succession of ecclesiastics (see PRESTER JOHN) until the country was de-

vastated by Genghis Khan. The Nestorians either introduced the gospel into India, or else revived a church previously founded, possibly by the apostle Thomas. There can be no reasonable doubt that in the 7th century they passed through Tartary into China, that they founded churches there, that they were at least tolerated and probably subsidised by successive emperors till the end of the 9th century, when, with a revolution or change of dynasty, the system of intolerance was introduced.

In the later mediæval centuries the missionary work was mainly in the hands of the great Roman orders, the Dominicans (q.v.) and the Franciscans (q.v.), especially the latter. Their work was chiefly among the Mussulmans of Spain, North Africa, and western Asia. Las Casas (q.v.) earned the title of 'apostle of the Indians.'

(c) *The Modern Period.*—The Jesuit order was formed immediately after the Reformation, avowedly for the purpose of retrieving the disaster which that great event had caused to the Church of Rome. By far the most distinguished of the early Jesuit missionaries was Francis Xavier (q.v.), who, essaying the conversion of the East, conducted great work in India, in the Malay Archipelago, and in Japan. After the labours of Ricci and Schall there are said to have been in China 300,000 Catholics in 1663. For the Jesuit 18th-century missions in Paraguay, see JESUITS, PARAGUAY. Notes on the Catholic missions in Japan and Korea will be found in the articles on these countries. There is a separate article on the Propaganda (q.v.). Since the Reformation 30,000,000 native converts are said to have been made by Roman Catholic missions, over 8,000,000 of these in the 19th century. Of the 19th-century converts over 6,000,000 are claimed for Asia, about 170,000 for Australia and Oceania, some 854,000 for Africa, and almost 1,000,000 for America.

The Reformation was a great preparation for missionary work, but the Reformation period was not distinctively a missionary period. In explanation it is to be noted that the Reformers' hands were full at home, and that the Protestant nations were lacking in the great colonial possessions of the Roman Catholic powers. Most important of all, however, was the interpretation placed by the Reformers on the Christian injunction to preach the gospel to every creature. When Luther has occasion to refer to that text, he tacitly assumes that its requirement is fulfilled when the *gospel*, as distinguished from Romanism, is preached to the nations of Europe. In the 16th and 17th centuries, therefore, we find no more than sporadic and ill-sustained efforts after mission-work, among the Jews and others. It fell to Leibniz, indeed, to anticipate the conception of a later age, and he may well be regarded as the harbinger of modern missions, even as, along with Newton, he is to be counted the harbinger of modern science. It was natural that the needs of the English colonies should first attract the interest of Englishmen to foreign parts; the life labours of John Eliot, 'the Indian apostle' (1604–90), were carried out under the auspices of the Corporation for the Spread of the Gospel in New England. The Hon. Robert Boyle, first governor of that society, contributed to the translation of the gospels into Malay, and left a bequest for foreign missions. Bishop Berkeley laboured for the foundation of a missionary college in Bermuda; and it was mainly for the spiritual wants of the American colonies that the Society for the Propagation of the Gospel in Foreign Parts was founded in 1701; its first missionary to India sailed in 1818.

Early in the 18th century the first Protestant mission was sent to India. It was projected

by the king of Denmark, having probably been suggested to him by his chaplain, Dr Lütkens. At first, and for a long time, Germany supplied the missionaries; but the pecuniary support of the mission soon devolved upon England, Prince George of Denmark, the husband of Queen Anne, having recommended the object to the Society for Promoting Christian Knowledge. Of all the men who have been engaged in this mission the most notable is Schwartz, who probably obtained an influence over all classes of the people of India such as no other European ever possessed.

While all the Protestant churches of Europe and America are now engaged in missionary work, there is one church which is distinguished from all the rest by this, that it is simply a missionary institute. Other churches make their missionary work subordinate to their pastoral functions; the Moravians or *Unitas Fratrum* have long regarded the conduct of missions as the end of their being. Beginning work in 1732, for its own sake and not as a part of colonial policy, their activities have extended from the West Indies and Greenland to the Tibetan Himalayas.

In England William Carey was the first effectually to arouse the missionary spirit of Protestantism, and he, too, was the first English Protestant personally to engage in missions. Finding his field in India, with his fellow-workers Marshman and Ward he established a centre in the Danish settlement of Serampore—the East India Company refusing countenance to any interference with native religion had barred him from British territory—and from there was laid the foundation for almost every method of subsequent missionary activity by the founding of schools and colleges, by the organising of native preachers and lay workers, but most of all by the publishing of Bible and other translations. It was in 1793 that Carey went to India. Henry Martyn's labours lay between 1805 and 1812. In 1795 the London Missionary Society was formed, and began its work by the despatch to the South Seas of the ship *Duff* with a large body of missionaries. For long the mission was not successful; but after a time it prospered greatly, and now there are many of the islands in which Christianity has for long been the sole religion. The London society cordially welcomed numerous fellow-labourers from England, Scotland, Germany, and America, and consented to a division of the islands for missionary purposes. It may be noted in passing that these small islands have contributed to a disproportional extent to the enrichment of missionary literature. Notable are Williams's *Missionary Enterprises*, Charlotte Yonge's life of Bishop Patteson, and Paton's narrative of his own work and that of his brethren in the New Hebrides.

The societies of the Church of England are the Society for the Propagation of the Gospel, High Church (1701), and the Church Missionary Society (1799). The English Nonconformists are represented in the mission-field all over the world by agents of the Baptist (1792), the London (1795), and the Wesleyan (1817) Missionary Societies. Among missionaries of the London Missionary Society have been Moffat and Livingstone. In the United States the American Board of Missions (1810) and the American Presbyterian Boards (North, 1837; South, 1862) are great organisations, whose agents are to be found in many fields; while the Baptists have their Burmese Mission (1813); the Methodist Episcopal Church Missionary Society came into the field in 1819. The efforts of the Salvation Army (q.v.) in the foreign field deserve mention. Missions to the Jews have a peculiar interest for many Christians. Zenana missions are a special department of Indian missions.

The Evangelical body in Germany is highly evangelistic in proportion to its strength. By means of many institutions it has trained and sent forth a large number of missionaries, some of whom have been men of extensive scholarship, but the greater proportion men of earnest piety. The Rationalistic party in Germany have not shown much zeal in the mission cause.

The Scottish missions differ from the others in this, that they are conducted by the churches as such, without the intervention of societies. The Church of Scotland and the United Free Church have extensive missions in India, Africa, China, the South Seas, and Japan. The English Presbyterian Church has an important mission in China. Notable among Presbyterian missionaries are Duff, Wilson, and Anderson in India, William Burns and Carstairs Douglas in China, Mary Slessor in Old Calabar.

Since the end of the 18th century 6,000,000 converts are said to have been made by Protestant missions.

The mode of carrying on missionary operations by the various bodies is essentially one, though, of course, modified by circumstances. In some cases 'medical missions' have come to be regarded as a valuable, and even as an indispensable, adjunct to other agencies. The missions of the Scottish churches have employed education as an evangelistic power to a greater extent than the other bodies, very widely in day schools, but also in such institutions as the Christian College at Madras, the mission station at Blantyre, and the United Free Church Institution at Lovedale in South Africa. Now, however, missions almost everywhere are confronted with expanding state systems of education, and in future missionary educational activities seem likely in many regions to be curtailed and even in some to be extinguished. In 1910 a Protestant World Missionary Conference was held in Edinburgh for the consideration along scientific lines of the problems of missionary enterprise, and here valuable reports which for two years previously had been prepared by representative commissions were presented.

The Orthodox Church accompanied Russian advances into Asia from the 16th century on; but its most notable work began in 1824 with the efforts of Archbishop Innocent (then known as John Veniaminov), who founded missions in Alaska and eastern Siberia. Others have worked among the Tatars, in China, and in Japan.

The Great War in certain of its reactions, most notably in its weakening of the moral and intellectual domination of western peoples, and in its intensification of national and racial antagonisms and suspicions, was unfavourable to the interests of Christian missions; and at the same time post-war political ferment in many parts of the world created missionary situations of peculiar difficulty.

Of the total population of the world it is estimated that under one-third is Christian. Whatever views, however, be held of the results of Christian proselytism, the great services rendered incidentally by Christian missions to literature, philology, exploration, anthropology, the study of comparative religion, and to the cause of civilisation in general are not to be forgotten.

Some account of Christian mission operations is given in the articles on the countries where these missions have had conspicuous success (FIJI, JAPAN, &c.); there are also biographical notices of the most eminent missionaries (ELIOT, CAREY, LIVINGSTONE, DUFF, HANNINGTON, XAVIER, RICCI, SCHALL, &c.). There is a bibliography (1913) by Weitbrecht, and one covering the period 1912-22 in *The International Review of Missions* (January 1922). Bliss, Dwight, and Tupper have edited *A New*

Encyclopædia of Missions (1905), and Dwight a *Blue Book of Missions* (1905, &c.). See also Henrion, *Histoire des Missions Catholiques* (1847); Spitz, *Les Missions Catholiques* (47 vols. 1868-1915); Louvet, *Les Missions Catholiques au XIX^e Siècle* (1894); J. S. Dennis, *Christian Missions and Social Progress* (3 vols. 1899-1906); A. Harnack, *Expansion of Christianity* (1904-5); Warneck, *Outlines of a History of Protestant Missions* (Eng. trans.; 3d ed. 1906); Streit, *Katholischen Missionsatlas* (1908); Fortescue, *The Lesser Eastern Churches* (1913); A. de W. Mason, *Outlines of Missionary History* (1913); C. H. Robinson, *History of Christian Missions* (1915); works by Marshall (1863), Rufus Anderson (New York, 1869), Christlieb (2d ed. 1880), Young (1881), William Brown (1882), P. Joung (New York, 1883), H. Gundert (2d ed. Calw, 1886), George Smith (1884; new ed. 1890), Stock (1904), Montgomery (1904), Bliss (1908), Ogilvie (1924); the reports (9 vols. 1910) of the World Missionary Conference, and the quarterly publication of its continuation committee, *The International Review of Missions* (1912, &c.). Statistics are to be found in numerous missionary year-books, in Dennis's *Centennial Survey of Foreign Missions* (1892), in Krose's *Katholische Missionsstatistik* (1908), and in a work (New York, 1916) by Beach and Burton St John.

Buddhist Missions.—Buddhist missionary enterprise outside India was initiated by Asoka (q.v.) in the latter half of the 3d century B.C., and in the centuries immediately following Buddhist missions seemingly spread themselves abroad in central Asia. In 67 A.D. Buddhism was first officially introduced into China, and there was eagerly received. Thereafter for a time the records of Buddhism in China are scant, but there is reason to suppose that the work of propaganda proceeded, though slowly. From the fall of the Han dynasty in 220 Buddhism enjoyed varying fortunes according to the differing faiths adopted by the several rulers of China. In the 4th century the greater part of the country began to be covered with Buddhist missions, and in the latter half of the 6th century Buddhism in China passes beyond the missionary stage. The translation into Chinese of Buddhist literature and the setting up of monastic institutions had been the outstanding features of the work, though it is not to be supposed that popular propaganda was wholly neglected. The borders of Tibet are said to have been touched by Asoka's missionaries, and in the 2d century A.D. a Buddhist temple is stated to have been built, but it is not till the 7th century that a footing can with certainty be held to have been obtained by Buddhism. Thereafter propaganda proceeded, but information as to its results is lacking, though here, as in China, the varying inclinations of successive rulers would appear again to have been the chief factor in determining the fortunes of the faith. With the later 10th century, however, came a fresh stream of Buddhist missionaries from North India; thereupon mystic Buddhism became more firmly established, and the missionary period of the religion, a period marked chiefly by literary activity, may be said to have ended. Towards the close of the 4th century Indian and Chinese missionaries first introduced Buddhism into Korea, but details as to their propaganda are wanting. In the course of about a century and a half, however, the whole country was converted to Buddhism. In Japan, Buddhism was first preached by Korean immigrants, and in 538 A.D. the religion was officially presented to the court. The fall of the conservative party in 587 was favourable to its advance, and in the reign (593-622) of Prince Shōtoku Buddhism became the state religion. Thereafter its progress was sure and steady, and before the close of the 8th century the whole country was converted to Buddhism. From the beginning of the 9th century Japan developed a Buddhism of its own, and from this time the missionary period

of Japanese Buddhism may be said to have ended, except for a new influx of Chinese influence in the latter half of the 13th century. Throughout, in marked contrast to the case of China, where an intellectual appeal had principally been made, propaganda had consisted chiefly in display of an elaborate ritual, in works of charity, especially medical works, though also to some extent in teaching, especially of science (astronomy, &c.). At the same time the missionaries also introduced skilled artisans and many useful arts, and did much for the economic advancement of the country.

See Nanjio, *A Catalogue of the Buddhist Tripitaka* (1883); *Nihongi* (trans. by Aston, 1896); Schlagintweit, *Buddhism in Tibet* (Leipzig, 1863); A. Lloyd, *The Creed of Half Japan* (1911).

Mohammedan Missions.—In the Koran the duty of missionary work is clearly laid down, and in a sense the missionary activity of Islam may be said to begin with Mohammed himself, who first sought converts in his own family, then in Mecca, and soon in Medina. Before his death in 633 Mohammed had extended his sway over the greater part of Arabia; but it was essentially a political sway, and religious converts were in a sense incidental. So later when Arab rule expanded over Syria, Persia, North Africa, and Spain, many converts were made, but there is no evidence of any distinctively proselytising effort; a notable exception, however, was 'Umayyad khalifah, 'Umar b. 'Abd al-'Aziz (717–20), who, in his vast dominions from North Africa to Transoxania and Sind, was a zealous propagandist. With the decline of the Arab empire the Moslem world was faced with the task of converting its new rulers. Obscurity surrounds the conversion of the Turks; but the work would seem to have proceeded slowly, and little headway was made before the 10th century, to which period also the winning of the Afghans is probably rightly to be assigned. In essaying the conversion of the Mongols in the face of competition from Buddhism and from Christianity a more formidable labour was undertaken. From the latter part of the 13th century, however, converts began to be made, and in Moslem missionary history a new epoch was inaugurated in which the religious orders and the Naqshbandi in particular played a prominent part. But in the Mongol empire the progress of Islam was essentially slow and fluctuating. In China Mohammedanism became firmly established in the 13th century through the influence of settlements of emigrants from the west; and these settlements subsequently developed through various causes, of which proselytism was one, into the great Chinese Moslem communities of modern times. In India from the beginning of the Mohammedan period a long series of preachers carried on a distinctively missionary work. In the 8th century a footing was gained in Sind and on the Malabar coast, and at the close of the 12th century in North India. Subsequently the flight to India of learned men and members of religious orders following the Mongol conquests of the 13th century resulted in a further spread of the faith. To its later extension various influences, political and social, no less than purposefully missionary, contributed. The introduction of Islam into the Malay Archipelago is traditionally ascribed to the 13th century. Sumatra, probably through the influence of traders, would seem to have been first affected, but the progress of the faith was slow. In the 15th century the conversion of Java was begun, and from thence Mohammedanism spread to the Moluccas and to Borneo; and in the 16th century, in the archipelago as a whole, Islam triumphed over Christianity. In the early days of Arab rule in Egypt and North Africa there

is little evidence of ordered missionary effort in the cause of Islam. Still, many converts were made, and by the 11th and 12th centuries Mohammedanism, by a process of gradual penetration, had acquired an ascendancy over the Berbers. Thereafter the Berbers introduced their adopted faith into the lands watered by the Senegal and the Niger, while Arabs from Egypt in the 12th century spread their religion into the Eastern Sudan. To the same period the conversion of Kordofan and Kanem would seem to belong. In the 13th century the Mandingoes emerge as zealous missionaries of Islam, to be followed by their converts the Hausas, destined later to spread their faith from one end to the other of the Sudan. Except in India and the Malay Archipelago there are few records of Moslem missions from the 15th to the 18th centuries. Nevertheless, in that period many conversions took place. Thus the Turkish conquests in Europe in the 14th and 15th centuries were followed by conversions to Islam on a large scale, and in the 17th century thousands of Christians in Turkey in Europe went over to the religion of their rulers; similarly the conquests of Ahmad Grān in Abyssinia (1528–43) were accompanied by numerous conversions. Speaking generally, however, these conversions were not the outcome of active propagandist effort. With the Wahhābi reformation, however, a great awakening took place in the missionary spirit of Islam, and the 19th century witnessed great missionary movements in India, in Sumatra, but especially in Africa, where later the partition of the greater part of the continent among the powers of Christian Europe gave an added stimulus to missionary effort, Moslem merchants and traders figuring in especial as proselytisers. While from the beginning Islam has always retained its primitive character as a missionary religion, it is remarkable that till the last decades of the 19th century societies for carrying on a continuous propaganda were unknown; such societies, too, when formed were largely in imitation of similar institutions in the Christian world. The most characteristic expression of the missionary spirit of Islam is to be found, indeed, not in permanent organisations, but in the proselytising zeal of the individual believer.

See T. W. Arnold, *The Preaching of Islam* (2d ed. 1913).

Zoroastrian Missions.—While the Iranism of ancient Persia was non-missionary, Zoroastrianism began as a distinctively missionary religion. Thus Zoroaster won King Vištāspa of Balkh to his doctrines, and he spread the faith with his conquests, amongst others to the Turanians. Zoroastrian missionaries, too, early disseminated the religion in distant lands, at times by invitation, though on occasion they encountered opposition. From the close of the Avestan period (224 A.D.) to the dynasty of the Sasanids (651 A.D.) there is an almost complete blank in the history of Zoroastrianism, though during this time there would seem to have been considerable diffusion, if not of orthodox Zoroastrianism, at least of Iranism, in Cappadocia, in Commagene, and in India. It was with the rise of the house of Sasan, however, that Zoroastrianism entered on its outstandingly missionary period. In many parts zealous proselytism was undertaken, and propaganda by force was even sanctioned in Persia and in Armenia. It was during this time also that there was some extension of Zoroastrianism in China, but this would seem to have been the result of commercial intercourse rather than of purposeful propaganda. With the Arab overthrow of the Sasanian dynasty the missionary enterprise of Zoroastrianism practically came to a close. True, the communities of Parsees

(q.v.), to which emigration had given rise in India, conducted some propaganda, but owing to the precariousness of their position only to a limited extent, though a measure of proselytism continued even as late as the 18th century.

See the article in the *Encyclopædia of Religion and Ethics*, and M. N. Dhalla, *Zoroastrian Theology* (New York, 1914).

Mississippi, one of the Gulf States of the American Union, lies west of Alabama and south of western Tennessee, and is bounded on the W. by the Mississippi River. Length, N. to S., 330 miles; width, 188 miles. Area, 46,865 sq. m. The surface except in the Yazoo delta, is generally hilly, though nowhere mountainous, the highest hills being only 800 feet above the sea-level. There are three distinct watersheds; the eastern counties are drained by the Tombigbee and its tributaries; the Pearl, Pascagoula, and Escatawpa with their affluents drain the central and south-eastern portion; and the Homochitto, Big Black, and Yazoo carry the water of the western and northern counties into the Mississippi. The Orange-sand formation (Post-Tertiary, 40 to 60 and even 200 feet thick) characterises the greater portion of the surface of the state, and forms the main body of the hills and ridges. It is usually coloured with hydrated peroxide of iron, or yellow ochre, and presents an endless variety of tints. Ferruginous sandstones, capping the tops of hills and thereby preventing denudation, are found in all sections covered by the Orange-sand formation. Gravel beds also abound, as well as beds of pipeclay, and of ochreous clays used for paints; and there are also vast beds of lignite of excellent quality, and marls which are used as ingredients of commercial fertilisers. There are mineral springs in different portions of the state.

Mississippi is essentially an agricultural state. The north-eastern prairie region, 70 miles long and from 15 to 20 wide, with its fertile, black, calcareous soil, contains much of the best farming and grazing land in the state. There are no springs here, but cisterns dug in the rotten limestone, bored wells, and artesian wells furnish ample water. In the north the bottom lands along the numerous creeks and rivers especially are well adapted to agriculture; while in the central portion stock-raising is carried on, and in the yellow-pine region large herds of sheep are raised. The yellow pine ranks first among the forest trees of Mississippi; it extends northward from the coast for 150 miles. The *Yazoo Delta*, embracing the elliptical area of alluvial bottoms between the Mississippi and Yazoo rivers, extending from Vicksburg to the state line on the north, is protected from inundation by levees. The delta's drainage flows into lakes, small but numerous, which form the head-waters of other bayous, and through them after miles of meandering find outlets into the Yazoo and other streams. The delta contains $4\frac{1}{2}$ millions of acres of alluvial land, of which about a third has been drained for cultivation. Virgin forests of hardwoods cover the rest. The majority of the farmers are coloured. Cotton is the chief crop. Others are corn, rice, wheat, oats, hay, and nuts.

The winters in Mississippi are short and mild, the mean temperature 45° F.; the summers are devoid of intense heat, the mean 81° , seldom reaching 100° . Ice from one to two inches thick forms in the northern part of the state. The elevation of the surface and the Gulf breezes render the climate delightful during most of the year. The annual rainfall ranges from 48 to 58 inches. The death-rate is very low— $12\cdot9$ in 1000.

Mississippi sends two senators and eight representatives to congress. The state legislature is elected quadrennially. Separate schools are main-

tained for the coloured race, who form more than half the population. The illiteracy rate is high, but falling. Of some twenty colleges for higher education the most important is the University of Mississippi at Oxford (1844). Institutions for the deaf and dumb and the blind are at Jackson, the capital; there also is the state penitentiary. There are about 4400 miles of railway in the state. Vicksburg, Greenville, and Natchez are principal ports on the Mississippi River, and Pascagoula and Biloxi on the Gulf. Manufactures (especially timber products, cotton-seed oil and cake, cotton goods) are growing. Mississippi is not a mining state. Pop. (1820) 75,448; (1880) 1,131,597; (1900) 1,551,270; (1910) 1,797,114; (1920) 1,790,618.

History.—Mississippi was first settled by the French, and constituted a part of Louisiana. Iberville planted the first colony at Biloxi in 1699. It was ceded to Great Britain in 1763; was admitted into the Union as a state, 10th December 1817; seceded 9th January 1861 (principal battles during the civil war, Corinth, Baker's Creek, Holly Spring, Iuka, siege of Vicksburg); was readmitted into the Union, 1869.

Mississippi - Missouri. The Mississippi River (Algonkin *Missi Sipi*, 'Great River'; literally 'Father of Waters'), the largest river of the North American continent, is, with its tributaries, wholly within the boundaries of the United States. It drains most of the territory between the Rocky and Alleghany Mountains, embracing an area of 1,257,545 sq. m., or more than two-fifths of the area of the United States. This basin includes the minor basins: Lower Mississippi, 65,646 sq. m.; Red River, 92,721; Arkansas, 184,742; Missouri, 527,690; Upper Mississippi, 179,635; Ohio, 207,111. Besides the four tributaries here named, there are forty-one others navigable, and 200 more of moderate size. The total length of the Mississippi is 2960 miles, of which 2161 are navigable; but the Missouri affluent (see below) is longer than the Upper Mississippi, and with the lower river gives a total of 4200 miles. The total navigable waters amount to 16,090 miles.

The source of the Mississippi is Lake Itasca in the north-west central part of Minnesota, about 7 miles long by 1 to 3 wide, which has, however, several feeders, the principal being Elk or Glazier Lake. The remotest springs of Itasca rise in $47^{\circ} 34'$ N. lat. and $95^{\circ} 20'$ W. long., and are 1680 feet above sea-level. As it issues from this lake the Mississippi is about 12 feet wide and 18 inches deep. Through pine-forests and swamps for hundreds of miles it winds from lake to lake, with frequent rapids and picturesque falls, until, 1200 feet wide, at the city of Minneapolis it plunges over the Falls of St Anthony. This point is the head of river-navigation, though in various reaches above small steamboats ply. After receiving the St Croix, the Mississippi becomes the boundary between the states of Minnesota, Iowa, Missouri, Arkansas, and Louisiana on the right, and Wisconsin, Illinois, Kentucky, Tennessee, and Mississippi on the left. Its frequent rapids within Minnesota are due to the granite bed, but sandstone prevails farther down, to Rock Island, Illinois. On the Wisconsin boundary the river expands into Lake Pepin, and thereafter, fully a mile wide, flows between bluffs 200 and 300 feet high, and sometimes through dense forests. At Rock Island there are rapids with 22 feet of fall, and 125 miles farther down are the Des Moines rapids with 24 feet of fall. Around these obstructions to navigation the United States government has constructed ship-canals. The entrance of the turbid Missouri produces a marked change in the character of the river; for several miles the diverse waters refuse to mingle, the Missouri's muddy

tribute taking the right bank and the Upper Mississippi's clear stream the left. When the union is complete, the whole river has thenceforth a light yellowish colour, modified somewhat by the Ohio's greenish water and more by the reddish water of the Arkansas and Red. From the mouth of the Ohio the trough of the Mississippi is about 4470 feet wide, but as it approaches the Red it is narrowed to 3000 feet, and at New Orleans is 2500 feet. The usual depth of the channel southward from the Ohio is from 75 to 100 feet, and its surface is sometimes higher than the country beyond its banks. In fact, from the Missouri to the Gulf the Mississippi rolls in serpentine course through vast alluvial tracts or 'bottoms,' whose width varies from 30 to 150 miles. The melting of the ice and snow in the upper basin swells the lower current from March to June. Levees or embankments, largely built by the government, now extend for more than 2000 miles. Between the Ohio and the Red rivers extraordinary floods, rising from 47 to 51 feet, occur about once in ten years, making 'crevasses' in the levees, and doing immense damage. In these great floods the river has been known to spread over a tract of 150 miles. Beyond the Red River the waters are discharged through numerous 'bayous' into the Gulf of Mexico. The main channel runs south-eastward, and finally divides into five or six passes, the principal being the south, the north-east, and the south-west; the last is in 28° 58' 5" N. lat. and 89° 10' W. long.

The mean velocity of the Lower Mississippi is $2\frac{1}{2}$ miles per hour. The yearly discharge into the Gulf is nearly 145 cubic miles; the sedimentary matter carried with this would form a prism 1 mile square and 263 feet high, while the amount pushed along the bottom of the channel would make another 1 mile square and 27 feet high. These vast deposits and the constant changes caused by floods tend to embarrass the entrance to the great river. To keep an open channel, at least 20 feet deep, Captain Eads contracted with the United States government to erect and maintain a system of jetties at the South Pass. The construction was begun in 1875, and has proved highly successful, a depth exceeding 30 feet having been maintained. The mouth of the Mississippi is essentially tideless.

The principal cities on the great river are Minneapolis, St Paul, La Crosse, Dubuque, Keokuk, Quincy, Hannibal, St Louis, Memphis, and New Orleans, at several of which the river is crossed by railway bridges. The steel bridge at St Louis is the most southern, besides which another was connected at the same city in 1890.

MISSOURI RIVER ('Big Muddy'), the principal branch of the Mississippi River, is formed by the confluence of the Jefferson, Gallatin, and Madison rivers, at Gallatin City, Montana, 4132 feet above the sea-level. These rivers rise in the Rocky Mountains, close to the sources of the Columbia and Colorado rivers, and to the Continental Divide. The Madison has the remotest source in a small lake of the same name in Yellowstone National Park in Wyoming, 44° 19' N. lat. and 110° 50' W. long., at an elevation of 7632 feet. This river flows north-west and north to the junction of the Three Forks. The Missouri then flows northward, skirting the main range of the Rocky Mountains, and, after passing through a gorge called 'The Gate of the Mountains,' turns to the north-east and reaches Fort Benton, the head of navigation, 225 miles from Gallatin City. About 40 miles above Fort Benton are the Great Falls, where the river descends 327 feet in 15 miles by a series of cataracts, the highest having a perpendicular fall of 87 feet. From Fort Benton the course is easterly, the river being flanked by bluffs about a mile apart

until it passes the rapids 400 miles below, when the valley opens to a width of 10 miles. The Milk River is its first large tributary, but at the boundary of North Dakota the still larger Yellowstone joins it. The Yellowstone also rises in the National Park, and flows at first over cataracts and through cañons until it emerges in a more level country. It is 1152 miles long, and has the general characteristics of the Missouri. From its junction, which is the head of navigation in the low-water season, the Missouri flows through North Dakota, east and then south-east to Bismarck (1610 feet above sea-level), where it is crossed by the splendid bridge of the Northern Pacific Railroad. Through South Dakota the south-easterly course continues to Sioux City, whence flowing south the river becomes the boundary between Nebraska and Kansas on the right and Iowa and Missouri on the left. On receiving the tributary Kansas the stream turns to the east, and flowing across the state of Missouri pours its muddy waters into the channel of the Mississippi, 20 miles above St Louis. The Missouri is 3047 miles long, of which 2682 are called navigable, but owing to its tortuous, treacherous, and obstructed channel navigation is attended with great risks. The growing cities on its banks forsake the use of the river for commercial purposes and depend on the railways. In 1866 there were seventy-one steamers in active service in that part within the state of Missouri, but twenty years later the number had diminished to seven steamers and three tow-boats. The chief towns on the banks are Bismarck, Yankton, Sioux City, Omaha, Council Bluffs, Nebraska City, St Joseph, Atchison, Leavenworth, and Kansas City.

Mississippi Scheme, projected in France by John Law (q.v.) of Lauriston in 1717, proposed to develop the resources of the province of Louisiana and the country bordering on the Mississippi. The company, incorporated as *Compagnie des Indes Occidentales*, started with a capital of 200,000 shares, of 500 livres each. Shares were eagerly bought; and when, in 1719, the company obtained the monopoly of trading to the East Indies, China, the South Seas, and all the possessions of the French East India Company, the brilliant vision opened up to the public gaze was irresistible. The *Compagnie des Indes*, as it was now called, created 50,000 additional shares, but a rage for speculation had seized all classes, and there were at least 300,000 applicants for the new shares, which consequently went up to an enormous premium. The public enthusiasm now rose to absolute frenzy, and Law's house and the street in front of it were daily crowded with applicants of both sexes and of all ranks; and while confidence lasted a factitious impulse was given to trade in Paris. But the regent had meanwhile caused the paper circulation of the national bank to be increased as the Mississippi stock rose in value, and many wary speculators, foreseeing a crisis, had secretly converted their paper and shares into gold, which they transmitted to England or Belgium for security. The increasing scarcity of gold and silver becoming felt, a general run was made on the bank. The Mississippi stock now fell considerably, and despite sundry desperate efforts, which were attended with momentary success, to keep up its credit, it continued to fall steadily and rapidly. In February 1720 the National Bank and the *Compagnie des Indes* were amalgamated, but, though this gave an upward turn to the share-market, it failed to put the public credit on a sound basis. Several useless attempts were made by Law, now controller-general of the finances, to mend matters; and those suspected of having more than a limited amount (fixed by a law passed at the time) of gold and silver in their possession, or of having removed

it from the country, were punished with the utmost rigour. The crisis came at last. In July 1720 the bank stopped payment, and Law was compelled to flee the country. A share in the Mississippi Scheme now with difficulty brought twenty-four livres. An examination into the state of the accounts of the company was ordered by government; much of the paper in circulation was cancelled; and the rest was converted into 'rentes' at an enormous sacrifice. See LAW (JOHN), and books there cited.

Missive, in Scots law, is a memorandum.

Missolonghi (*Mesolongion*), a seaport town of Greece, in the nomarchy of Ætolia, on the northern shore of the Gulf of Patras, 24 miles W. of Lepanto. A modern place, built on a swampy flat, it is chiefly memorable for the two sieges which it underwent during the war of independence. In 1821-22 it was vainly invested for three months by land and sea by the Turks; in 1825-26 it was again besieged by an overwhelming Ottoman force, and, after ten months of resistance and suffering, its garrison, reduced from 5000 to 3000 fighting-men, cut their way through the ranks of the enemy, carrying with them a great number of the women and children. The Turks then entered the town, which was all but totally destroyed. There is a statue (1835) over the grave of Bozzaris, and another (1881) of Lord Byron, on the spot where his heart is interred. Pop. 8000.

Missouri, one of the central states of the American Union, and ninth in order of population, is midway between the Rocky Mountains and the Atlantic; and, lying between 36° and 40° 30' N. lat. and between 89° 2' and 95° 51' W. long., occupies a commanding position in the Mississippi valley. It is 280 miles long from north to south, and gradually increases in width from 208 miles in the north to 312 miles in the south. Area, 69,420 sq. m., or nearly that of Scotland, Ireland, and Wales. The Missouri River divides the state into two unequal sections, designated 'North Missouri' and 'South Missouri' respectively. That part of the state lying north of the Missouri River is generally level or slightly undulating, consisting of rolling prairies and level bottom lands, diversified with a luxuriant growth of timber along the streams. The southern section has a more diversified surface, deriving its distinctive features from the Ozark Mountains, which cover about one-half of this division. These mountains enter the state from north-western Arkansas, and extend across the state to the Mississippi River; throughout the greater part of their length they may very properly be classed as tablelands, reaching their highest altitude (1500 feet) in Greene and Webster counties, and gradually breaking up into narrow ridges, spurs, knobs, and peaks farther east. The entire eastern limit of the state is washed by the Mississippi River, with a water front of 560 miles, while the Missouri River forms the boundary from the extreme north-west corner to Kansas City, and thence across the state to the Mississippi, with which it unites just above St. Louis. Many smaller tributaries flow into these two majestic rivers—into the Mississippi the Fabius, Salt, Cuivre, Meramec, St. Francis, Current, and Black; and into the Missouri the Nodaway, Platte, Grand, and Chariton on the north, and the Osage and Gasconade on the south. The general drainage of the surface is indicated by long gentle slopes toward the Mississippi and Missouri rivers, except in the extreme south-west, where the streams flow into the Arkansas. The climate is genial, agreeable, and healthful. All the extremes of heat and cold peculiar to this latitude are experienced; but

the mean annual temperature is about 54°, and the mean average rainfall is 41 inches.

Missouri is pre-eminently an agricultural state. Of the 44,000,000 acres of her land surface more than 42,000,000 are adapted to agricultural and horticultural purposes. The soils are rich, deep, and unsurpassed in variety and productiveness. The principal crops are Indian corn, hay, wheat, oats, potatoes, rye, barley, hemp, flax, cotton, sorghum, and buckwheat. Of tobacco a fair crop is 8,000,000 lb.; and orchard products are grown in great abundance. There has been a great increase in the number of grazing animals, especially mules and horses. The immense quantities of dressed beef and pork shipped annually to home and foreign markets are constantly increasing.

The mineral resources of Missouri are exceedingly rich, comprising extensive coalfields, that cover more than 20,000 sq. m.; also vast deposits of iron ore, lead, and zinc; while copper, cobalt, nickel, fireclays, fine marble, granite, and limestone of excellent quality abound in different localities. The coalfields are capable of yielding 100,000 tons of bituminous coal a day for several thousand years. The supply of iron ore is excellent in quality and inexhaustible in quantity; but the richest deposits yet worked are confined chiefly to two counties in the south-east—Iron and St. François. Yet the iron belt south of the Missouri River, and extending from the Mississippi River on the east to Osage River on the west, covers an area of 25,000 sq. m. Excellent transportation facilities are afforded by the Mississippi River along the eastern border of the state, and by the Missouri River across the state; and the railroads are about 9000 miles in length.

Missouri returns two senators and 16 representatives to congress. The general assembly (34 state senators and 142 representatives) meets every two years. The public-school system is very complete and very efficient, embracing the state university, the school of mines, state normal schools, and city, town, village, and country schools. Washington and St. Louis (Roman Catholic) Universities are at St. Louis.

The metropolis of Missouri is St. Louis (pop. 1920, 772,897), one of the greatest railroad, manufacturing, and commercial centres in the country; Kansas City (324,410), St. Joseph, Springfield, Joplin, Hannibal, Sedalia, Chillicothe, Mexico, Moberly, Boonville, Nevada, Marshall, Kirksville, Carrollton, Lexington, &c., are all thriving cities. Pop. (1820) 20,845; (1840) 140,455; (1860) 1,182,012; (1880) 2,168,380; (1900) 3,106,665; (1910) 3,293,335; (1920) 3,404,055.

History.—Missouri was first explored by De Soto in 1541-42, and in 1673 Marquette and his followers visited its eastern border. It formed part of the 'Louisiana Purchase' (see LOUISIANA), the northern portion of which in 1805 was organised as the 'District of Louisiana.' It was not till 1812 that a part of this territory took the name of Missouri. In 1821 Missouri was admitted into the Union, but the present limits of the state were not established till 1836. Its admission was preceded by a long and bitter political controversy between the representatives of the North and South, the former resisting its entrance as a slave-state. The discussion resulted in the famous 'Missouri Compromise,' under which compact it was agreed that slavery should be for ever excluded from all that part of Louisiana north of 36° 30' lat., except Missouri. During the four years of the great civil war the citizens of Missouri suffered terribly. The people were nearly equally divided in sentiment, and both sides prepared for the conflict. The state furnished 109,111 men for the Union army, and about three-fourths as many for the other

side. Death and the destruction of property everywhere prevailed. But when the war ended the people commenced to build up the waste places; improvements were extended in all directions, bitter feelings soon died away, and the state entered upon an era of singular prosperity.

Missouri River. See MISSISSIPPI-MISSOURI.

Mist. See FOG.

Mistassini, LAKE, in Labrador, some 300 miles N. by W. of Quebec, is strictly speaking an expansion of the river Rupert, which flows into the southern extremity of Hudson Bay. It is 100 miles long from north-east to south-west by 12 in average breadth.

Mistletoe, with its thick, succulent, yellowish foliage, and white, viscous berries, was long a puzzle to botanists, its peculiar mode of growth having given rise to the most curious fancies. The name is shared by several genera of Lorantheæ (*Viscum*, *Loranthus*, and the Australian *Notothixos*), with about 600 species. The only British species of these parasitical shrubs is the Common Mistletoe (*Viscum album*), a native also of the greater part of Europe (not of north England, Scotland, or Ireland), growing on many kinds of trees, particularly on the apple and others botanically allied to it, as the pear, service, and hawthorn; sometimes, also, on sycamores, limes, poplars, locust-trees, and firs, but very rarely on oaks (contrary to the common belief). In the Himalayas the mistletoe grows abundantly on the apricot-tree, on the vine and *loranthus* in Italy, on spruce-firs in France and Switzerland. The evergreen leaves of the *V. album* of English woods, with their yellowish hue, make a conspicuous appearance in winter among the naked branches of the trees. The flowers are insignificant, and grow in small heads at the ends and in the divisions of the branches, the male and female blossoms on separate plants. The berries are about the size of currants, white, translucent, and full of a very viscid juice, which serves to attach the seeds to branches, where they take root when they germinate, the radicle always turning towards the branch, whether on its



Mistletoe (*Viscum album*).

upper or under side. It may be easily made to grow on suitable trees even where not native—as in Scotland, for example.

The mistletoe was intimately connected with many of the superstitions of the ancient Germans and of the British Druids. In the northern mythology, Balder (q.v.) is said to have been slain with a spear of mistletoe; and in Holstein it is the *Märentaken*, or 'branch of spectres,' which confers upon its possessor the power to see ghosts. Among the Celts the mistletoe which grew on the oak was in peculiar esteem for magical virtues. According to an old tradition the mistletoe supplied the wood for the cross, which until the

time of the crucifixion had been a forest tree, but was henceforth condemned to exist only as a mere parasite. Traces of the ancient regard for the mistletoe still remain in some old English Christmas customs, as kissing under the mistletoe. The mysterious surrounding of the mistletoe invested it with a widespread importance in old folklore remedies. Culpepper speaks of it as 'good for the grief of the sinew, itch, sores, and toothache, the biting of mad dogs and venomous beasts;,' while Sir Thomas Browne alludes to its virtues in the cure of epilepsy. In Sweden a finger-ring made of the mistletoe is an antidote against sickness, and in France amulets made of its wood were formerly much worn.—*Loranthus europæus*, a shrub very similar to *Viscum album*, but with flowers in racemes, is plentiful in some parts of the south of Europe, and very frequently grows on oaks.—*L. odoratus*, a Nepalese species, has very fragrant flowers.—The American mistletoe, *Phoradendron*, of which there are some eighty species, is similar in general appearance and habit to the European. The commonest species is *P. flavescens*, found from New Jersey to Mexico.—The West Australian *Nuytsia floribunda*, a tree of 30 to 40 feet, seems to be parasitic on roots.

Mistral (also *Mistraou* and *Maestral*), a north-west wind which at certain seasons of the year prevails on the south coast of France. Its approach is heralded by a sudden change of the temperature, from the most genial warmth to piercing cold; the air is felt to be purer, and more easily inhaled, the azure of the sky is undimmed by cloud, and the stars shine by night with extraordinary and sparkling brightness. The mistral then comes in sudden gusts, struggling with the local aerial currents, but its fast-increasing violence soon overcomes all opposition. In a few hours it has dried up the soil, dispersed the vapours of the atmosphere, and raised a dangerous tumult among the waters of the Mediterranean. The mistral blows, at intervals, with its greatest force from the end of autumn to the beginning of spring.

Mistral, FRÉDÉRIC (1830–1914), Provençal poet, was born a peasant's son near Maillane (dept. Bouches-du-Rhône), and studied law at Avignon; but for law he had no liking, and he went home to work on the land and write poetry. In 1859 he published the epic *Mirèio* (Eng. trans. 1890), written in his native Provençal dialect. This charming representation of life in southern France made Mistral's name famous throughout the country, and gained for him the poet's prize of the French Academy and the cross of the Legion of Honour. It also led to the formation of the society called *Lou Felibrige*, which set itself to create a modern Provençal literature. In 1867 Mistral published a second epic, *Calendau*, and in 1876 a volume of poems entitled *Lis Isclo d'Or* ('Golden Islands'), songs steeped in the golden sunshine of the Mediterranean and its vine-clad shores. He also published a novel in verse, *Nerto* (1884), a Provençal dictionary (1878–86), and *Mes Origines* (1906). There are verse translations by Mrs Preston and H. Crichton. See books by Downer (1901), Kiepert (1905), and Schoen (1910).

Mistretta, a town of Sicily, near the north coast, half-way between Palermo and Messina; pop. 12,000.

Mitanni, an ancient kingdom lying to the east of the upper Euphrates in the region of the rivers Khabur and Belikh. By the middle of the second millennium B.C. a group of warriors of Iran had pushed westwards into Mesopotamia and established an Aryan dynasty ruling the kingdom of Mitanni. Thereafter the kingdom grew at the

expense of its neighbours Alshe and Assyria into a powerful and cultivated state, whose influence and language extended westward to Tunip in the Orontes valley, and eastward to Nineveh. Its capital was Washshukkani. Through the campaigns of the Egyptian rulers Thutmose I. (acceded 1540 B.C.), Thutmose III. (acceded 1501 B.C.), and Amenhotep II. (acceded 1447 B.C.) contact with Egypt was established, and the marriage relationships entered into on a footing of equality between the two countries at the end of the 15th century, when the power of Egypt was at its height, are evidence of the importance of Mitanni. After about 1375 B.C., however, strong anti-Egyptian movements gained ground in Mitanni and elsewhere in north-western Asia, and the power of the country declined, its name disappearing from history. Knowledge of the Mitannians is limited, the archaeological evidence being both slight and uncertain. Their racial affinities are said to be with the Hittites. About a thousand clay tablets in Assyrian from a house conjectured to have been that of a Mitannian were discovered in 1924-25 by Dr Chiera at Yaghlan Tepe, 8 miles SW. of Kirkuk; of the proper names there are about one hundred Aryan to every one Semitic. While the ruling dynasty of Mitanni was Indo-European, the prevailing language, an example of which in cuneiform survives in a long Amarna letter, is not Indo-European, but according to most philologists akin to Georgian; some say it is allied to Hittite, itself a tongue of unknown origin. The name Mitanni may survive in the modern Metina, the designation of a mountainous district a day's march north-west from Mardin.

Mitau (Lettish *Jelgava*), a town of Latvia, till 1918 capital of the Russian government of Courland, on the right bank of the Aa, 27 miles by rail SW. of Riga. Founded in 1271 by the grand-master of the Teutonic Knights, and annexed to Russia in 1795, it has a castle, begun by Biron in 1738, a museum, &c., with some very important manufactures (flax, iron, leather, ink), and a trade in grain and timber. From 1798 to 1807 Mitau offered an asylum to Louis XVIII. Pop. 25,000, of whom more than one-half are Germans, and nearly a fourth Jews.

Mitcham, a village of Surrey, forms a ward of Croydon. It lies in the centre of a district in which flowers and aromatic herbs (roses, lavender, camomile, &c.) are extensively grown.

Mitchel, JOHN, an Irish patriot, was born the son of a Presbyterian minister at Dungiven in County Derry, 3d November 1815. He studied at Trinity College, Dublin, and practised several years as an attorney at Banbridge. Soon after the formation of the Young Ireland party, and the starting of the *Nation* in 1842, Mitchel began to contribute, and after the death of Thomas Davis in 1845 he became assistant-editor. But his language was too violent for the paper, and three years later he started the *United Irishman*, for his articles in which he was tried on a charge of 'treason-felony' and sentenced to fourteen years' transportation. He was sent to Bermuda, and next to Van Diemen's Land, whence he made his escape to the United States in the summer of 1853. In New York he published his *Jail Journal, or Five Years in British Prisons* (1854). Next followed a series of short-lived newspapers, the *Citizen*, the *Southern Citizen*, the *Richmond Inquirer*, and the *Irish Citizen*, which cost him the confidence of many of his American friends by its enthusiastic defence of slavery and the South. In 1874 he returned unmolested to Ireland, and was elected to parliament for Tipperary, but declared ineligible. Again elected, he died at Cork, 20th March 1875.

Of his books may be mentioned a *Life of Hugh O'Neill, Prince of Ulster* (1845); and *History of Ireland from the Treaty of Limerick* (1868); besides editions of the poems of Thomas Davis (1856) and James C. Mangan (1859). See the studies by William Dillon (2 vols. 1888), Montégut (trans. 1915), O'Hegarty (1917).

Mitchell, DONALD GRANT, an American author, many of whose works appeared under the pen-name of 'Ik Marvel,' was born in Norwich, Connecticut, 12th April 1822, was in 1853 appointed consul at Venice, in 1868-69 editor of the *Atlantic Monthly*, and died 15th December 1908. About his farm—Edgewood—near New Haven, he wrote several delightful books. Among his other works are *Reveries of a Bachelor* and *Dream Life* (1850-51; new eds. 1889); a novel, *Dr Johns* (1866); *English Lands, Letters, and Kings* (1889); *American Lands and Letters* (1897-99).

Mite. See ACARINA, CHEESE-MITE, ITCH, HARVEST-MITES.

Mitford, MARY RUSSELL, born at Alresford, Hants, 16th December 1787, was the only child of a physician, a selfish, extravagant man, who spent several fortunes, and was always in debt. A few years after his marriage he moved to Lyme Regis, and thence to London. On Mary's tenth birthday he took her to a lottery office, and bought her a ticket. She chose a particular number which drew a prize of £20,000. While this money lasted she was sent to a good school in Chelsea, and Dr Mitford built himself a large house near Reading. Here Mary returned when she was fifteen, a clever, accomplished girl, devoted to her parents, a great reader, and fond of gardening. Her first volume of poems appeared in 1810, and was followed in 1811 and 1812 by two other poems. In 1820, as the family became more and more impoverished, they were obliged to move to a cottage at Three Mile Cross, near Reading, and at length the need came for Miss Mitford to write to earn money. She wrote for magazines, and plays for the stage. Four of her tragedies, *Julian*, *The Foscari*, *Rienzi*, and *Charles I.*, were acted; the three first met with success, but they have not kept the stage. Her true line was describing what she saw around her in a series of sketches of country manners, scenery, and character. These little essays were rejected by several London editors, but at length found a place in the *London Magazine*, and were published in a collected form in 1824 under the name of *Our Village*, the series of five volumes being completed in 1832. Few would think, as they read this 'playful prose,' with what toil and anxiety it was written. Dr Mitford died in 1842, leaving his affairs in such a state that a subscription was started to enable his daughter to pay his debts; which was soon followed by a pension from the crown. In 1851 Miss Mitford moved to a cottage in Swallowfield, a village close by, where she spent the rest of her life. In 1852 she published *Recollections of a Literary Life*, and in 1854 a novel, *Atherton, and other Tales*. She died 10th January 1855, and was buried at Swallowfield. Her sketches are charming. See *Life by L'Estrange* (3 vols. 1878), and his *Friendships of Mary Russell Mitford* (1882).

Mitford, WILLIAM, was born in London, 10th February 1744, entered Queen's College, Oxford, but left without a degree. In 1761 he succeeded to the family estate of Exbury near the New Forest, and in 1769 became a captain in the South Hampshire Militia, of which Gibbon was then major. By Gibbon's advice and encouragement he was induced to undertake his *History of Greece* (5 vols. 1784-1818). It is a pugnacious, opinionative, one-sided, and even fanatical production. The author is an intense hater of democracy, and can see in Philip of Macedon nothing but a great statesman, in

Demosthenes nothing but a noisy demagogue. Yet his zeal, which so often led him astray, also urged him, for the very purpose of substantiating his views, to search more minutely and critically than his predecessors into certain portions of Greek history, and the result was that Mitford's work held the highest place in the opinion of scholars until the appearance of Thirlwall and Grote. He sat in parliament from 1783 to 1818, and died at Exbury, 8th February 1827.

See the Memoir prefixed to the 7th edition of his *History* (1838) by his brother John Freeman Mitford (1748-1830), who was Lord Chancellor of Ireland (1802-1806), and was raised to the peerage as Lord Redesdale.

Mithra, or MITHRAS, an oriental god whose local worship, extending from Persia, developed into a widespread religion (Mithraism), the great rival in the first centuries after Christ of Christianity.

The god Mithra would seem to have been known to the Indo-Iranians before their separation, for he appears in both Veda and Avesta. In the first his position is important, but not clearly defined; in the second it is clearly defined, but less important; thus in the Veda he is invoked along with Ormuzd, the sovereign of good, but no more than vaguely; while in the Avesta he is a spirit of the second rank or *yazata*, but occupies a definite rôle as the chief of these spirits, and as intermediate between Ahriman, the lord of evil, and Ormuzd, on whose side, in conflict with the former, he always fights. While in India Mithra seems to have been early superseded, in Persia his cult became important. Above all he was a god of light, and by transfer to the moral world a god of truth; but he was, too, a deity of vegetation and of increase, a prosperer of the good and a destroyer of the bad, a champion of armies and of heroes, an enemy of evil spirits, a protector of souls, and a redeemer. With the growth of the Persian empire the worship of Mithra spread throughout Asia Minor, and there was modified—at times Mithra came to be identified with sun-gods—though never essentially altered by contact with various religions. The fall of Persia in no way affected the popularity of the religion, and its spread continued. Most remarkable was its progress in the Roman world. First introduced into Rome in 68 B.C., possibly by some Cilician pirates captured by Pompey, the faith gained a foothold only gradually in Italy. Towards the close of the 2d century after Christ, however, it began to spread rapidly among the military and mercantile classes, and so was borne to the farthest limits of the empire; thus tablets found at Housesteads in the Roman wall, at York, and elsewhere, are proof of the presence of Mithraism in Britain. Later gaining support both on political and on philosophical grounds, it came to number its adherents among every class, and by the middle of the 3d century seemed on the point of triumphing over Christianity as the universal religion. But at the end of the same century, following the northern invasions and the increasing aggression of Christianity, its downfall began, and by the end of the next century may be said to have been completed, though in the 5th century the cult still survived in parts of the Alps. In the East it died more slowly, and found a successor in Manichæism, in which was combined the adoration of Christ and of Zoroaster.

The worship of Mithra was originally conducted in caverns, but in the Roman world was characteristically celebrated in small temples or Mithræums wholly or partially constructed underground, surviving examples of which, as at Rome, Ostia, Capua, and at places outside Italy, are in no sense rare. In these temples was to be found the symbolism of the religion in relief. Notable in this connection is the monument from Oster-

burken in Germany. In the typical relief Mithra is invariably represented in the form of a youth, with conical cap and flying drapery, slaying a bull by plunging a dagger into its side; a scorpion attacks the genitals of the animal, a serpent drinks its blood, a dog springs towards the wound; and frequently, in addition, there are representations of the sun-god, of his messenger the raven, of a fig-tree, of a lion, of a ewer, and of torch-bearers. In some instances this typical or main relief is surrounded by lesser reliefs which need not be here described, but which in the view of Cumont are to be taken as falling into two groups. The symbolism of the various reliefs has been interpreted by Cumont. According to him the first group of lesser reliefs illustrates the legend of the origin of the gods, is, indeed, a representation of Mithraic theology, Mithra appearing in the divine hierarchy as the mediator between suffering humanity and the unknowable and inaccessible god of all being. The second group of lesser reliefs Cumont takes as picturing the legend of Mithra; incidents in the legend, when reconstructed, are the birth of Mithra from a rock and his adoration by shepherds; his clothing himself in fig-leaves; his undertaking to vanquish all beings already in the world; his reluctant slaying, as the servant of an omnipotent deity, of a sacred bull, from which, in spite of the powers of darkness, springs the life of the earth; his conquest of drought by drawing water from a rock; his saving of one man and his cattle from universal deluge; his final banquet with the sun; his ascent to the habitation of the immortals, whence he continues to protect the faithful. From the interpretation of the second group of lesser reliefs the meaning of the main relief above described becomes apparent—it represents one incident in the legend of Mithra, his life-giving sacrifice of the sacred bull; there was also an astrological symbolism, but it was of secondary importance.

In the worship of Mithra a system of secret rites and mysteries played a part, it would seem, of great importance. For the mystic, seven degrees or successive steps were assigned, each marked by a symbolical name—*Corax* (Raven), *Cryphius* (Occult), *Miles* (Soldier), *Leo* (Lion), *Perses* (Persian), *Heliodromus* (Courier of the Sun), *Pater* (Father). Mystics not beyond the third degree were not in full communion, but the fourth degree admitted to full initiation. The various degrees were conferred by the *Patres*—devotees, that is to say, who had been admitted to the seventh degree—the mystic having previously been prepared by lustral purification, by prolonged abstinence, and by severe deprivation. Special ceremonies, such as the marking of the forehead in a kind of baptism, the application of honey to the tongue and hands, a communion of bread, water, and possibly wine, accompanied the several degrees; and other rites more or less barbarous in character, together with some, such as the administration of oaths, the repetition of sacred formulæ, the manipulation of lights in Mithræums, all had their place in the cult. Sacrifices, too, were offered by priests, who, in addition, kept alight an eternal altar-fire, and three times a day addressed prayers to the sun. The cult was supported mainly by voluntary effort. Women had no place in the religion, but among its male worshippers an essentially democratic element would seem to have eliminated distinctions between rich and poor, though in point of fact the devotees of the religion were usually from the humbler classes.

Owing to the almost complete lack of documentary evidence, knowledge of the beliefs of Mithraism, as of much else in the religion, is no more than vague and imperfect. Certain it is,

however, that the faith, personal as it was in character, and applying as it did the processes of the struggles and regeneration of nature to the case of the human soul, had in it much to satisfy real moral needs. Throughout stress is laid on the constant struggle between good and evil. For the defeat of evil moral rectitude is called for. Given that rectitude, however, victory is assured both in this world and in the world to come, for Mithra the unconquered is ever on the side of the faithful. For the worthy soul there is ascent into heaven, where a better life compensates for the sufferings of earth; for the unworthy there is descent into the realms of darkness. But one day the struggle between good and evil is to cease, and Mithra descending is to call all men from their tombs, separating the just from the unjust. The unjust are to be destroyed by fire, but the just are to be rendered immortal in body no less than in soul; then the universe renewed is to enjoy eternal happiness.

Parallels to Christianity in Mithraic legend, in Mithraic ceremony, and in Mithraic belief will have been apparent, and other resemblances, as the sanctification of Sunday and of the 25th of December, the birthday of Mithra, might be cited. But there were also marked differences. Thus Christianity was rigidly monotheistic, while Mithraism was not clearly so, and in a manner combined monotheism with polytheism; Christianity claimed an historical personage as its founder, Mithra a mythical character; Christianity held a place for women, Mithraism excluded them wholly, as has been seen, from its privileges. The points of similarity in the two religions rendered the struggle between them the fiercer, but in the end it was just the differences of the two beliefs which gave to Christianity and not to Mithraism the victory.

The standard authority is Cumont. See his *Textes et monuments figurés relatifs aux mystères de Mithra* (with bibliography, 2 vols. Brussels, 1896-99). His *Les Mystères de Mithra* (Eng. trans. by McCormack, 1903) gives his main conclusions from the *Textes*, and also in the Paris 1913 edition continues the bibliography. Other works are Phythian-Adams, *Mithraism* (1915), and L. Patterson, *Mithraism and Christianity* (1921).

Mithradates (less properly MITHRIDATES; Persian, 'given by Mithras'), the name of several kings of Pontus, Armenia, and Parthia, all of whom have sunk into insignificance, with the exception of Mithradates VI. of Pontus, surnamed Eupator, but more generally known as Mithradates the Great. He succeeded his father, probably about 120 B.C., before the age of thirteen, and soon after subdued the tribes that bordered on the Euxine as far as the Chersonesus Taurica (Crimea). The jealous behaviour of the Romans, and the promptings of his own ambitious spirit, now incited him to invade Cappadocia and Bithynia, but a wholesome fear of the power of the great republic induced him to restore his conquests. The *First Mithradatic War* was commenced by the king of Bithynia (88 B.C.), who, at the instigation of the Romans, invaded Pontus. The generals of Mithradates repeatedly defeated the Asiatic levies of the Romans, and he himself took possession of Bithynia, Cappadocia, Phrygia, and the Roman possessions in Asia Minor. He also sent three powerful armies to aid the Greeks. He was, however, driven from Pergamus (85 B.C.) by Flavius Fimbria, and reduced to the necessity of making peace with Sulla, relinquishing all his conquests in Asia, giving up 70 war-galleys to the Romans, and paying 2000 talents. The wanton aggressions of Murena, the Roman legate, gave rise to the *Second Mithradatic War* (83-81 B.C.), in which Mithradates was wholly successful. In 74 B.C. he invaded Bithynia, commencing the *Third Mithradatic War*. He obtained

the services of Roman officers of the Marian party, and his arms were at first prosperous; but afterwards the Roman consul Lucullus compelled him to take refuge with Tigranes of Armenia (72 B.C.). Lucullus then conquered Pontus, defeated Tigranes (69 B.C.) at Tigranocerta, and both Tigranes and Mithradates at Artaxata (68 B.C.). Mithradates, however, recovered possession of Pontus. After the war had lingered for some time Pompey completed the work of Lucullus (66 B.C.), defeating Mithradates on the Euphrates, and compelling him to flee to his territories on the Cimmerian Bosphorus. Here his indomitable spirit prompted him to form a new scheme of vengeance, which was, however, frustrated by the rebellion of his son, Pharnaces, who besieged him in Panticapæum. Deeming his cause hopeless, Mithradates put an end to his own life (63 B.C.). Mithradates was a specimen of the true eastern despot, possessing great ability and extraordinary energy and perseverance. He had received a Greek education at Sinope, is said to have spoken the twenty-two languages and dialects of his subject-peoples, and made a great collection of pictures, statues, and engraved gems.

Mitrailleuse. See MACHINE GUN.

Mitral Valve. See HEART.

Mitre (Lat. *mitra*, also *infula*), the head-dress worn by bishops in solemn church services. The name, as probably the ornament itself, is borrowed from the orientals, although, in its present form, it is not in use in the Greek Church, or in any other of the churches of the various eastern rites. The western mitre is a tall, tongue-shaped cap, terminating in a twofold point, which is supposed to symbolise the



Mitre.

'cloven tongues,' in the form of which the Holy Ghost was imparted to the apostles, and is furnished with two flaps, which fall behind over the shoulders. Opinion is much divided as to the date at which the mitre first came into use.

Eusebius, Gregory of Nazianzus, Epiphanius, and others speak of an ornamented head-dress, worn in the church; but the cleft mitre does not seem to have been known till the 12th century. The material used in the manufacture of the mitre is very various, often consisting of most costly stuffs, studded with gold and precious stones. The mitre of the pope is of quite a different form, and is called by the name *Tiara* (q.v.). Although the mitre properly belongs to bishops only, its use has been permitted by special privilege to certain abbots, to provosts of some distinguished cathedral chapters, and to a few other dignitaries.

In the English Church, since the Reformation, the mitre was no longer a part of the episcopal costume till 1885, when it was resumed by the Bishop of Lincoln; but it is placed over the shield of an archbishop or bishop, instead of a crest. The Bishops of Durham surround their mitre with a ducal coronet, in consequence of their having been till 1836 Counts Palatine of Durham.

Mitscherlich, EILHARD, chemist, was born at Neuende, near Jever in Oldenburg, Germany, on 7th January 1794, and died at Schöneberg near Berlin on 28th August 1863. At the university of Heidelberg (1811-13) he devoted himself to philology, especially to Persian. At this time of his life his ambition was to go to Persia, and for this end he visited Paris and began to study medicine in Göttingen after 1814. But whilst studying medicine, his deepest interest was arrested by the

sciences of geology and mineralogy, chemistry and physics. Work in the Berlin laboratory in 1819 led him to discover the law of Isomorphism (q.v.). Berzelius invited the young chemist to Stockholm (1820), from which city he returned (1822) to fill the chair of Chemistry at Berlin. One of his earliest discoveries after his appointment was that of the double crystalline form of sulphur, one of the first observed cases of Dimorphism (q.v.). His investigations regarding the production of artificial minerals, and his memoirs on benzene and the formation of ether, must also be noted. His principal work is *Lehrbuch der Chemie* (2 vols. 1829-35; 4th ed. 1840-48; 5th begun in 1855, but not completed). See Memoir by Rose (Berlin, 1864).

Mittweida, a town of Saxony, 11 miles NE. of Chemnitz, manufactures linen, woollen, and cotton goods; pop. 17,000.

Mitylene. See LESBOS.

Mivart, ST GEORGE (1827-1900), educated for the bar, devoted himself to biology, and was professor in the Roman Catholic College at Kensington in 1874-84, and in the University of Louvain in 1890-93. A zealous opponent of Darwinian Natural Selection (though an Evolutionist), he was yet too heterodox or 'modern' for the church authorities, and ten weeks before his death was excommunicated by Cardinal Vaughan for articles in the *Contemporary* and *Nineteenth Century*.

Mnemonics (Gk. *mnēmōn*, 'mindful'), the art of assisting the memory by artificial devices. Thus the value of π , 3.1415926536, can be fixed by help of such a sentence as *But I must a while endeavour to reckon right the ratios*. Each word supplies, by the number of its letters, a figure of the ratio to be remembered. Some rhythmical mnemotechnic contrivances have been used for ages: one, for example, which, notwithstanding the enormous multiplication of printed calendars, still survives is, 'Thirty days hath September,' &c. The Latin student is thankful for the mnemonic rhyme for the dates of the ides and nones; and for centuries no text-book on logic has omitted the five hexameter lines ('Barbara, Celarent,' &c.) which compress the doctrine of the syllogism into a marvellous minimum of space.

Plato and Aristotle refer to a system of 'topical mnemonics' attributed to Simonides the poet, who died 469 B.C. The speaker having selected, for example, a house with which he is so familiar as to remember well the position, not only of each room and passage, but of all the prominent objects in every room, associates as vividly as possible the introduction of his discourse with the entrance-hall, and systematically assigns thought after thought to the chief points there visible. The first main division of his subject may then be identified with the dining-room; and every piece of furniture, every picture, &c., utilised for recalling the succession of arguments with their illustrations and results; and thus for the rest of his discourse. Another form of topical mnemotechny was based on imagining the four walls of each room, and its floor, to be each divided into nine places, and a distinct object—such as a particular bust, picture, or tree, &c.—to be inseparably associated with each place. Then the mnemotechnist who has a succession of things to be remembered assigns them to a particular room and compels himself to detect some association, no matter how incongruous, between each of them and one of the 'hieroglyphs.'

Many minor systems for learning dates and detached numbers have been based on that of Gregor von Feinaigle, a German who lectured in London, 1811. His scheme was

1	2	3	4	5	6	7	8	9	0
t	n	m	r	l	d	k	b	p	s

each letter was more or less suggestive of the figure which it represents: moreover, *p* may be supplanted by *f*, *k* by *c* or *g*, and *b* by *v* or *w*, &c. Thus, as an example, the Anglian kingdom from the Humber to the Firth of Forth was founded in 547, and by Feinaigle's scheme that date becomes *lrk*. By inserting vowels we form the mnemonic words *lark, lurk, large, lyric, Alarie*, &c., any one of which the historical student may choose to suit his notions of King Ida the Flamebearer. Another might prefer *la race, la rage*, &c., or Lat. *lorica*. The similar system (1730) of Dr Richard Grey (1694-1771) is less elastic than Feinaigle's. Dr Pick improved Feinaigle's method by introducing a principle not unlike that which we have noted in describing the topical systems. A list of detached words can be recalled in order by inserting between each pair a connective word which links them or forms a bridge. Other mnemotechnists have been Schenkel, 1547; Aimé Paris, 1833; Karl Otto, 1840; Gouraud, 1845; Copner, 1893; Loissette, 1896. Grey's system was really a modification of Winckelmann's, which attracted the notice of Leibniz and gave him the suggestion of a universal alphabet.

Mnemo synē, in Greek Mythology, the daughter of Uranus, and mother of the nine muses by Zeus. The principal seat of her worship was at Eleutherae, in Boeotia.

Moa, a name believed to have been used by the Maoris to designate various large flightless birds (Dinornithidae) of New Zealand, some of which persisted until comparatively recent times. They

were of heavy build, without known wings, and some attained a height of 10 feet. They are known from bones, foot-prints, feathers and eggs, pebbles used in the stomach, and even pieces of skin, muscle, and ligament. Various genera are distinguished, but with considerable uncertainty, Dinornis, Pachyornis, Mesopteryx, Anomalopteryx, and Emeus. The smallest known, *Anomalopteryx parva*, was about the size of a turkey. The figure shows the still surviving Apteryx or Kiwi beside the extinct Moa. See Parker, *Trans. Zoological Soc.*, xiii. (1895).



Restoration of the Moa.

Moabites, a pastoral people, who inhabited the bleak and mountainous country east of the lower part of the Jordan and of the Dead Sea, divided into two portions by the deep bed of the Arnon. Their capitals were Ar-Moab and Kir-Moab (Kerak), both south of the Arnon; and Kerak was the capital in the days of the later Arabs and Seljuks. But their kings often resided in their native places, as Mesha in Dibon, where was discovered in 1868 his inscription, the most important historical record of ancient Palestine. Among other sites of Moab are Medeba, where a very interesting mosaic map of Palestine of about

the 5th century A.D. was found, and Machærus, a fortress of the Herodians, where John the Baptist was imprisoned by Herod Antipas and executed. The soil of Moab is extremely fertile, and many wine-presses have been found, especially in the Jordan Valley. The land, formerly wealthy, populous, and, to judge from Mesha's inscription, far from uncultured, was exposed on the east to the bedouins of the Syrian desert and to both the traders and raiders that followed the route later taken by pilgrims between Syria and Arabia. 'In Moab,' to quote the words of Sir George Adam Smith, 'you never feel out of touch with Arabia, but Western Palestine belongs to the Levant.'

The history of Moab is bound up with that of the neighbouring states, and all were intimately related ethnologically. The Moabites were compelled to become tributary to David (c. 1000 B.C.), and later to Omri (c. 880 B.C.). Mesha records his successful revolt against Israel (c. 850 B.C.), but Jeroboam II. probably again subjected them. They were involved in the Assyrian wars with Palestine, but appear to have suffered slightly. During the weakness and decay of the great empires and the rise of Persia there were widespread movements among the desert-peoples; and at this turning-point of ancient history, when Israel underwent reconstruction (6th century B.C.), the old Moab gradually disappeared, and gave way to the Nabatæans (q.v.) and other tribes. This difference between the destinies of Moab and Israel is the more noteworthy because the language and script and the religious and other institutions of both peoples were very similar. And to these we may add Phœnicia (q.v.). The national god of Moab was Chemosh, even as Yahweh was Israel's: see the important passage, *Judg.* xi. 24. But the deity Ashtar-Chemosh, venerated by Mesha, probably represents a fusion of female and male deities for which there is no exact parallel in Israel. Again, the 700 rude stone monuments found by Conder, though familiar elsewhere, are so rare on Israelite soil as to suggest that Israelite iconoclasm is responsible for their rarity. The 'ban' when Mesha 'devoted' the Israelites of Nebo was familiar in Israel (*Dent.* ii. 34); but the licentious rites of Baal Peor, and the human sacrifice, when Mesha offered his son as a burnt-offering (2 Kings, iii.), though not unknown in Israel, were repeatedly denounced by the prophets; and, although the Moabites doubtless had their own prophets, we hear of no ethical-spiritual seers like those that distinguish the history of Israel.

See the accounts by Tristram (1873), Conder (1883), G. A. Smith (*Hist. Geog. of Holy Land*), by Brünnow and Domaszewski (German, 1904-5) and Musil (Ger. 1907-8), Jaussen (modern customs, French, 1908), and S. Erskine (*Vanished Cities of Arabia*, 1924). For Mesha's inscription, see G. A. Cooke (*North-Sem. Inscr.*, 1903), W. H. Bennett (1911), and Driver (*Ency. Bibl.*, col. 3040; also his commentary on Samuel).

Moallakat. See ARABIAN LANGUAGE.

Moawiya. See KHALIF.

Robberly, capital of Randolph county, Missouri, 148 miles by rail WNW. of St Louis, is an important railway junction, and the dépôt of a rich coal country. It has large railway-shops. Pop. 13,000.

Mobile, the principal city and seaport of Alabama, is situated on the west side of Mobile River and at the head of Mobile Bay, which opens into the Gulf of Mexico, and is defended by Fort Morgan. It is 141 miles by rail ENE. of New Orleans, and is built with broad shaded streets on a sandy plain, rising gradually from the river. It has a fine custom-house and post-office, a city hall and market-house, a Roman Catholic cathedral and many other churches, several asylums and

hospitals, a medical college, a Jesuit college, and a convent and school. Mobile contains a floating dry-dock and several shipyards, foundries, cotton and cottonseed-oil mills, canneries, numerous cigar-factories, &c. Before the civil war the chief business was the export of cotton, and it still ranks as the third cotton market in the United States, while the export of timber has grown very large. Mobile was settled by the French in 1702, and was a Spanish town until 1813, and its population still shows traces of this Latin origin. In 1879 the city limits were curtailed somewhat. Pop. (1870) 32,034; (1890) 31,822; (1910) 51,521; (1920) 60,777.

Mobilier, CRÉDIT. See CRÉDIT MOBILIER.

Mobilisation, a word for the art of making an army ready for taking the field. The process consists in bringing the various units to war strength by calling in reserve men, in organising the staff of brigades, divisions, and army corps, constituting the commissariat, medical, and transport services, and in accumulating provisions and munitions. As the work of mobilising an army causes great and inevitable expense, it is only resorted to when hostilities appear imminent.

Mocaya. See ACROCOMIA.

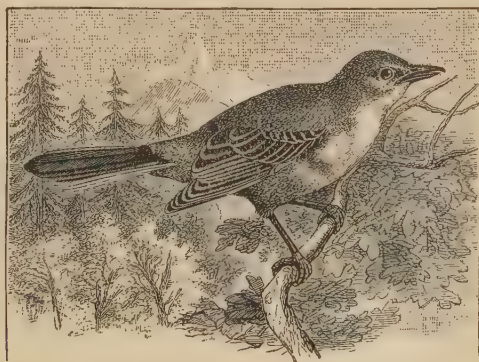
Moccasin, the shoe of the North American Indian, made all of soft hide, and often ornamented.

—The Moccasin Snake (*Toxicophis piscivorus*) of North America is a brown-coloured poisonous swamp snake; the skin is marked with black bars.

Mocha, a seaport, and once the capital of Yemen in Arabia, is situated on the Red Sea, 130 miles WNW. of Aden. From early in the 16th century until the middle of the 17th Mocha was the port from which the coffee of Yemen was principally exported; hence called Mocha coffee. It now exports hides. Pop. 5000.

Mocha Stones are pieces of agate or of chalcedony, containing dendritic infiltrations, often assuming appearances very like finely ramified *confervæ*, &c. They were first brought to Europe from Mocha. Of the same nature with Mocha stones are *Moss Agates*.

Mocking-bird, or MOCKING-THRUSH (*Mimus*), a genus of birds of the family Turdidae, order Passeres, having a more elongated form than the true thrushes, a longer tail, shorter wings, and the



Mocking-bird (*Mimus polyglottus*).

upper mandible more curved at the tip. Twenty species are known, ranging from Canada to Patagonia, and from the West Indies to the Galapagos Islands. The best-known species, the mocking-bird of the United States (*M. polyglottus*), is about the size of the song-thrush; the upper parts of a dark brownish ash colour, the wings and tail nearly black, the under parts brownish white. The mocking-bird is common in almost all parts of

America, from the south of New England to Brazil; north of the Delaware it is only a summer visitant, but in more southern regions it is found at all seasons. It is one of the most common birds of the West Indies, and its exquisite song fills the groves with melody by night, for which reason it is there very generally known as the nightingale. By day the mocking-bird is generally imitative, excelling all birds in its power of imitation, now taking up the song of one bird, and now of another, and often deceiving the most practised ear by its perfect performance. By night its song is for the most part original. It does not confine itself, however, to musical strains; it seems to take equal pleasure in repeating the harshest cries of the feathered tribes, and in domestication readily adds to its accomplishments the imitation of almost any sound which it is accustomed to hear, passing from one to another with great rapidity, so as to produce an incomparable medley. The mocking-bird readily learns to whistle a tune, even of considerable length, but there is no well-authenticated instance of its imitating the human voice. The barking of a dog, the mewing of a cat, the crowing of a cock, the cackling of a hen, the creaking of a wheel-barrow are all within the compass of its powers. During its performances it spreads its wings, expands its tail, and throws itself about, as if full of enthusiasm and enjoyment. The mocking-bird is vocal at all seasons of the year. It enjoys almost everywhere the protection of man, and often makes its nest in a tree or bush close beside a house. The nest is rudely constructed of dried sticks, withered leaves and grasses, and lined internally with fibrous roots. The eggs are of a short ovoid form, and of a light-green colour spotted with amber. For the first brood from four to six are laid; for the second, four or five; and when there is a third brood, seldom more than three. The first brood is hatched about the middle of April. The male is extremely attentive to his mate, and manifests extraordinary courage in driving away enemies from the nest. Mocking-birds often assemble on such occasions, and birds of prey, far superior to them in size and strength, are compelled to retreat. Snakes are killed by reiterated blows on the head, and cats learn to consider the vicinity of a mocking-bird's nest unsafe. The food of the mocking-bird consists chiefly of berries and insects. The mocking-bird is easily reared by the hand if removed early from the nest, but it is said that it never attains in captivity the same wealth of song as in its free state. Another species of mocking-bird is found in the Rocky Mountains, and species of the same genus are among the finest song-birds of the temperate parts of South America.

Mock Orange, a name applied in England to the so-called *Syringa*, properly *Philadelphus*, and in the United States to *Prunus caroliniana*, a small evergreen resembling the cherry-laurel.

Mòd (Gaelic, from Old Norse *mót*, an assembly; cf. Old English *mót*, modern *moot*, and the verb *meet*), an annual gathering for the encouragement of Gaelic literature and Highland music, similar to the Welsh Eisteddfod.

Mode, a name given to the scales of ancient Greek music. The three oldest were composed of two disjunct tetrachords. There was a semitone between the third and fourth notes (reckoning downwards) of each tetrachord in the Dorian mode, between the second and third in the Phrygian, the first and second in the Lydian. From these are got the Hypo-Dorian, Hypo-Phrygian, Hypo-Lydian, each a fifth lower, and the Hyper-Dorian, Hyper-Phrygian, Hyper-Lydian, a fifth higher. In the additional scales the tetrachords become conjunct,

and the 'diatonic tone' (between the tetrachords of the original mode) appears above the upper tetrachord in the Hypo series, below the lower in the Hyper. Other modes of less importance were added later.

The ecclesiastical modes formulated by St Ambrose and St Gregory do not correspond accurately with the Greek modes of the same names. See HARMONY, PLAIN-SONG. For Major and Minor Modes, see SCALE.

Modelling. See CLAY, POTTERY, SCULPTURE.

Modena (anc. *Mutina*), capital of the former duchy of Modena, stands on a broad plain in Northern Italy, 23 miles by rail NW. of Bologna. Pop. of commune (1921) 83,663. It had extensive ramparts, long since converted into promenades, and has fine streets, many of them arched on both sides. The ancient Via Æmilia divides it into the old and new city. The cathedral of St Geminianus, a Romanesque building, was begun, at the instance of the famous Countess Matilda, in 1099, and has a fine façade; its campanile is one of the great towers of Italy. The ducal (now royal) palace, a picturesque structure of the 17th century, has an infinity of galleries, courts, and marble arches, and contains the Este library, the Este archives, collections of coins, and the gallery of pictures, including works by Guido, the Carracci, Guercino, Correggio, and other great Italian masters. Modena has besides a university (1678). The chief manufactured products are silk, leather, vinegar, and cast metals. There is a very lively trade in agricultural products. Originally an Etruscan town, Modena was conquered successively by the Gauls and the Romans, and destroyed by Constantine the Great, the Goths, and the Longobards. Charlemagne made it the capital of a line of counts. The family of Este (q.v.) became its masters in 1288; and in 1452 the reigning marquis was created duke by the Emperor Frederick III. During the first half of the 19th century its dukes pursued a tyrannous reactive policy against liberalism, and were on more than one occasion expelled their dominions, finally and definitively in 1860. The duchy was then incorporated in the kingdom of Italy, and afterwards divided into the provinces of Modena, Reggio, and Massa-Carrara. Area of province, 1000 sq. m.; pop. 400,000.

Moderator, a president, especially (1) in Presbyterian churches the president of a kirk-session, presbytery, synod, or general assembly (see ASSEMBLY, GENERAL), and (2) an official who conducts certain university examinations (in Oxford Moderations or 'Mods,' the first public examination for B.A.; in Cambridge, the Mathematical Tripos).

Modernism, a name used by Swift of innovation in style or expression. In 1704 he called those modernists who maintained the superiority of modern over ancient literature. Rousseau in 1769 spoke of an atheistical philosopher as a modernist. Ruskin in 1874 contrasted 'infidel modernists' with 'dunce Christians.' Much more recent is the use of the term modernism for a series of attempts so to modify the relation of Christian dogma towards history and science, while retaining religious truth intact, as to leave Christian scholars free to pursue their researches in science and history untrammelled by dogmatic limitations, and to accept unhesitatingly conclusions which the church had heretofore branded as rationalism or worse.

Innovating movements in the Roman Catholic Church under Pius IX. usually took a politico-liberal direction; under Leo XIII. they were largely of the nature of social reform; but under Pius X. they assumed an avowedly theological and critical aspect, especially in Italy and France. The leaders

in this latter movement do not by any means all adhere to the same doctrines or positions; but such men as Murri and Fogazzaro in Italy, Loisy in France, Tyrrell and Von Hügel in England, have enough in common to justify their being grouped under a common name. Their critics charge them with having been influenced by elements hostile to Catholicism derived from Kant, from Schleiermacher, from Herbert Spencer, from Bergson; with having carried Newman's doctrine of development to conclusions at which Newman would have shuddered; and with being but little distinguished from 'liberal' Protestants as unlike one another as Harnack, Eucken, and Sabatier. This the Catholic modernists earnestly deny, affirming that they are devout Catholics in heart, seeking only to remove obstacles and stumbling-blocks in the way of faith by bringing church doctrine into perfect harmony with the results of scientific research and free historical studies. They accept the substance of the Catholic faith, and adhere to its ritual as they find it in the 20th century, to its sacred books, its organisation and discipline, only they claim a right fearlessly to apply conscientious and thorough historical and critical methods to the study of the church's origin and development. The representative modernists secure this freedom by their emphatic distinction between religion and dogma, between historic facts and the doctrines which have been developed out of them and built around them by the Christian consciousness of the church. If the faith is alive its expression must take new forms, must seek more adequate presentation, must develop not merely in clearness but in substance. Religious experience does not depend on evidence and scientific fact, nor in the end does Christian faith or Christian doctrine.

Modernism is at once a philosophy, a theology, a method of interpretation, and a system of criticism. In effect it yields up, as matters of science and historic fact, most of the positions negative criticism holds itself to have proved; but claims to rescue the faith from attack and defeat, and believers from doubt and difficulty, by proving that the faith—the Catholic faith in all essentials—is indefeasible, as established on the eternal foundations of religious need, religious aspiration, religious hope, religious assurance. Modernism was condemned by the Italian bishops in 1905 and 1906; by the Papal decree *Lamentabili* (which, however, does not use the word modernism) in July 1907; and by the encyclical *Pascendi*, which confutes 65 'modernist' propositions, in September 1907. Loisy was visited with the major excommunication in 1908; and Tyrrell, expelled from the society of the Jesuits, died in 1909, while his privileges as a Catholic priest were still withdrawn.

The modernising tendency seeks to retain the traditions, the ceremonies, and the discipline of the old faith as far as is consistent with the educated beliefs and conscience of the time, with the accepted facts of history, the principles of service, and developing realisation of a universe in which man is not the centre, and to which man's history is not the key. It tends to minimise the miraculous, and humbly to admit that the laws of nature are also the laws of God; it substitutes the immanent view of God for a merely transcendental; it sets aside for ever the bitterness of dogmatic controversy, dwells as little as may be on the more barren problems of theology, and, reconciling service with religion, seeks to harmonise order with progress, and the welfare of the individual with that of the race.

The Rev. J. M. Thompson is a notable modernist within the Church of England. In *The Miracles of the New Testament* he frankly disavowed his belief in the miraculous element in the gospels;

but in *Through Facts to Faith* (1913) he argues that belief in Providence remains untouched after the miraculous element is eliminated; the testimony of religious experience, in reply to the scientific conclusion that miracles do not happen, is that miracles do not matter. And he even finds himself able to justify the Christian belief in the divinity and deity of Christ on the basis of a providential order (although quite obviously the evangelists based Christ's divine mission and powers on the miracles they recorded).

Modica, an inland town of Sicily, 45 miles SW. of Syracuse, with trade in fruit, oil, wine, and grain; pop. 60,000.

Modjeska, HELENA, Polish actress, was born in Cracow, 12th October 1844, and began to act in a travelling company in 1861. Four years later she made a great name at Cracow, and from 1868 to 1876 was the first actress of Warsaw. Then she settled, with her second husband, near Los Angeles, California, to try farming; but the enterprise not succeeding, she returned to the stage, and won a complete triumph as Adrienne Lecouvreur at San Francisco in 1877, although she acted in English, of which language she had known nothing seven months before. She was acknowledged one of the best of modern emotional actresses, achieving triumphs in Juliet, Rosalind, Beatrice, and in the *Dame aux Camélias*. Returning to farming and bee-keeping in California, she died in April 1909. See her Autobiography (1910).

Modulation, in Music. When in the course of a melody the keynote is changed, and the original scale altered by the introduction of a new sharp or flat, such change is called modulation. Much of the pleasure of music is derived from a judicious use of modulation. The art of good modulation from one key to another consists in the proper choice of intermediate chords.

Moe, JÖRGEN (1815-82). See ASBJÖRNSEN.

Möen, a Danish island in the Baltic Sea, at the south-east end of Zealand. It is 20 miles in length.

Moeris, LAKE (Greek *Moirios limnē*), a sheet of water in Egypt, called in ancient Egyptian *Piōm* ('sea,' whence Fayūm), now represented by the large sheet of brackish water at the north-west end of the oasis of Fayūm (q.v.), covering nearly 80 sq. miles, called the Birket-el-Karūn, or 'Lake of the Horns,' but originally filling the whole depression, about 50 miles SW. of Cairo; extreme length from north-east to south-west, 35 miles.

Moero, or MWERU, LAKE, lies SW. of Tanganyika in Central Africa, on 9° S. lat. and 29° E. long., and is traversed by the Luapula (see CONGO). This lake was discovered by Livingstone in 1867. Its shores yield salt.

Moesia, an ancient Roman province, divided by the river Cibus (Zibritza) into two parts, the eastern corresponding to part of Bulgaria, and the western (Moesia Superior) to part of Serbia. Its original inhabitants were mostly of Thracian race. In 75 B.C. the Romans first came into conflict with the Gaulish or Celtic invaders of the land, who had settled in Upper Moesia two hundred years previously; but they did not conquer Upper Moesia until 29 B.C. and Lower until 15 B.C. To protect these provinces from the Dacians and Sarmatians beyond the river a wall was built and fortified posts erected along the Danube. The Emperor Valens permitted the Visigoths to settle in Moesia in 375 A.D. From the 5th to the 7th century Moesia was colonised by the races who still occupy it.

Mæso-Goths, the name given to the Goths (q.v.) who in the 3d century and in the 5th settled

in Lower Mœsia. It was for them that Ulfilas (q.v.) translated the Scriptures.

Moffat, a pleasant watering-place and police burgh in Upper Annandale, Dumfriesshire, 51 miles SSW. of Edinburgh by road. It lies 370 feet above sea-level, engirt by round grassy hills (the loftiest, Hartfell, 2651 feet), and in the midst of delightful scenery, chief features of which are 'dark Loch Skene,' the Grey Mare's Tail, and the Devil's Beef-tub. Its mineral springs have been celebrated since 1653. Pop. 3000.

Moffat, ROBERT, missionary, was born at Ormiston, East Lothian, 21st December 1795. While following the occupation of a gardener at High Leigh, Cheshire, in 1815, he offered himself for the mission-field. His services were accepted by the London Missionary Society, and he sailed for South Africa in 1816. He began his labours (January 1818) in Great Namaqualand at the kraal of Afrikaner, a chief who from being a terror to the neighbouring districts of the colony had embraced Christianity, and now showed a desire for its promotion. On 27th December 1819 Moffat married Mary Smith (1795-1870), daughter of his former employer at Dukinfield near Manchester, who proved a worthy helpmeet. He made several journeys and laboured at various stations before he settled at Kuruman (1826-70) in Bechuanaland. He printed in Sechwana the New Testament (1840), the Old Testament (1857), and several religious works. In England (1838-43) he had an enthusiastic reception, and published his graphic *Labours and Scenes in South Africa* (1842). In 1843 he returned, reinforced by other missionaries, remaining till 1870. He died at Leigh, Kent, 9th August 1883. It may be said that Moffat's influence drew Livingstone to Africa; it was to Kuruman Livingstone went first, and he married Mary Moffat. See *Lives of Robert and Mary Moffat*, by J. S. Moffat (1885).

Mofussil (from an Arabic word meaning 'separate'), a term commonly used by Anglo-Indians for the rural part of a district as opposed to the administrative headquarters. Thus in Bengal the Mofussil means practically the whole province beyond the city of Calcutta.

Mogador, or SUEÏRA, a seaport 130 miles WSW. of the city of Marrakesh. Pop. about 20,000, of whom 700 are Europeans. It stands on a rocky promontory opposite a small island, the channel between forming the somewhat indifferent harbour. It was laid out in 1760 by Cornut, a French engineer. On its landward side the place is surrounded by drifting sandhills, but the climate is salubrious, dry, and temperate.

Mogileff. See MOHILEFF.

Mogok, the centre of a ruby-mining district of Burma, 90 miles NNE. of Mandalay.

Moguer, a town and small port of Spain, on the Río Tinto, near its mouth, and 8 miles E. of Huelva, with some trade; pop. 8000.

Mogul, also spelt *Moghul* and *Mughal*, is really but another form of *Mongol*. The term 'great Mogul' is the popular designation of the emperor of Delhi in India. The first Great Mogul was Baber (q.v.), a descendant of Timur the Tatar or Tamerlane (q.v.); he founded the empire in 1526. The dynasty lost its power and territories to the English in 1765. The last emperor, having joined the rebels in 1857, died a prisoner in Rangoon (1862). See Irvine, *The Later Mughals* (1922).

Moguntiacum, the Latin name of Mainz (q.v.).

Mohács, a town of Hungary, on the western arm of the Danube, 37 miles by rail ESE. of Fünfkirchen; pop. 16,000. Here, on 29th August

1526, Louis II. of Hungary, with 25,000 Hungarians, met the Sultan Soliman at the head of 200,000 Turks. The battle resulted in the disastrous defeat of the Hungarians, who lost their king, seven bishops, many nobles and dignitaries, and upwards of 22,000 men. In a second battle fought here on 12th August 1687 the Turks in their turn were defeated by an Austro-Hungarian army under Charles of Lorraine.

Mohair, the wool of the Angora Goat (q.v.). Few animals have so beautiful a covering as the fine, soft, silky, long, and always pure white wool of this goat. See WOOL.

Mohammed (*Muhammad*, and less correctly *Mahomet*; Arab., 'Praised'), the founder of Islam. He was born about the year 570 A.D. at Mecca, the son of Abdallah, of the family of the Hashim, and of Amina, of the family of Zuhra, both of the powerful tribe of Koreish (Quraish). His father died probably shortly after Mohammed's birth, and the boy spent his infancy and part of his childhood with Halima among the Beni Sa'd. His grandfather, 'Abd-al-Muttalib, the foremost chief of Mecca and keeper of the holy place, adopted him on the death of Amina, which occurred when Mohammed was six years old. Two years later 'Abd-al-Muttalib also died, and Mohammed came under the guardianship of his uncle, Abu Talib, who, finding himself too poor to provide for the pilgrims, handed over this expensive duty, along with the charge of the well Zemzem, to his younger brother Al-Abbās, from whom in days to come were descended the powerful family of the Abbasids. Abu-Talib proved a kind friend and guardian to his nephew throughout his life. Thoughtful beyond his years and endowed with a refined mind and delicate tastes Mohammed kept himself singularly pure in a society where purity meant little or nothing, and for this he became known as Al-Amin, 'The Faithful.' During his youth he tended the flocks of Mecca on the hills surrounding the city, and in after years he is reported to have said, 'Verily there hath been no prophet raised up who performed not the work of a Shepherd.' At twenty-five he hired himself to Khadija, a wealthy widow, also descended from the Koreish, for four camels, to go with one of her caravans to Syria. The undertaking was a complete success commercially, and led, through the greater chances of meeting, to what may well be considered the event which more than any other led to Mohammed's happiness—his marriage with Khadija. This marriage with Khadija (fifteen years his senior) gave him that ease of circumstances and freedom from the cares of daily life which he needed. Within the next ten years Khadija bore to Mohammed two sons and four daughters. The first-born was named Al-Kāsim; and after him, according to Arabian custom, Mohammed received the name Abu'l-Kāsim, 'Father of Al-Kāsim'; next were born his four daughters, Zeinab, Rokeiya, Fātima, and Um Kuthūm; and lastly, his second son, Abd-Mānaf. Both his sons died young.

No description of Mohammed at this period has been attempted by traditionists. But from many accounts given of his person in later life an outline of his appearance in early manhood may be attempted. Slightly above middle height, his figure though lean was handsome. Broad-shouldered and strongly built, he was fair skinned for an Arab; his neck was long and finely moulded, his hair jet-black and slightly curly fell to his shoulders, while a long beard added to the dignity of his appearance. A black mole between his shoulders became known afterwards among the faithful as 'the seal of prophecy.' His expression

was pensive and thoughtful, and the face was full of intelligence, although something sensuous might also be discerned. He leaned slightly forward as he walked, and his step was sharp and decided, though he moved his whole body somewhat violently, which gave him the look of one descending a declivity.

Throughout Arabia, from about the year 600, Christianity and Judaism had played prominent parts in the peninsula. Also at this time there had arisen several men from the Hejaz, who preached the Unity of God (the ancient religion of Abraham) in opposition to the futility of the ancient pagan creed with its star worship, pilgrimages, temples, and fetishes. In fact, these Hanifs may be considered the forerunners of Mohammed, for by their zeal they aroused many from their pagan beliefs to join either Christianity or Judaism.

In his fortieth year, while passing the time, as he was so fond of doing, at Mount Hira, in the neighbourhood of Mecca, he received his first communication from God. Gabriel appeared to him with a message from his Lord, 'Cry (recite) in the name of thy Lord who created all things.' Greatly terrified at this revelation he returned to Khadija, who comforted him. The visions after this were withheld for some years, and on their return he only communicated them to Khadija, his daughters, his cousin and adopted son Ali, his former slave and adopted son Zaid, and his friend the prudent, wise, and honest Abū Bekr. His other relatives rejected his teaching with scorn. Abu Lāhab, his uncle, called him a fool; and Abu Tālib, his adopted father, though he never ceased for the honour of his family to protect him, yet never professed any belief in Mohammed's words. In the fourth year of his mission, however, he had made forty proselytes, chiefly slaves and people from the lower ranks, and now first some verses were revealed to him, commanding him to come forward publicly as a preacher, and to defy the scorn of the unbelievers. He now inveighed against the primeval superstition of the Meccans, and exhorted them to a pious and moral life, and to the belief in an all-mighty, all-wise, everlasting, indivisible, all-just, but merciful God, who had chosen him as he had chosen the prophets of the Bible before him, so to teach mankind that they should escape the punishments of hell, and inherit everlasting life. God's mercy was principally to be obtained by prayer, fasting, and almsgiving. The belief in the sacredness of the Kāaba and the ceremonies of the pilgrimage was too firmly rooted in his and the people's minds not to be received into the new creed; but certain barbarous habits of the Bedouins, such as the killing of their new-born daughters, were unsparingly condemned by Mohammed. The prohibition of certain kinds of food also belongs to this first period, when he as yet entirely stood under the influence of Judaism; the prohibition of gambling, usury, and wine coming after the Hegira. Whether he did or did not understand the art of writing and reading at the commencement of his career is not quite clear; certain it is that he pretended not to know it, and employed the services of amanuenses for his Koranic dicta, which at first consisted merely of brief, rhymed sentences in the manner of the ancient Arabic soothsayers. Zaid, his adopted son, who was later to gather these fragments into a complete whole (see KORAN), was his chief secretary. The Meccans did not object to his doings; they considered him a common poet or soothsayer, who, moreover, was not in his right senses, or was simply a liar. Gradually, however, as the number of his converts increased they began to pay more and more attention to his proceedings; and finally, fearing mostly for the sacredness of Mecca, which the new doctrine

might abolish, they rose in fierce opposition against the new prophet and his adherents, who dared 'to call their ancient gods idols, and their ancestors fools.' The Koreish now demanded that Abu Tālib should silence or surrender his nephew. Abu Tālib refused. Many of the converted slaves and freedmen had to undergo terrible punishments; and others suffered so much at the hands of their own relatives that they were fain to revoke their creed. A hundred believers, on the prophet's own advice, emigrated to Abyssinia. Mohammed himself, although protected by the strong arm of Abu Tālib, was yet at that time so low-spirited and fearful that, before an assembly of the Koreish, he raised three of the idols to mediatorial beings between God and man—a dictum, however, which he next day revoked as an inspiration of Satan, thereby increasing the hatred of his adversaries. All the Hāshimi family were now excommunicated, and all except Abu Lāhab retired to Abu Tālib's ravine in the mountains east of Mecca. After two years they were restored when on the brink of starvation.

A great grief befell Mohammed at this time—his faithful wife Khadija died, and, shortly afterwards, his uncle Abu Tālib; and, to add to his misery, the vicissitudes of his career had reduced him by this time to poverty. An emigration to Taif proved a failure; it was with great difficulty that he escaped with his life. Shortly after his return from Taif he married Sauda, and he afterwards so increased the number of his wives that at his death he still left nine, of whom Ayesha, the daughter of Abū Bekr, and Hafsa, the daughter of Omar, are best known. In the midst of his vain endeavours to find a hearing in his own city he succeeded, during a pilgrimage, in converting several men from Medina, whose inhabitants had long been accustomed to hear from the numerous Jews there the words Revelation, Prophecy, God's Word, Messiah. The seed sown in the minds of these men bore a fruitful harvest. While he waited for the next pilgrimage he had in vision his night journey to heaven, the relation of which caused even his staunchest adherents to smile at his hallucination. The next pilgrimage brought twelve, and the third more than seventy adherents to the new faith from Medina, and with these he entered into a close alliance. Mohammed now conceived the plan to seek refuge in the friendly city of Medina, and about June 622 A.D. he fled thither. About one hundred families of his faithful flock had preceded him some time before, accompanied by Abū Bekr, and reached, not without danger, the town, called previously Yathrib, but thence Medinat Alnabi ('City of the Prophet'), or Medina ('City'), by way of eminence; and from this flight dates the Mohammedan Era, the Hegira (q.v.).

Now everything was changed to the advantage of the prophet and his religion; and if formerly the incidents of his life are shrouded in comparative obscurity, they are from this date known often to their most insignificant details. Formerly a despised 'madman or impostor,' he now assumed at once the position of highest judge, lawgiver, and ruler of the city and two most powerful Arabic tribes. His first care was directed towards the consolidation of the new worship, and the inner arrangements in the congregation of his flock; his next chief endeavour was to proselytise the numerous Jews who inhabited the city, to whom he made many important concessions also in the outer observances of Islam, but he was sorely disappointed in his hopes to convert them. They ridiculed his pretension to be the Messiah, and so enraged him by their constant taunts that he soon abrogated his concessions and became their bitterest adversary up to the hour of his death. The most important act in the first year of the Hegira was his permission

to go to war with the enemies of Islam in the name of God—a kind of manifesto chiefly directed against the Meccans. Not being able at first to fight his enemies in open field, he endeavoured to weaken their power by attacking the caravans of the Koreish on their way to Syria. Being successful enough to disturb their trade and to conclude alliances with the adjoining Bedouin tribes, he at last dared to break even the peace of the sacred month of Radjab, and with this the signal to open warfare was given. A battle, the first, between 300 Moslems and about 600 Meccans was fought at Badr, in the second year of the Hegira, December 623; the former gained the victory and made many prisoners. This battle is one of the outstanding events in Moslem history, and the moral effect never left Mohammed. A great number of adventurers now flocked to him, and he successfully continued his expeditions against the Koreish and the Jewish tribes, chiefly the Beni Keinukâ and the Beni Kureidhah. In January 625 the Meccans defeated him at Uhud, where he was dangerously wounded. The siege of Medina by the Meccans in 627 was frustrated by Mohammed's ditch and earthworks. In 628 he proclaimed a public pilgrimage to Mecca. Although the Meccans did not allow this to be carried out, he gained the still greater advantage that they concluded a term of peace with him at Hudaibiyeh for ten years. He was now allowed to send his missionaries all over Arabia, and even beyond the frontiers, without any hindrance; and in the following year he had the satisfaction of celebrating the pilgrimage with 2000 followers for three days undisturbed at Mecca. Shortly afterwards, during his expeditions against the Jews of Chaibar and Fadak, Mohammed very nearly lost his life: a Jewess, Zainab by name, a relative of whom had fallen in the fight against him, placed a poisoned piece of roast meat before him, and although he merely tasted it he yet up to his death suffered from the effects of the poison. His missionaries at this time began to carry his doctrines abroad. He wrote letters demanding the conversion of Chosroes II., of Heraclius, of the king of Abyssinia, the Viceroy of Egypt, and the chiefs of several Arabic provinces. Some received the new gospel, but Chosroes II., the king of Persia, and Amru the Ghassanide rejected his proposals with scorn, and the latter had the messenger executed in Moab. This was the cause of the first war between the Christians and the Moslems, in which the latter were beaten with great loss by Amru. Some Meccans having taken part in a war between a tribe in their alliance and another in Mohammed's alliance, he marched at the head of 10,000 men against Mecca before its inhabitants had had time to prepare for the siege. It surrendered, and Mohammed was publicly recognised as chief and prophet. With this the victory of the new religion was secured in Arabia. While employed in destroying all traces of idolatry in the captured city Mohammed heard of new armies which several warlike Arabic tribes had concentrated near Taif (630). There again he was victorious, and now his dominion and creed extended farther and farther every day. From all parts flocked the deputations to do homage to him in the name of the various tribes, either as the messenger of God or at least as the Prince of Arabia, and the year 8 of the Hegira was therefore called the year of the Deputations. Once more he made most extensive preparations for a war against the Syrian subjects of Byzantium; but, not being able to bring together a sufficient army, he had to be satisfied with the homage of a few minor princes on his way to the frontiers. Towards the end of the tenth year of the Hegira he undertook his last solemn pilgrimage to Mecca, and there on Mount

Arafat fixed for all time the ceremonies of the pilgrimage (Hajj); and he again solemnly exhorted his believers to righteousness and piety, and chiefly recommended them to protect the weak, the poor, and the women, and to abstain from usury.

Returned from Mecca, he occupied himself again with the carrying out of his expedition against Syria, a necessary aid to religion and patriotism in keeping his people together, but fell dangerously ill very soon after his return. One night while suffering from an attack of fever he went to the cemetery of Medina and prayed and wept upon the tombs, praising the dead, and wishing that he himself might soon be delivered from the storms of this world. For a few more days he went about; at last, too weak further to visit his wives, he chose the house of Ayesha, situated near the mosque, as his abode during his sickness. He continued to take part in the public prayers as long as he could, until at last, feeling that his hour had come, he once more preached to the people recommending Osâma the son of Zaid as the general whom he had chosen for the army, and Abû Bekr as his particular friend. He then asked whether he had wronged any one, and read passages from the Koran preparing the minds of his hearers for his death and exhorting them to peace among themselves. A few days afterwards he asked for writing materials, probably in order to fix his successor as chief of the faithful; but for some reason they were not brought to him. In his last wanderings he spoke only of angels and heaven. He died in the lap of Ayesha about noon of Monday the 12th (11th) of the third month in the year 11 of the Hegira (8th June 632). His death caused an immense excitement and distress among the faithful; and Omar, who himself would not believe in it, tried to persuade the people that he was still alive. But Abû Bekr said to the assembled multitude: 'Whoever among you has served Mohammed let him know that Mohammed is dead; but he who has served the God of Mohammed let him continue in His service, for He is still alive and never dies.' While his corpse was yet unburied the quarrels about his successor, whom he had not definitely been able to appoint, commenced; but finally Abû Bekr received the homage of the principal Moslems at Medina. Mohammed was then buried in the night between the 9th and 10th of June, after long discussions, in the house of Ayesha, where he had died. It afterwards became part of the adjoining mosque.

A man of Mohammed's extraordinary powers and gifts is not to be judged by a modern commonplace standard; the manners and morals of his own time and country must also be taken into consideration. He was at times deceitful, cunning, revengeful, cowardly, addicted to sensuality, and even a murderer. Yet not only his public station as prophet, preacher, and prince, but also his private character, his amiability, his faithfulness towards friends, his tenderness towards his family, and the frequent readiness to forgive an enemy must be taken into consideration, besides the extreme simplicity of his domestic life; he lived when already in full power in a miserable hut, mended his own clothes, and freed all his slaves. His melancholic temperament, his nervousness, his poetic nature, his extreme sensitiveness which sometimes developed by introspection into hysteria, must not be forgotten. Altogether his mind contained the strangest mixture of right and wrong, of truth and error. Although his self-chosen mission was the abolition of superstition, he yet believed in jinn, omens, charms, and dreams. Take him all in all, the history of humanity has seen few more earnest, noble, and sincere prophets, men

irresistibly impelled by an inner power to admonish and to teach, and to utter austere and sublime truths the full purport of which is often unknown to themselves.

See the *Lives* in German by Weil (1843), Sprenger (1861-65), Nöldeke (1863), Krehl (vol. i. 1884); in French by Delaporte (1874); Sir W. Muir, *Life of Muhomet* (4 vols. 1858-61; ed. Weir, 1912), and *Mahomet and Islam* (1887); Syed Ameer Ali's *Life of him* (1890); P. de L. Johnstone, *Muhammad and his Power* (1901); and Margoliouth, *Mohammed and the Rise of Islam* (1905).

MOHAMMEDANISM, the religion founded by Mohammed, or, according to him, the only orthodox creed existing from the beginning of the world, and preached by all the prophets ever since Adam. It is also called *Islām*, 'Resignation,' entire Submission to the will and precepts of God. In its exclusively dogmatical or theoretical part it is *Imān*, 'Faith'; in its practical, *Dīn*, 'Religion.' The fundamental principles of the former are contained in the two articles of belief: 'There is no God but God; and Mohammed is God's Apostle.' The Mohammedan doctrine of God's nature and attributes coincides with the Christian, in so far as He is by both declared to be the Creator of all things in heaven and earth; who rules and preserves all things, without beginning, omnipotent, omniscient, omnipresent, and full of mercy. But, according to the Mohammedan belief, He has no offspring: 'He begetteth not, nor is He begotten.' Nor is Jesus called anything but a prophet and apostle, although His birth is said to have been due to a miraculous divine operation; and as the Koran superseded the Gospel, so Mohammed superseded Christ. The crucifixion is said to have been carried out upon another person, Christ having been taken up unto God before the decree was put into execution. Christ will come again upon the earth to establish everywhere the Moslem religion, and to be a sign of the coming of the day of judgment. Next to the belief in God, that in angels forms a prominent dogma. Created of fire, and endowed with a kind of incorporeal body, of no sex, they stand between God and man, adoring or waiting upon God, or interceding for and guarding man. The four chief angels are Gabriel, 'The Holy Spirit' or 'Angel of Revelations'; Michael, the special protector and guardian of the Jews; Raphael (Azraël, Azraïl), the 'Angel of Death'; and Uriel (Israfil), whose office it will be to sound the trumpet at the Resurrection. Islam borrowed its ideas of the unseen world from the Persians or from the Jews, who had borrowed them from the Persians (see ANGEL). To each human being are appointed two guardian angels. Besides angels, there are good and evil genii, the chief of the latter, who are generally called Ifrit, being Iblīs ('Despair'), once called Azazil, who, refusing to pay homage to Adam, was rejected by God. These jinn are of a grosser fabric than angels, and subject to death. They are, in almost every respect, like the Shēdim in the Talmud and Midrash. A further belief is in certain God-given Scriptures, revealed successively to the different prophets. Four only of the original one hundred and four sacred books—the Pentateuch, the Psalms, the Gospel, and the Koran—are said to have survived; the three former, however, in a mutilated and falsified condition. The number of prophets, sent at various times, is stated variously at between two and three hundred thousand, among whom 313 were apostles, and six were specially commissioned to proclaim new laws and dispensations, which abrogated the preceding ones. These were Adam, Noah, Abraham, Moses, Jesus, and Mohammed—the last the greatest of them all, and the founder of the final dispensation.

The belief in the resurrection and the final judgment is the next article of faith. The dead are

received in their graves by an angel announcing the coming of the two examiners, Munkir and Nakir, who put questions to the corpse respecting his belief in God and Mohammed, and who, in accordance with the answers, either torture or comfort him. Concerning the condition of the soul between death and the resurrection Islam has no authoritative teaching. The soul is supposed, according to its rank, either to enter immediately into paradise (as do the prophets), or to partake, in the shape of a green bird, of the delights of the abode of bliss (as the martyrs); while, in the case of common believers, it stays near the grave, or is with Adam in the lowest heaven, or remains either in the well of Zem-Zem or in the trumpet of the resurrection. The souls of the infidels dwell in a certain well in the province of Hadramaut, or, being first offered to heaven, then offered to earth, and rejected by both, are subject to unspeakable tortures until the day of resurrection. Concerning the latter, great discrepancy reigns among the Mohammedan theologians. Mohammed himself seems to have held that both soul and body will be raised; and the 'bone Luz' of the Jewish Haggadah was by him transformed into the bone Al Ajb ('the rump-bone'), which will remain uncorrupted till the last day, and from which the whole body will spring anew, after a forty days' rain. Among the signs by which the approach of the last day may be known—nearly all taken from the legendary part of the Talmud and Midrash—are the decay of faith among men, the advancing of the meanest persons to highest dignities, wars, seditions, and tumults, and consequent dire distress. The sun will rise in the west, the Beast will appear, Constantinople will be taken by the descendants of Isaac, the Mahdi (q.v.) will come, the Dejjāl or arch-impostor also will come and be killed by Jesus at Lud. There will further take place a war with the Jews, the coming of Gog and Magog (Yāyūj and Mājūj's), a great smoke, an eclipse, the Mohammedans will return to idolatry, the Kāaba will be destroyed by the Ethiopians, beasts and inanimate things will speak, and finally, a wind will sweep away the souls of those who have faith. The time of the resurrection Mohammed himself could not learn from Gabriel: it is a mystery. Three blasts will announce it: that of consternation, of such terrible powers that mothers shall neglect the babes on their breasts, and that heaven and earth will melt: that of examination, which will annihilate all things and beings, save paradise and hell, and their inhabitants; and forty years later, that of resurrection, when all men, Mohammed first, shall have their souls breathed into their restored bodies, and will sleep in their sepulchres until the final doom has been passed upon them. The day of judgment, lasting from one to fifty thousand years, will call up angels, genii, men, and animals. The trial over, the righteous will enter paradise to the right hand, and the wicked will pass to the left into hell; both, however, have first to go over the bridge Al Sirāt, laid over the midst of hell, and finer than a hair, and sharper than the edge of a sword, and beset with thorns on either side. The righteous will proceed on their path with ease and swiftness, but the wicked will fall down headlong to hell below.

Hell is divided into seven stories or apartments, respectively assigned to Mohammedans, Jews, Christians, Sabians, Magians, idolators, and, lowest of all, the hypocrites, who, outwardly professing a religion, in reality had none. The degrees of pain, chiefly consisting in intense heat and cold, vary; but Mohammedans and all who professed the unity of God will finally be released, while unbelievers and idolators will be condemned to eternal punishment. Paradise is divided from

hell by a partition (Arâf), in which a certain number of half-saints will find place. The blessed, destined for the abodes of eternal delight (Jannat Aden; Heb. Gan Eden), will first drink of the Pond of the Prophet, which is supplied from the rivers of paradise, whiter than milk, and more odoriferous than musk. Arrived at one of the eight gates, they will be met by beautiful youths and angels; and their degree of righteousness (prophets, religious teachers, martyrs, believers) will procure for them the corresponding degree of happiness. Yet, according to the Mohammedan doctrine, it is not a person's good works or merits that gain his admittance, but solely God's mercy. The poor will enter paradise five hundred years before the rich. The majority of the inhabitants of hell are women. The various felicities which await the pious (and of which there are about a hundred degrees), are a wild conglomeration of Jewish, Christian, Magian, and other fancies on the subject, to which the Prophet's own exceedingly sensual imagination has added largely. Feasting in the most gorgeous and delicious variety, the most costly and brilliant garments, odours and music of the most ravishing nature, and above all, the enjoyment of the Hûr Al Oyûn, the black-eyed daughters of paradise, created of pure musk, and free from all the bodily weaknesses of the female sex, are held out as a reward to the commonest inhabitants of paradise, who will always remain in the full vigour of their youth and manhood. For those deserving a higher degree of recompense rewards will be prepared of a purely spiritual kind—i.e. the 'beholding of God's face' by night and by day. A separate abode of happiness will also be reserved for women. The last of the precepts of pure faith taught by Mohammedanism is the full and unconditional submission to God's decree (Islam), and the predestination of good and evil. Not only a man's fortunes, but his deeds, and consequently his future reward or punishment, are irrevocably, and thus unavoidably, pre-ordained (Fate, *kismeh*): a doctrine which is not, however, taken literally by all Moslems, but which has no doubt contributed largely to the success of Islam by inspiring its champions with the greatest contempt for the dangers of warfare.

The Dîn, or practical part of Islam, which contains the ritual and moral laws, inculcates as the chief duties the following four: prayer, almsgiving, fasting, and pilgrimage.

Prayer, 'the key of paradise,' comprises also certain religious purifications, as the most necessary preparations. They are of two kinds: the *Ghâsl*, or total immersion of the body, required as a religious ceremony on some special occasions; and the *Wudû*, a partial ablution, to be performed immediately before the prayer. This is of primary importance, and consists of the washing of hands, face, ears, and feet up to the ankles—a proceeding generally accompanied at each stage by corresponding pious sentences, and concluded by the recital of the 97th chapter of the Koran. If water be beyond reach, dry dust or sand may supply its place. 'The practice of religion being founded on cleanliness,' the ground or the carpet upon which the believer prays must be as clean as possible, and the use of a special prayer-carpet is therefore recommended. Every Mohammedan is obliged to pray five times in the space of every twenty-four hours. The prayer (Salât) itself consists partly of extracts from the Koran (Fard), partly of pieces ordained by the Prophet without allegation of a divine order (Sunnah). The first time of prayer commences about sunset; the second at nightfall; the third at daybreak; the fourth about noon; the fifth in the afternoon. The believers are not to commence their prayers exactly at sunrise, or noon, or sunset,

lest they might be confounded with the infidel Sun-worshippers. These several times of prayer are announced by the Muezzins (q.v.) from the minarets of the mosques. Their chant, sung to a very simple but solemn melody, sounds harmoniously and sonorously down the height of the mosque, through the mid-day din and roar of the cities, but its impressiveness is most strikingly poetical in the stillness of night. The day-call (the Adân) consists chiefly of the confession of faith ('God is most great,' 'Mohammed is God's apostle'; 'Come to prayer, come to security') repeated several times; the night-calls (Ula, the first; Ebed, the second), destined for persons who desire to perform supererogatory acts of devotion, are much longer. The believer often changes his posture during his prayers; and one series of such inclinations of head and knees, prostrations, &c. is called a Rukû. It is also necessary that the face of the worshipper should be turned towards the Kiblah, in the direction of Mecca, the exterior wall of the mosque marking that direction being distinguished by a niche (Mihrab). All sumptuous and pompous apparel is laid aside before the believer approaches the sacred place; and the extreme solemnity and decorum, the humility, the devotion which pervades it have been unanimously held up as an example to other creeds. The mosques are always open. Women, although not strictly forbidden to enter the mosque, yet are practically not allowed to pray there, lest their presence might be hurtful to true devotion. Besides these prayers, there are others ordained for special occasions, as on a pilgrimage, before a battle, at funerals, during an eclipse, &c. Moslems pray to God only, but implore the intercession of Mohammed, saints, and angels (see MOSQUE). Mohammedanism has no clergy in our sense of the word, the civil and religious law being bound up in one (see MOLLAH, MUFTI).

Next in importance stands the duty of giving alms. These are twofold—legal and voluntary, but the former, once collected by the sovereign, and applied to pious uses, has now been practically abrogated. The latter is, according to the law, to be given once every year, of cattle, money, corn, fruits, and wares sold, at about the rate of from two and a half up to twenty per cent. Besides these, it is usual to bestow a measure of provisions upon the poor at the end of the sacred month of Ramadân.

The duty of fasting follows (see FASTS). During the whole month of Ramadân the Moslem is commanded to refrain from eating, drinking, smoking, smelling perfumes, bathing, and every unnecessary indulgence in worldly pleasure, from daybreak until sunset. From that period till the morning he is allowed to eat, drink, and enjoy himself. The Arabian year consisting of twelve lunar months, it often happens that the Ramadân falls in mid-summer, when the fasting, more especially the abstaining from drinking, is excessively mortifying. None are exempt from this duty save the sick, travellers, and soldiers in time of war; but they are bound to fast an equal number of days during some other months. Nurses and pregnant women are entirely free from fasting. It is Mohammed's special and express desire that no one should fast who is not quite equal to it, lest he might injure his health and disqualify himself for necessary labour. Of the other commendable fast-days the Ashûra, on the 10th of Moharram, deserves special mention. There are very few Moslems that do not keep the Ramadân, even if they neglect their other religious duties; at all events, they all pretend to keep it most strictly, fasting being considered 'one-fourth part of the faith,' nay, 'the gate of religion.'—For the fourth paramount duty of the Mohammedan, the pilgrimage to Mecca, see MECCA.

With the 'positive' ordinances of Islam may also be reckoned the minor and greater festivals. The first (Al-Fetr, or 'breaking the fast'), following immediately upon the Ramadân, begins on the first day of the month of Shawâl, and lasts three days. The second (Eed Al-Korbân, or 'sacrifice') begins on the 10th of Dhu'l Hijjah, when the pilgrims perform their sacrifice, and lasts three or four days. The weekly day of rest is the Friday, because, from times long before Mohammed, the people used to hold public assemblies for civil as well as religious purposes on that day. When the special Friday service with its Chotbeh or Homily is over, the people are allowed to return to their worldly affairs; if they cannot afford to give themselves up entirely to pleasure or devotion for the rest of the sacred period.

The ancient rite of circumcision is used in Mohammedanism as the badge of the faith. It is commonly performed between the sixth and eighth year. Of the fundamental prohibitory laws of the Koran, one forbids the drinking of wine, which includes all strong and inebriating liquors, as giving rise to 'more evil than good'; and although of late, chiefly through European influence, very many Moslems have lost their religious scruples on that score, and not only secretly but openly indulge in spirits, yet the great bulk of the faithful refuse even to make use of the proceeds of the sale of wine or grapes. Some over-scrupulous believers even include opium, coffee, and tobacco in the prohibition; but general practice has decided differently. The prohibitory laws respecting food resemble closely those of Judaism; blood, the flesh of swine, animals that have died from disease or age, or on which the name of some idol has been invoked, or that have been sacrificed to an idol, or have been strangled, or killed by a blow, a fall, or by some other beast, are strictly forbidden. 'Pure' animals must be slaughtered according to certain fixed rules, and the name of God is to be invoked before the operation, without, however, the usual addition of the benevolent epithets. Fish, birds, and game are mostly allowed for food.

All games subject to chance, such as dice, cards, tables, bets, are considered so wicked that a gambler's testimony is invalid in a court of law. Chess and other games depending on skill, provided that they do not interfere with the regular performance of religious duties, and that they are played without any stakes whatsoever, are allowed by the majority of Moslem theologians. Usury is strictly prohibited. Taking interest upon any loan, however large or small, or profiting in trade through any questionable means, save by buying and selling, is severely condemned.

To prevent the faithful from ever falling back into idolatry the laws relating to images and pictures have been made very stringent. Whosoever makes an imitation of any living being, in stone, wood, or any other material, shall on the day of judgment be asked to endow his creation with life and soul, and, on his protesting his inability to do so, shall undergo the punishment of hell for a certain period.

The civil and criminal laws of Mohammedanism, founded both on the Koran and on the Traditions (*Sunnâ*), are in some instances, where the letter of the written or oral precept allows of various explanations, or where the case in question is not foreseen, interpreted according to the opinion of one of the four great masters of Islam—Abu Hanîfa, Malek Ibn Ans, Shâfeî, Ibn Hanbal—within the pale of their respective sects. The principal points, however, upon which all Mohammedans agree are the following. Polygamy is allowed. 'Take in marriage of the women who please you, two, three, or

four; but if ye fear that ye cannot act equitably, one, or those whom your right hands have acquired'—i.e. your slaves. Thus four wives, and a certain number of concubine slaves, is the extent to which a Moslem may legally go. The Prophet's example proves nothing to the contrary, since he was endowed with special privileges. It is moreover added, as an advice, that to marry one or two is quite sufficient for a man. A Moslem may, if urged by excessive love, or if unable to obtain a wife of his own creed, marry a Christian woman or a Jewess, but a Mohammedan woman is not, under any circumstances, to marry an unbeliever. In all cases, however, the child of a Moslem father, whatever the mother's faith, is a Moslem; nor does the wife that is an unbeliever inherit at her husband's death. A simple declaration of a man and woman at the age of puberty, before two witnesses, of their intention to marry each other, and the payment of part of the dowry (which is indispensable, and must amount to at least ten dirhems, or about five shillings) is sufficient for a legal marriage. A girl under age is given away by her natural or appointed guardian, with or without her consent. To see the face of any woman who is neither his wife nor his concubine, and who does not belong to any of the forbidden degrees, is strictly forbidden to the believer. Divorce is an easy thing for a Moslem husband. Twice a man may send away his wife and take her back again without any ceremony; the third time, however, or if he unite the triple divorce in one sentence at once, he dare not receive her again in wedlock until she have been married to another man in the meantime. Mere dislike is sufficient reason for a man to dissolve the conjugal ties, and his saying 'Thou art divorced,' or 'I divorce thee,' together with the payment of part of the wife's dowry, is all that is required from him by the law. A wife, on the other hand, is bound to her husband for ever, unless she can prove some flagrant ill-usage or neglect of conjugal duty on his part; and even then she forfeits part, or the whole, of her dowry. A woman proving disobedient to her husband may be declared by the *cadi* rebellious, and the husband is no longer bound to maintain her; but he cannot be forced to divorce her under these circumstances. If a slave becomes a mother by her master, and he acknowledges the child to be his own, the child is free, and the mother is to be emancipated at the master's death. A free person wishing to marry his or her slave must first emancipate this slave.

The privilege of primogeniture does not exist in the Mohammedan law, but males generally receive a double share. A person may not bequeath more than one-third of his property, unless there be no legal heirs. Children—whether begotten with the legal wife, or slave, or concubine, or only adopted—and their descendants are the first heirs; next come the claims of wives, parents, brothers, sisters, in their order. Where there is no legal heir the property falls to the crown. The law is very lenient towards debtors, the Koran recommending the creditor to remit a debt 'as alms.' Insolvency and inability to work for the discharge of the claim solve all further obligations. The most conscientious performance of all private contracts, however, is constantly recommended in the Koran.

Murder is punishable either with death or by the payment of a fine to the family of the deceased, according to their own pleasure. There must, however, be palliating circumstances in the latter case. Unintentional homicide is expiable by freeing a believer from slavery, and paying to the family a certain sum in proportion to the rank and sex of the deceased. He who has not the means of freeing a believer is to fast for two months, by way of penance. According to the strict letter of the law,

a man is not liable to capital punishment for killing his own child or an infidel; but, practically, no difference is generally made by civilised Mohammedan governments in our day: murder is punished with death, and no fine frees the culprit.

The Mosaic law of retaliation, in case of *intentional* wounds and mutilation, holds good also for Islam; that is (not, as has ignorantly been supposed, that the corresponding limb of the offender is to be cut off), a certain proportionate fine in money is to be paid to the injured. The payment for any of the single limbs of the human body, such as the nose, is the full price, the same as for a homicide; for a limb which is found twice, like hand or foot, half; for a finger or toe, the tenth part. Women and slaves have smaller claims. Injuries of a dangerous or otherwise grievous nature pay the full price; those of an inferior kind bring the perpetrator within reach of the lash or cudgel.

The Koran orders theft to be punished by cutting off the chief offending limb, the right hand; the second theft is punishable by the loss of the left foot; the third, of the left hand; the fourth, of the right foot; but the ordinary punishments of imprisonment, hard labour, and the bastinado have been substituted in our days. Not, however, if the property stolen were of easy access to the thief, nor if it consisted of food, since he may have taken this to satisfy the craving of his hunger.

Unchastity on the part of a woman was, in the commencement of Islam, punished by imprisonment for life, for which afterwards, however, stoning was substituted in the case of a married woman, and a hundred stripes and a year's exile in the case of an unmarried free woman; a slave to undergo only half of that punishment. Fornication in either sex is, by the law of the Koran, to be visited with a hundred stripes.

Infidelity, or apostasy from Islam, is a crime to be visited by the death of the offender, if he have been warned thrice without recanting. Equally severe, and not to be averted by repentance or revocation of any kind, is the punishment inflicted for blasphemy—against God, Mohammed, Christ, Moses, or any other prophet.

A further injunction of the Koran, for the carrying out of which the time has well-nigh gone by, is that of making war against the Infidels. He who is slain while fighting in defence and for the propagation of Islam is reckoned a martyr; while a deserter from the holy war is held up as an object of execration, and has forfeited his life in this world as well as in the world to come. At first all the enemies taken in battle were ruthlessly slain. Later, however, it became the law to give the people of a different faith against whom war was declared the choice of three things: either to embrace Islam, in which case they became Moslems at once, free in their persons and fortunes, and entitled to all the privileges of Moslems; or to submit to pay tribute—in which case they were allowed to continue in their religion, if it did not imply gross idolatry or otherwise offend against the moral law; or to decide the quarrel by the fortune of war—in which case the captive women and children were made slaves, and the men either slain, unless they became converts at the last moment, or were otherwise disposed of by the prince. The fifth part of the spoil belongs 'to God,' that is, the Sanctuary, to the apostle and his kindred, to the orphans, the poor, and the traveller.

In cases for which subsequent ages found no written rules laid down by the Prophet, traditional oral dicta were taken as the norm, and later still precedents of the califs were binding. Hence contradictions in theory and practice have crept in,

according to the different traditions and decisions of the Imáms or expounders of the Law, besides the various interpretations put upon the book itself within the pale of the different Mohammedan sects. The secular tribunals, therefore, not unfrequently differ in their decisions from the judicial tribunals; and the distinction between the written civil Law of the ecclesiastical courts and the common Law, aided by the executive power, is, fortunately for the cause of civilisation, getting clearer and clearer every day.

That part of Islam which has undergone least change in the course of time, and which most distinctly reveals the mind of its author, is also its most complete and its most admirable part—we mean the ethics of the Koran. They are not found, any more than the other laws, brought together in one, or two, or three Surahs, but 'like golden threads' they are woven into the huge fabric of the religious constitution of Mohammed. Injustice, falsehood, pride, revengefulness, calumny, mockery, avarice, prodigality, debauchery, mistrust, and suspicion are inveighed against as ungodly and wicked; while benevolence, liberality, modesty, forbearance, patience and endurance, frugality, sincerity, straightforwardness, decency, love of peace and truth, and, above all, trust in God and submission to His will are considered as the pillars of true piety, and the principal signs of a true believer. Nor must we omit to point out expressly that Mohammed never laid down that doctrine of absolute predestination which destroys all human will and freedom, because the individual's deeds cannot alter one iota in his destiny either in this world or in the next. So far from it, foolhardiness is distinctly prohibited in the Koran (ii. 196). Caution is recommended. And a glance at the whole system of faith, which is built on hope and fear, rewards and punishments, paradise and hell, destined to be man's portion according to his acts in this life, as well as the incessant exhortations to virtue and denunciations of vice, is sufficient to prove that the extreme doctrine of predestination is not in the Koran. But submission to the Lord's will, hope during misfortune, modesty in prosperity, and entire confidence in the Divine plans are supported by the argument that everything is in the hands of the Highest Being, and that there is no appeal against His absolute decrees.

That the worst side of Mohammed's character, the often wanton cruelty with which he pursued the propagation of his faith, should by his successors have been taken as a thing to be imitated is not wonderful if we consider how brilliant the results of the policy of the bloody sword had proved. The progress of the Moslem arms is described in the article KHALIF. Eighty years after Mohammed's death Islam reigned supreme over Arabia, Syria, Persia, Egypt, the whole of the northern coast of Africa, and over Spain; and notwithstanding the subsequent strifes and divisions in the interior of this gigantic realm, it grew and grew outwardly, until the Crescent was made to gleam from the spires of St Sophia at Constantinople (1453), and the war-cry, 'Lâ illâha ill Allâh!' resounded before the gates of Vienna (1529). From that time, however, the splendour and the power of Mohammedanism began to wane. Over two hundred millions, or 15 per cent. of the human race, profess Islam. Three-fourths of these are found from the Adriatic to farthest Malaysia, the rest mostly in North Africa. There are some 68½ millions of Moslems in India alone. Among the African races Mohammedanism has lately made great progress. Yet since it left off conquering it has lost also that energy and elasticity which promises great things. Its future fate will depend chiefly

on the progress of European conquest in the East, and the amount of Western civilisation which it will, for good or evil, import thither.

The strong points of Mohammedanism, its sobriety, its pure theism, its simple and intelligible creed, are heavily counterbalanced by its slavery, its degradation of woman, its stereotyping of laws and science, and its belief in the past rather than in the future. Yet it is strangely suitable for the Eastern mind.

Besides the Koran, the Sunna, and the native (Arabic, Persian, Turkish, &c.) writers on the foregoing subject, see the works of the European scholars D'Herbelot, Sale, De Sacy, Hammer-Purgstall, Burckhardt, Sprenger, Burton, Muir, Garcin de Tassy, Lane, Weil, Geiger, Nöldeke, Kremer, Margoliouth, Caetani, Snouck-Hurgronje; MacDonald, *Aspects of Islam* (1911); Bury, *Pan-Islam* (1919); Ameer Ali, *Mohammedanism* (1922); also the articles on ARABIA, KHALIF, CRUSADES, DEMONOLOGY, KORAN, MECCA, SENUSI, SHITES, SUNNITES, TURKEY, WAHABIS, and the great *Encyclopædia of Islam* (1905 et seq.).

Mohammed, the name of six sultans of Turkey, of whom the most noted is MOHAMMED II., the conqueror of Constantinople; born 1430, succeeded 1451, died 1481. See TURKEY.

Mohammerah (*Muhammrah*), a town of Arabistan, Persia, near the 'Iraq frontier, at the junction of the lower Karun with the Shat-el-Arab. It has about 12,000 inhabitants, and has become of commercial importance since the opening of the navigation of the Karun (q.v.) and the oil trade.

Moharram, or MUHARREM, the first month of the Mohammedan year, kept by the Shiite Mohammedans as a month of fasting and mourning, in commemoration of the sufferings of Hassan and Hussein (Hasan and Hosain), sons of Ali, the adopted son of the Prophet. A celebrated passion-play (Eng. version by Sir Lewis Pelly in 1879) is performed during this month in honour of the two saints at several towns in Persia and India.

Mohave Desert, a basin, with little water or vegetation, chiefly in the SE. of California, and extending into Arizona. The Mohave River rises in the San Bernardino range, and finally disappears in the Mohave Sink.

Mohawks. The Mohock or Mohawk Club, mentioned in the *Spectator* by Steele (No. 324) and Budgell (No. 347), was a scandalous club existing in London in 1711-12. 'The avowed design of their institution was mischief.' Gay mentions, in *Trivia*, that the Mohawks rolled women in hogsheads down Snowhill, and Swift told Stella of a report that eighty of them had been put into prison; while Lady Wentworth, writing to her son Lord Strafford, says, 'I am very much frightened with the fyer, but much more with a gang of devils that call themselves Mohocks.' A royal proclamation was issued against them 18th March 1712.

Mohawks. See IROQUOIS.

Mohic'ans, or MOHEGANS, a warlike sub-tribe of Delaware Indians, which in the 17th century settled in Connecticut, and afterwards helped the English against the French, and the colonists against the English. Of the few survivors, some remain at Norwich, and the rest are in Kansas and at Green Bay, Wisconsin. Their name has become widely known through Cooper's novel, *The Last of the Mohicans*.

Mohileff, or MOGILEFF, a town of White Russia, is situated on the right bank of the Dnieper, 95 miles SW. of Smolensk. It is the seat of a Greek and a Roman Catholic archbishop, their respective cathedrals dating from 1780 and 1692, and has an old castle, and a town-house built

in 1679. Tanning is the principal industry. Pop. 50,000, fully two-thirds being Jews. The town was burned down by Peter the Great for strategical reasons in 1708. Here on 23d July 1812 the French under Davout defeated the Russians under Bagration.

Mohileff, or MOGILEOFF, a town of Podolia, Ukraine, is situated on the left bank of the Dniester, 190 miles NW. of Odessa; pop. 30,000.

Mohl, JULES (1800-76), orientalist, was born at Stuttgart, and educated for the Lutheran Church at Tübingen. But at an early age he was irresistibly attracted to oriental studies, and in 1823 he betook himself to the famous Silvestre de Sacy and Rémusat at Paris. He was nominally professor at Tübingen from 1826 to 1833, but he lived all his life in Paris, becoming a member of the Institute in 1844, and professor of Persian at the Collège de France in 1847. He was long secretary to the Société Asiatique, and his admirably learned and luminous annual reports on the progress of oriental learning were collected by Madame Mohl, under the title *Vingt-sept Ans d'Histoire des Études Orientales* (2 vols. 1879-80). His great edition of the *Shāh Nāmah* was published in six folio volumes, from 1838 till 1868; a posthumous seventh volume, edited by Meynard, completed the gigantic undertaking in 1878.

Mohs, FRIEDRICH, German mineralogist, was born at Gernrode in the Harz Mountains 29th January 1773. He studied at Halle, at Freiburg school of mining, and in Austria. Professor of Mineralogy at Gratz in 1812, he removed to Freiburg as Werner's successor in 1817, and to Vienna as professor of Mineralogy and superintendent of the Imperial Cabinet in 1826. He died near Belluno 29th September 1839. Author of a *Grundriss der Mineralogie* (trans. 1825), he is best known for his scale of hardness, which has been much used for the identification of minerals. The scale is as follows: 1. Talc. 2. Gypsum. 3. Calcite. 4. Fluorspar. 5. Apatite. 6. Orthoclase. 7. Quartz. 8. Topaz. 9. Corundum. 10. Diamond. By hardness is to be understood resistance not to breaking but to scratching. Thus a mineral which will scratch calcite but not fluorspar has a hardness between 3 and 4. The finger-nail will scratch a mineral of hardness 2; a knife anything up to 5 with ease, 6 with difficulty. The hardness of a crystal may be different when tested in different directions on different faces; as a rule not much different, though kyanite ranges from 4 to 7. The method is a rough one, but not to be despised.

Mohun, CHARLES, fourth BARON (c. 1675-1715), dicer, brawler, and duellist, was tried in 1693 by his peers as an accomplice in the murder of the actor William Mountford, as the sequel to an attempt to abduct Mrs Bracegirdle the actress. Acquitted (apparently justly) of this and of another murder charge in 1699, he fought a duel with the Duke of Hamilton in 1712, in which both were killed. This affair is introduced in *Henry Esmond*.

Moidart. See INVERNESS-SHIRE.

Moidore, a former gold coin of Portugal, worth 27s. sterling.

Moir, DAVID MACBETH, a minor Scottish poet and humorist, was born at Musselburgh, 5th January 1798, and practised there as a physician till his death, 6th July 1851. He was much beloved by his friends for his amiability, and he earned a wide popularity, and made his pen-name of *Delta* (Δ) famous in Scotland at least by his verses contributed to *Blackwood's Magazine*. Of these a collection was made by Thomas Aird in 1852. Of more lasting merit is his genuinely humorous and still

popular *Autobiography of Mansie Wauch* (1828). Other books of less value were *Outlines of the Ancient History of Medicine* (1831) and *Poetical Literature of the Past Half-century* (1851).

Moira. See FATES, HASTINGS.

Moire (from the French verb *moirer*, to water silk in a large pattern, as distinguished from *tabiser*, to water or wave it in a small pattern), silks figured by the peculiar process called 'watering.' The silks for this purpose must be broad and of a good substantial make; thin and narrow pieces will not do. They are wetted, and then folded with particular care, to ensure the threads of the fabric lying all in the same direction, and not crossing each other, except as in the usual way of the web and the warp. The folded pieces of silk are then submitted to an enormous pressure, generally in a hydraulic machine. By this pressure the air is slowly expelled, and in escaping draws the moisture into curious waved lines, which leave the permanent marking called watering. The finest watered silks are known as *Moirs antiques*.

Moissac, a town in Tarn-et-Garonne, 111 miles SE. of Bordeaux; pop. 8000.

Moissan, HENRY (1852-1907), born at Paris, and professor of Chemistry from 1889, became very eminent as having isolated and liquefied fluorine, produced artificial diamonds, simplified the manufacture of acetylene, and reduced the refractory metals by the electric furnace. Among his works are one on fluorine and its compounds (1900) and *The Electric Furnace* (trans. 1904).

Mokanna, founder of a sect in Khorasan in the 8th century, was a soldier who, having lost an eye, was called Al-Mokanna, 'the veiled,' because to hide this deformity he constantly wore a veil, a habit attributed by his followers to the necessity of shrouding from the eye of the beholder the dazzling rays which issued from his divine countenance. Mokanna set himself up as an incarnation of God. Among other miracles, he is said to have caused a moon or moons to issue from a deep well. Mokanna found many adherents, and ere long he was able to seize upon several fortified places. But Almahdi marched against him, and after a long siege took his stronghold of Kash (780 A.D.), when, together with the remnant of his army, the veiled one took poison.

Mola di Bari, a seaport of Italy, on the Adriatic, 12 miles by rail SE. of Bari; pop. 16,000.

Mola di Gaeta. See FORMIA.

Molasses. See SUGAR.

Mold, a town of Flintshire, on the Alyn, in a rich mineral district, 11 miles W. by S. of Chester. Its fine 15th-century church is rich in stained glass. The county prison was sold in 1880 to expelled French Jesuits, who renamed it St Germanus' House, in memory of the 'Alleluia Victory' hard by (see GERMANUS). With Flint, &c., Mold till 1918 returned one member. Pop. (1921) 4659.

Moldau (Czech *Vltava*), the chief river of Bohemia, and an important tributary of the Elbe, rises in the Böhmerwald, on the south-west frontier, 3870 feet above sea-level, and flows south-east to Hohenfurt, thence northward to its confluence with the Elbe opposite Melnik. Its course to the point of confluence (278 miles) is longer than that of the Elbe, and the navigation of that river is greatly facilitated by the body of water which it contributes. It receives on the left the Wotawa and the Beraun, and on the right the Luschnitz and the Sazawa. The chief towns on its banks are Budweis and Prague. It becomes navigable from Budweis.

Moldavia, (1) formerly a principality, now the central northern division of Rumania (q.v.).—(2) An 'autonomous republic' (erected in October

1924) in south-west Ukraine, answering to parts of the old governments of Podolia and Kherson. Capital Balta.

Mole (*Talpa*), an Old World genus of Insectivores, with about eight species confined to Europe and Asia, all very like the Common Mole (*Talpa europæa*) which ranges from Great Britain (not including Ireland) to the Altai Mountains and Japan. The family Talpidæ includes the American Scalops, with webbed hind-feet, and the star-nosed Condylura. The aquatic long-tailed Desman (*Myogale*), which used to occur in Britain, is represented by two species, one in the Pyrenees and the other in south-east Russia. The family of Talpidæ goes back to the Upper Eocene, and the *Protalpa* of that remote age was less specialised for burrowing than the *Talpa* of to-day.

Characteristics of the Common Mole.—The plump, somewhat barrel-like body is well suited for burrowing; the pointed snout is effective in boring



Fig. 1.—Common Mole (*Talpa europæa*).

into the soft soil, and is supported by a cartilage ending in a little bone; the obliteration of the external ear-trumpet or pinna reduces friction; the eyes are hidden and protected among the fur. The short velvety fur has no 'set,' that is to say, the hairs rise vertically; it is therefore not inconvenient for the mole to move tail foremost in its burrow. There is no externally marked neck-region, but the neck-muscles are very strong and are used when the head tosses the earth. The old name 'mould-warp' refers to this action.

The pectoral girdle is very strongly developed,

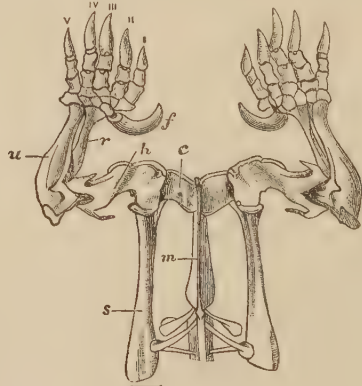


Fig. 2.—Shoulder Girdle and Fore-limbs of the Common Mole:

s, shoulder-blade, or scapula; c, collar-bone, or clavicle; m, manubrium; h, humerus; u, ulna; r, radius; f, falciform or sickle-shaped bone of the wrist; i to v, the digits.

and there is a keel on the breast bone to which are fastened some of the powerful muscles used in burrowing. Very remarkable is the broadening and out-turning of the hand with its long nail-like claws; and in addition to the five digits there is an extra

'sickle-bone' to the inside of the thumb. With this powerful shovel the mole literally swims in the earth, and it can turn through 180° with four strong strokes. It is only from the wrist downwards that the fore-limb projects beyond the general contour of the body. The hind-limbs are built more delicately than the fore-limbs, and they are of more use in progression than in actual burrowing, though they help a little in scratching the earth backwards. The total length of the head and body is about $5\frac{1}{2}$ inches, and to that must be added $1\frac{1}{2}$ inches for the tail. Colour variations are not very uncommon, and include albino-moles without any pigment at all.

The teeth of the mole are 3 incisors, 1 canine, 4 pre-molars, 3 molars, on each side, above and below, making a total of 44, a common old-fashioned formula. More interesting is the long sharp upper canine, which helps in killing, and the presence of numerous mountain-top-like cusps on the crowns of the molars, which are admirably suited for crunching grubs and the like. The food consists chiefly of earthworms and insect-larvæ, and there is unusually rapid digestion. It is necessary for the restless animal to have a meal every few hours. Moles are also thirsty creatures, and there is often a well-marked run to the nearest water.

Moles are more active during the night, but they are sometimes to be seen burrowing near the surface in broad daylight, their back showing as they move along. Being subterranean as well as mainly nocturnal, they have little need of eyes for the ordinary purposes of vision. The eye is a minute black spot, about $\frac{1}{8}$ of an inch in diameter. It was described by Aristotle, who remarked that it had all the parts our eye has, except lids. As these are vestigial, the eye is permanently open. The lens of the mole's eye is imperfectly finished, and if any image is formed, it must be a blurred one. The optic nerve is somewhat degenerate. In all probability the chief use of the mole's eye is to distinguish light and darkness. The senses of touch, hearing, smell, and taste are keenly developed. The brain is of a somewhat primitive type. It will be evident from what has been said that the mole is a bundle of adaptations. It is suited through and through to the conditions of its life.

Habits of the Mole.—The burrowing is often very rapid; a tunnel of a hundred yards may be made in loose soil in a night. There is a twofold meaning in these burrows; they are made in the pursuit of food, and they serve as 'runs' around the nest, sometimes helping escape from enemies (which are not numerous), and sometimes leading to water. When the soil can be pushed to the sides, it is not necessary to form mole-hills, but in many places their formation is obligatory.

What is badly called the mole's 'fortress' is a large mole-hill, which serves for winter-quarters, and includes a comfortable grass-lined nest. There are runs radiating outwards and connected by circular tunnels, but there is no regularity of construction, and often very little intricacy. A fortress larger than usual is made by the female before she brings forth her young.

Pairing takes place above ground in spring, and soon afterwards the female makes the larger nest referred to, living quite by herself. Four or five young ones are brought forth from April onwards. They are naked and blind to start with, but they grow very rapidly, and are able to begin active life in about five weeks. The males are more numerous than the females, and there are fierce, sometimes fatal, encounters between rivals at the breeding season. There is no possibility of ranking the mole among monogamous mammals. But there is probably much to be still discovered in regard to

these matters. A subterranean animal is not a good subject for observation, and the mole's appetite is so exacting that captivity is seldom possible for more than a few days.

The mole is not a hibernator. If the ground is frozen it burrows more deeply than usual. Several observers, such as Ritzema-Bos, have given circumstantial accounts of stores of earthworms found, sometimes a spadeful together, near the mole's winter-quarters; and these may represent a last resource in very severe weather. They would not, of course, satisfy the mole's appetite for more than a short time. Ritzema-Bos noticed that the earthworms in the store he studied were all decapitated; and he interpreted this as a device for preventing them from crawling away. But it is necessary to gather more information in regard to the frequency of these stores and in regard to the general occurrence of decapitation. It may be mentioned that when a mole is beginning to devour an earthworm it bites the tail-end off, and then eats from the head, pressing with its paws on the worm so that the soil in the food-canal is squeezed out posteriorly.

Moles are often out of place, as on golf-courses and gardens. They are sometimes so numerous that they smother the pasture with their mole-hills, which should be scattered. Sometimes they spoil the teeth of the reaping machine or bring down a horse, as when William of Orange broke his collar bone. But they destroy large numbers of injurious insects and rather improve the soil than otherwise. Their fur is of considerable value, and they would not become too numerous if man did not destroy their natural enemies, the stoat and the weasel, the owls and hawks.

There is much that is attractive in this ancient mammal, and the balance, as regards utility or injuriousness, is quite certainly in its favour. Moles are highly specialised, beautifully adapted, extraordinarily active and strenuous, apparently very affectionate, and they should be encouraged within limits by relief from molestation.

The name, abbreviated from *Mouldwarp* or *Mouldwarp*, still provincially used, is derived from O. E. *molde*, 'mould,' and *weorpan*, 'to throw up.' Cf. Ger. *Maulwurf*. See conveniently, J. J. Simpson's *British Mammals*, 1924. For moles on the person, see NÆVUS; for masonry moles, see BREAKWATER.

Mole, MARSUPIAL. See NOTORYCTES.

Molé, MATTHIEU LOUIS, COMTE, statesman, descendant of Matthieu Molé (1584–1656), the mediator between the king of France and the parliament of Paris during the troubles of the Fronde, and son of Édouard Molé, president of the parliament in 1788, was born at Paris, 24th January 1781. His *Essai de Morale et de Politique* vindicated the government of Napoleon on the ground of necessity. The emperor appointed him Master of Requests, and eventually raised him (1813) to the dignity of a count, and to a place in the cabinet. Louis XVIII. made him a peer in 1815, and in the same year he was appointed minister of Marine. After Louis-Philippe ascended the throne he became minister of Foreign Affairs for a few months. In 1836 he succeeded Thiers as prime-minister; his ministry was unpopular, and in 1839 he appealed to the electors, but unsuccessfully. Henceforward he took little part in political affairs, except that after the revolution of 1848 he exerted himself, though in vain, to rally and unite the party of order in the Assembly, to which he had been elected. He died 23d November 1855. See *his Life and Memoirs*, ed. Noailles (trans. 1923 *et seq.*).

Mole-cricket. See CRICKET.

species which inhabits the sand-dunes of the coast.

Moleschott, JAKOB, physiologist, born at Boisle-Duc in Holland, 9th August 1822, studied medicine at Heidelberg, and taught there physiology, anatomy, and anthropology from 1847 until 1854, when he resigned his chair, the senate of the university having 'warned' him on account of the strong materialistic tendency of his writings. In 1853 he established a private laboratory and worked in it until 1856, when he was nominated professor of Physiology at Zürich; in 1861 he moved to the university of Turin, and in 1878 to that of Rome, where he died 20th May 1893. He wrote some twenty works, in German and Italian, on various branches of physiological research, including one on the *Natural History of Man and Animals* (1855).

Moleskin. See FUSTIAN.

Molesworth, MRS (Mary Louisa Stewart; 1839-1921), novelist and popular writer for the young, was born of Scottish parentage at Rotterdam, and her childhood was passed in Manchester and Scotland, and partly in Switzerland. She lived a good deal abroad. She began to write when very young, and her first attempts were published when she was only sixteen. She was most carefully educated under the superintendence of a very cultivated and accomplished mother, and she owed much to the instruction and direction of the Rev. William Gaskell, husband of the novelist. As 'Ennis Graham' she began at twenty-four to publish novels, and a few years later took foremost rank as a writer of children's stories. She also wrote lives of the saints for children, and stories to illustrate the Lord's Prayer.

Molesworth, SIR WILLIAM, the 'liberator and regenerator of Britain's colonial empire,' was born in London, 23d May 1810, of an old Cornish family, the Molesworths of Pencarrow, near Bodmin. He succeeded as eighth baronet in 1823; studied at Cambridge, at Edinburgh, and in Germany; made the tour of Europe; and sat in parliament for East Cornwall 1832-37, for Leeds 1837-41, and for Southwark from 1845 till his death on 22d October 1855, having accepted office in 1853 as First Commissioner of Public Works under the Earl of Aberdeen, and in 1855 as Colonial Secretary under Palmerston. He was the intimate friend of Bentham and James Mill, and was regarded as the parliamentary representative of the 'philosophical Radicals,' whose organ, the *Westminster Review*, he purchased in 1836, and merged with it the *London Review*, started a year before by him and Roebuck. A great admirer of Hobbes, he edited his complete works (16 vols. 1839-45) at a cost of £6000; but he will chiefly be remembered as having drawn attention to the abuses connected with the transportation of criminals, and as having pointed out the maladministration of the colonial office, and expounded the true principles of colonial self-government. Mrs Fawcett published a Life of him in 1901; and Mr E. Egerton edited in 1903 his *Select Speeches on Colonial Policy*.

Molfetta, a seaport and cathedral city of Southern Italy, on the Adriatic, 16 miles by rail N.W. of Bari; pop. 46,000.

Molière (JEAN BAPTISTE POQUELIN, who took this stage-name for reasons not apparent, and every point in whose imperfectly known life has been the subject of elaborate disquisition) was born at Paris, probably in the Rue St Honoré, and early in the year 1622. The house is not certain, and the exact date is unknown, though it appears to have been about the middle of January. His father was Jean Poquelin, his mother Marie Cressé, and the family came from Beauvais, there being no proofs of the Scottish origin which used to be asserted. Poquelin,

the father, was a substantial tradesman and *valet tapissier de chambre du roi*, an office combining the arrangement with the supply of furniture. The son was well educated, though the precise details of his education are very uncertain. He is supposed to have studied under the Jesuits at the Collège de Clermont, under Gassendi the philosopher, and under the regular teachers of law. He may have been called to the bar. His mother, who had some property, died when he was ten years old, and thus when he came of age he received his share of her fortune at once, becoming his own master. He declined to follow up his father's business (though it is said that he had already as his representative attended Louis XIII. on a royal progress as *valet tapissier*), hired a tennis-court, and embarked in theatrical affairs with the Béjart family and others, under the style and title of *L'Illustre Théâtre* (1643-46). This first venture lasted for over three years in Paris and failed. The company then proceeded to the provinces and had a sufficient amount of success to keep it going for twelve years, from 1646 to 1658, and to enable its manager to return triumphantly to the capital at the end of that time.

All the pains which have been spent on Molière's history have failed to elaborate any connected or detailed history of these long *Wanderjahre*. We hear most of the troupe at Lyons and in Languedoc; but its range must have been considerable, since it journeyed as far northwards as Rouen. The Prince de Conti (said to have been Molière's school-fellow) took it under his protection for a time, and Pézenas, near his Languedocian seat of La Grange, is one of the fixed points of Molière's biography. When, Conti having taken to Catholic Methodism, his protection failed, Molière succeeded in obtaining that of the king's brother, Philippe d'Orléans, so that his troupe became the servants of Monsieur. He was now in haste to return to Paris, where he at once received marks of royal favour, played before the king on October 24, 1658, and organised, first in the Petit Bourbon, then, on its demolition, in the Palais Royal, a regular theatre in competition with, if not in opposition to, those of the Hôtel de Bourgogne and the Marais.

During his sojourn in the provinces Molière had acquired considerable experience as a comic writer. Most of his work had been in a style not far removed from that of the old farces, and of this we have only two relics in *La Jalousie du Barbouillé* and *Le Médecin Volant*. But he had also written *L'Étourdi* and the *Dépit Amoureux*, and it is more than probable that some of his still greater work was at least on the stocks before his return to Paris. As a theatre manager he had to give tragedy as well as comedy: he is said to have been mistaken as to his own powers of tragic acting, and he had to depend for his tragedies on others. Corneille's *Nicomède*, with which he opened, was not a success; and though the other great tragedian of the day, Racine, was a personal friend of Molière's, their connection as manager and author was, not at all by Molière's fault, brief and unfortunate. But he did not tarry long before showing the immense resources which he possessed in his own talent as a comic writer. *Les Précieuses Ridicules*, the first essay of 'la bonne comédie,' as a famous story has it, dates, as far as publication is concerned, from November 1659; and from that time to his death on February 17, 1673, no year passed without one, and few years without more than one, of the greatest achievements in their own particular line that the world has seen. Except in one respect, the history of Molière during these fourteen busy years is the history of his work as an author, an actor, and a manager. But

the one exception is the most important incident of his life. In the spring of 1662 (perhaps on St Valentine's day, perhaps earlier or later, for the exact date, like almost everything else in this history, is disputed) Molière married Armande Claire Elisabeth Grésinde Béjart, an actress in his own company, probably about nineteen years old, and the youngest member of the above-mentioned family of Béjart, whereof two other sisters, Madeleine and Geneviève, and one brother, Joseph, had been members of the Illustre Théâtre. On this marriage scandal, both at the time and since, has exhausted itself. It was and still is, in the teeth not indeed of positive evidence, but of something nearly approaching thereto, maintained that Madeleine Béjart and Molière were not only comrades but lovers, that Armande was not Madeleine's sister but her daughter, even that Molière himself (this crowning calumny was, it seems, started by the jealousy of Montfleury, a rival actor and playwright) was the father of his wife. Not content with this imputation, later scandal asserted that Madame, or, as the time called her, Mademoiselle Molière, was unfaithful to her husband, and contemporary satire asserted that he was at any rate very jealous of her. Of this last there is, both from internal and external evidence, too much probability; of the graver charge there is as in the other case no evidence, while such evidence as there is is against it. It may be said before going further that Molière was during his whole life at Paris the butt of vehement animosities, professional and other; that before his death (1670) a sort of play, *Élomire Hypochondre* (Élomire = Molière), appeared, written by a certain Le Boulanger de Chalussay, with intent to take revenge for Molière's jests on doctors, which contains much spiteful tittle-tattle; and that long afterwards, in 1688, a venomous libel on his widow, entitled *La Fameuse Comédienne*, threw some mud at him in order to throw more on her. A kind of Molière-legend also sprang up, composed of stories such as the famous but apparently impossible tale of the *en-cas de nuit* or cold collation which Louis XIV. shared with Molière in order to overcome the prejudice of his aristocratic *valets de chambre*, that of the old woman to whom he is supposed to have read his plays, that (better grounded than the others) of the marquis who, angry at the actor's satire, rubbed Molière's head against the sharp buttons of his own coat in a feigned embrace, and so forth. Such authentic documents as we have show us a man well-to-do, though not above his work, well thought of by good judges, and living well. In August 1665 the king adopted Molière's troupe as his own servants. In 1667 symptoms of lung disease showed themselves in him, but were for the time checked. On the 17th February 1672 Madeleine Béjart, his comrade of thirty years, if nothing more, died. On the same day next year, after the seventh representation of his last play (see below), Molière died in his own house in the Rue de Richelieu of hæmorrhage from the bursting of a blood-vessel, having struggled through, as no imaginary sick man, the title-part. In person he is said to have had a good figure, but not a handsome face. His character would appear to have been extremely generous and amiable, though he seems to have certainly suffered from jealousy, and most probably from hypochondria. Nor is there discoverable in his work, or in anything reported of him, the least excuse for the accusations of irreligion which were brought against him, partly by private malice, partly as retaliation for the terrible attack on religious hypocrisy in *Tartuffe*, and for the misunderstood irony of *Don Juan*. The first-named piece was delayed five years before it could be completely played, and *Don Juan* was stopped and subjected to excisions.

Part of Molière's ill-fame in this respect was no doubt due to his earlier associations with Gassendi and to his fondness for that teacher's favourite classic, Lucretius, whose poem Molière himself is said to have translated as a whole.

The dates and titles of Molière's plays are as follows: *L'Étourdi*, *Le Dépit Amoureux* (1658; in the provinces two years earlier); *Les Précieuses Ridicules* (1659); *Sganarelle* (1660); *Don Garcie de Navarre* (1661); *L'École des Maris*, *Les Fâcheux*, *L'École des Femmes* (1662); *La Critique de l'École des Femmes*, *Impromptu de Versailles* (1663); *Le Mariage Forcé*, *La Princesse d'Élide*, *Tartuffe* (partially, 1664); *Le Festin de Pierre* [*Don Juan*], *L'Amour Médecin* (1665); *Le Misanthrope*, *Le Médecin Malgré Lui*, *Mélicerte*, *Le Sicilien* (1666); *Tartuffe* (fully, but stopped after first night, 1667); *Amphitryon*, *George Dandin*, *L'Avare* (1668); *Tartuffe* (at last fully), *Monsieur de Pourceaugnac* (1669); *Les Amants Magnifiques*, *Le Bourgeois Gentilhomme* (1671); *Les Fourberies de Scapin* (1671); *La Comtesse d'Escarbagnas*, *Les Femmes Savantes* (1672); *Le Malade Imaginaire* (1673). To this must be added part of *Psyché* (1671) in collaboration with Quinault and Corneille, the two farces above referred to (which are almost certainly his), attributed to him on the authority of J. B. Rousseau, a few arrangements of court masques, and some miscellaneous poems, the only important one being a copy of verses on Mignard's fresco-work at the church of Val de Grâce.

For posterity, however, Molière is nothing if not a comic dramatist; and the enormous majority of competent suffrages—a majority increasing as years go on—puts him at the very head of all writers of his own particular class. In France he is called a poet; but, though he could manage verse well enough when he chose to write in it, he is almost always best in prose, and his work possesses few, if any, of the more distinguishing and essential qualities of poetry. It is as a dramatist of manners—who more and more adjusted his art to the direct purpose of satirising and, if possible, reforming folly and vice, and who almost alone of all writers that have done this never sacrificed the art to the purpose—that he is absolutely unrivalled. Romantic or poetical comedy, like that of Shakespeare and Calderon, he hardly ever tried (almost the sole successful play in it being *Don Juan*), and it is not very probable that he would have frequently succeeded in it. The time made it impossible for him to be poetical like Aristophanes in subject, and his own genius did not incline him to be fancifully creative like Aristophanes in form. But in the sphere defined above he has no superior, and is very unlikely ever to have an equal. He gradually confined himself to it more and more closely, and always with the result of improvement. Nothing is more instructive than to compare *Les Précieuses Ridicules*, which is almost his first play, with *Les Femmes Savantes*, which is almost his last. They are so closely connected in subject that the later play has sometimes been called an expanded recast of the earlier. But the improvement in treatment is immense. Amusing as *Les Précieuses Ridicules* is, it is not much more than farce of the very best sort. *Les Femmes Savantes* is comedy of the highest kind, the result of exact observation of life informed by intimate knowledge of character, and clothed with the most accomplished phrase. Molière has sometimes been reproached with a leaning towards farce up to the last—exemplified not merely in such avowedly lighter plays as *Le Bourgeois Gentilhomme*, and the two satires on the provincial gentry, *Monsieur de Pourceaugnac* and *La Comtesse d'Escarbagnas*, but in passages of his more serious pieces. The objection shows a wholly erroneous conception of comedy

itself, and may be said to argue deficiency of humour in one direction. But the merely farcical side predominates, as undoubtedly as naturally in the earlier plays, the serious in the later. It is not till *L'École des Femmes*, perhaps not till *Le Misanthrope*, that the full genius of the author appears; and these two, with *Tartuffe*, *Le Festin de Pierre*, *Les Femmes Savantes*, *Le Malade Imaginaire*, and perhaps the admirable *Bourgeois Gentilhomme* as an example of the lower kind, may be said to be Molière's masterpieces. But from the *Dépit Amoureux* onward no play of his, not even the slightest, is without touches of his admirable wit, his astonishing observation, his supreme power over his own language, his masterly satire. It can hardly be said that any class of men or any prominent trait of mankind is spared by this satire, but undoubtedly three subjects—the vanity and levity of women, the frivolity of the nobles, and the pedantic professionalism of the learned classes, especially of medical men, have the largest share of Molière's lash. He has been accused of taking too low a view of human nature, but this again seems to come from a mistake in appreciating the conditions of his work. He also was and is accused of plagiarism; and it is quite true that in his early pieces especially he avails himself of existing canvas for his own embroidery freely. The best defence of the practice is the boldest: that any man who can embroider like Molière does only too well to requisition canvas where and to what extent he likes. Of another, a subtler, and a less easily refuted observation—that, admirable as his criticism of humanity in general is, his characters tend too much to types, and are lacking in the individuality which Dante and Shakespeare give—we have no room to speak fully. Indeed, much more space than can be here afforded would be insufficient to discuss even most briefly the various aspects of his genius. We must content ourselves with saying that of all French writers he is that one whose reputation stands highest by the combined suffrage of his own countrymen and of foreigners, that at his best he keeps the stage with perfect ease and success after two hundred years, and that he is almost everywhere delightful in the study for his wonderful truth to nature and his not less wonderful expertness in art.

The bibliography of Molière is very voluminous. The first complete edition of his work was edited in 1682 by his comrades, La Grange and Vinot. By far the best, complete as to text, with life, lexicon, bibliography, &c., is that of Despois and Mesnard in the series of 'Les Grands Écrivains Français' (13 vols. 1873-1900). There are excellent editions of the dramatist's works by Anatole France in the 'Collection Lemerre' (7 vols. 1876-91), with notes by G. Monval in the 'Bibliothèque des Bibliophiles' (8 vols. 1882). There are translations by Van Laun (1875-77) and Heron Wall (1876-77). From 1870 to 1889 there existed a special periodical called the *Moliériste*. M. Loiseau's *Points Obscurs de la Vie de Molière* caused discussion; an excellent collection of studies will be found in M. Larroumet's *La Comédie de Molière*. The Life prefixed to the above-named 'Grands Écrivains' edition may be regarded as a complete digest of the whole subject. Other Lives are those of Taschereau (4th ed. 1851), Claretie (1873), Mahrenholtz (Heilbronn, 1881), Moland (1886), Desfeuilles (Paris, 1900), Schneegans (Berlin, 1901), Hatton (1905), H. M. Trollope (exhaustive but not popularly written, 1906), Chatfield Taylor (1907), Brander Matthews (1911); and the volume on 'Molière and his Times' (1906) in Mantzius's *History of Dramatic Art*.

Molina, JUAN IGNACIO (1740-1829) Jesuit missionary and botanist, born at Talca in Chile, died at Bologna. He wrote a natural history of Chile and discovered many plants. A genus of grasses, *Molinia* (with one British species *M. caerulea*), is named after him.

Molina, LUIS, a celebrated Spanish Jesuit theologian, was born at Cuenca, in New Castile, in the year 1535, and, having entered the Jesuit Society in his eighteenth year, studied at Coimbra, and was appointed professor of Theology at Evora, where he continued to teach for twenty years. He died at Madrid, 12th October 1600. Molina's celebrity is mainly confined to the theological schools. His principal writings are a commentary on the *Summa* of St Thomas Aquinas (1593); a minute and comprehensive treatise, *De Justitia et Jure* (1592); and the celebrated treatise on the reconciliation of grace and free-will (*Liberi Arbitrii cum Gratiae Donis . . . Concordia*), which was printed at Lisbon in 1588, with an appendix, printed in the following year. The problem which the latter work is meant to resolve is almost as old as the origin of human thought itself, and had already led, in the 4th century, to the well-known Pelagian controversy (see PELAGIUS). In reconciling with the freedom of man's will the predestination of the elect to happiness, and of the reprobate to punishment, Molina asserts that the predestination is consequent on God's foreknowledge of the free determination of man's will, and, therefore, that it in no way affects the freedom of the particular actions, in requital of which man is predestined whether to punishment or to reward. God, in Molina's view, gives to all men sufficient grace whereby to live virtuously, and merit happiness. Certain individuals freely co-operate with this grace; certain others resist it. God foresees both courses, and this foreknowledge is the foundation of one or the other decree. This exposition was at once assailed in the schools on two grounds—first as a revival of the Pelagian heresy, inasmuch as it appears to place the efficacy of grace in the consent of man's will; second, as setting aside altogether what the Scriptures represent as the special election of the predestined. Hence arose the celebrated dispute between the Molinists and the Thomists—both of whom, however, maintained that, in all circumstances, the will remains free, although they may fail to explain how this freedom is secured under the action of efficacious grace. It was first brought under the cognisance of the Inquisitor-general of Spain, by whom it was referred to Pope Clement VIII. This pontiff, in 1598, appointed the celebrated congregation *De Auxiliis* to consider the entire question; but, notwithstanding many lengthened discussions, no decision was arrived at during the lifetime of Clement; and although the congregation was continued under Paul V., the only result was a decree in 1607, permitting both opinions to be taught by their respective advocates, and prohibiting each party from accusing the adversaries of heresy. The dispute, in some of its leading features, was revived in the Jansenist controversy (see JANSEN). Molinism has been commonly taught in the Jesuit schools. See AQUINAS, SUAREZ.

Molina, TIRSO DE. See TELLEZ.

Moline, a city of Illinois, on the Mississippi, 179 miles by rail W. by S. of Chicago, and separated from Rock Island only by a swift and narrow channel affording great water-power, which is utilised by means of a dam. There are many busy mills and factories. Pop. 31,000.

Molinos, MIGUEL DE, was born of noble parentage at Patacina, near Saragossa, 21st December 1640. He received holy orders and was educated at Pampeluna, and afterwards at Coimbra. At Rome he soon acquired a high reputation as a director of conscience and a master of the spiritual life. An ascetical treatise which he published, under the title of *Guida Spirituale*, added largely to the popularity which he had acquired in his

personal relations; but there were not wanting many who, in the specious but visionary principles of this work, discovered the seeds of a dangerous and seductive error. Among these the celebrated Jesuit preacher Segneri was the first who ventured publicly to call them into question. By degrees reports unfavourable to the practical results of this teaching, and even to the personal conduct and character of Molinos, or of his followers, began to find circulation; and eventually, in the year 1685, he was cited before the Holy Office, and submitted to close imprisonment and examination. In addition to the opinions contained in his book, a prodigious mass of papers and letters, to the number, it is said, of 20,000, found in his house, were produced against him, and he was himself rigorously examined as to his opinions. The result of the trial was a solemn condemnation of sixty-eight propositions, partly extracted or inferred from his *Spiritual Guide*, partly, it would appear, drawn from his papers or his personal professions. These doctrines Molinos was required publicly to abjure, and he was himself sentenced to close imprisonment, in which he was detained until his death, 28th December 1697. The opinions imputed to Molinos may be described as an exaggeration of the principles of Quietism (q.v.)—the utter indifference of the soul, in a state of perfect contemplation, to all external things. See John Bigelow's *Molinos the Quietist* (New York, 1882); J. H. Shorthouse, *Golden Thoughts from the Spiritual Guide* (1884).

Molise. See CAMPOBASSO.

Mollendo, a port of Peru, lying SW. from Lake Titicaca. It has railway connection with Cuzco and with Lake Titicaca and La Paz (by a line passing Arequipa and crossing the Andes at a height of 14,660 feet), and enjoys considerable trade. Pop. 10,000.

Mollusca, a large division (or phylum) of Invertebrate animals, including three chief classes: (1) Lamellibranchs, Pelecypods or bivalves; (2) Gasteropods, snails and slugs of many kinds; and (3) Cephalopods, cuttle-fishes and the Pearly Nautilus. Another class (Scaphopods) seems to be required for the cylindrical Elephant's Tooth Shells (Dentalium); and there are a few primitive types—e.g. Neomenia and Chetoderma—which are regarded by many zoologists as forming a fifth class (Solenogastres). Of the three chief classes constituting the phylum Mollusca, the bivalves are divergent from the others in having an undeveloped head-region and no rasping-ribbon or radula in the mouth.

There is great diversity in the form of the body in molluscs; but there is this in common, that segmentation is conspicuous by its absence. Segments are suggested by the eight shell-plates of Chitons, but this is a quite superficial feature. The symmetry of the body is bilateral in Lamellibranchs and Cephalopods, but in most Gasteropods the body is unsymmetrical or lop-sided. The primitive Chitons and Solenogastres are bilateral, and a secondary bilaterality appears in the free-swimming pelagic Gasteropods known as Pteropods or sea-butterflies. Another general feature which marks off molluscs from Arthropods is the absence of anything in the nature of limbs. Very characteristic is the so-called 'foot,' a muscular development of the ventral surface. Its primitive form was probably a flat, creeping sole, as in Chiton. This condition persists in many Gasteropods, and in some simple Lamellibranchs like Solenomya. But in most Lamellibranchs it becomes wedge-shaped or ploughshare-like (to which the term Pelecypod, 'hatchet-footed,' refers), and in Cephalopods it seems to form the 'arms' around

the mouth and a siphon or funnel through which water is expelled. Another distinctively molluscan feature is the mantle, a single or double fold of skin, arising from the dorsal surface, which encloses a space (the mantle cavity) in which gills usually lie. Typically the mantle secretes the shell, but both mantle and shell may be absent. In most Lamellibranchs the mantle is drawn out posteriorly to form a double tube or siphon through which water enters and leaves the body. The water-current brings in food-particles, and some bivalves use their siphon in actively searching for nutriment. In many Gasteropods there is a single respiratory siphon. In the land-snails the mantle cavity has become a pulmonary chamber for breathing dry air. In Cephalopods the mantle is strong and muscular, and helps in locomotion. While there are active molluscs like the squids, molluscs are, on the average, relatively sluggish, and with this is to be associated the abundance of unstriated muscle. The more rapidly contracting muscles have cross-striated fibres as usual, or fibres with unstriated fibrils twisted in a spiral. As to diet, the Cephalopods are voracious carnivores, as their prehensile suckers, parrot-beak jaws, and powerful radula suggest; the Gasteropods include thorough-going carnivores able to bore through hard shells, and thorough-going vegetarians, some with a wide and others with a very specialised appetite; the Lamellibranchs subsist on minute organisms and particles of detritus.

On the dorsal surface of the molluscan larva there is usually a small sac in which a transient primary shell is formed. The permanent shell is a cuticular product of the mantle. It consists of an organic basis of conchlin (or conchiolin) and of carbonate of lime associated therewith. The outermost layer of the shell (periostracum) is typically of pure conchlin; the next layer (prismatic) has the lime disposed in prisms; the innermost layer (nacreous or mother-of-pearl) has the lime in fine lamellæ, and often shows iridescence. The parallel lines on shells indicate periods of growth. There are three main types of shell: the bivalve shell of Pelecypods; the typically spiral, unsymmetrical, and unchambered shell of most Gasteropods; and the chambered shell of Nautiloids and Ammonoids coiled in one plane. There are numerous peculiar types, such as the eight plates of Chitons, the

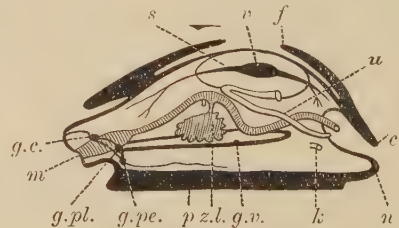


Fig. 1.—Section of Schematic Mollusc (from Lankester). m, mouth; g.c. cerebral, g.pl. pleural, g.pe. pedal, g.v. visceral ganglia; p, foot; a.l. left lobe of digestive gland; k, genital opening; n, posterior end of the foot; c, edge of the mantle; u, kidney; f, edge of primary shell-sac; v, ventricle of the heart; s, pericardial cavity.

tube of Dentalium, the cone of limpets, the strange secondary tube of Aspergillum (q.v.), and so on. A reduction or absence of shell is seen in land-slugs, some Pteropods and Heteropods of the open sea, all the Nudibranchs of the shore, and in all the living Cephalopods except the Pearly Nautilus. Arion (the Black Slug), Clio (a Pteropod), Pterotrachea (a Heteropod), and Octopus (a Cephalopod), may be mentioned as types with no shell in the adults.

Among the more technical general characters

the following are the most important. The nervous system consists of three chief pairs of ganglia—cerebrals, pedals, and pleurals—with connecting circum-oesophageal commissures, and there is also a visceral system consisting typically of (a) a loop connecting the two pleurals and provided with two visceral ganglia, and (b) a stomatogastric loop passing from the cerebrals beneath the gullet and provided with two buccal ganglia. A portion of the true body-cavity or coelom usually persists, at least as a pericardial chamber around the heart, and communicates with the exterior through a nephridium or two nephridia. The rest of the cavity of the body is hæmocœlic, corresponding to enlarged blood-channels. The heart typically consists of a ventricle and two auricles, and there are usually well-developed blood-vessels; part of the circulation, however, is in most cases lacunar, i.e. in ill-defined channels. Respiratory organs are typically represented by gills or ctenidia situated in the mantle cavity, consisting of an axis attached to the body and bearing lamellæ. But the gills may have simpler forms, or may be absent altogether, in which case the mantle takes on respiratory functions, as in the fringed margin of the limpet or the 'lung' of terrestrial snails and slugs. In the higher Lamellibranchs the gills form two great basketwork-like ciliated plates on each side of the body between the foot and the mantle, and are of great importance in wafting food-particles to the mouth. In those marine Gasteropods in which the typical gills have been suppressed there may be 'adaptive gills' in the form of branching processes of the body wall, as in many Nudi-branchs. At the base of the gills there is generally a paired or unpaired olfactory organ, called the osphradium. The sexes are always separate in Cephalopods, usually separate in Lamellibranchs, but a large number of Gasteropods are hermaphrodite, e.g. all the terrestrial snails and slugs.

There are two common larval stages among molluscs—the trochophore and the veliger. The trochophore or trochophore is a minute, free-swimming, pear-shaped or barrel-shaped, larva, with a curved gut and a ring of cilia in front of the mouth. Great interest attaches to its occurrence in molluscs, for it is also the characteristic larva of Annelid worms. Different as is the adult structure in these two groups, there is a very striking resemblance in the early stages of development. A trochophore larva is exhibited by many Gasteropods and Lamellibranchs, and also by Dentalium. It is probably representative of an ancestral type common to Annelids and Molluscs. The trochophore larva, among Gasteropods,



Fig. 2.—Earlier (A) and later (B) 'Veliger' of a Gasteropod (after Gegenbaur).
a, velum; b, foot; c, visceral dome.

Lamellibranchs, and Scaphopods, usually changes into the second larval stage or veliger, marked by an effective locomotor structure, the ciliated velum, which is often produced into mobile lobes, by the beginnings of foot and mantle, and by a minute shell-gland on the dorsal surface. In short, there is an anticipation of the varied adult conditions, and the characters are definitely molluscan, not ancestral. In cuttle-fishes there is neither trochophore nor veliger, and the development is direct

and condensed, a fact associated with the large store of nourishment in the egg. An analogous suppression of larval stages is seen in the terrestrial snails. The fresh-water mussels (Unionidæ) have a peculiar kind of larva (glochidium), which is without mouth, velum, and foot, but has a bivalve shell with marginal teeth on each valve. It is liberated from the parent when a fresh-water fish (sometimes one particular species) is in the vicinity. To this the larva may manage to attach itself, and if it is successful it undergoes a metamorphosis on its temporary host, and falls off after attaining the adult form.

Lamellibranchs are represented by a few rarities in the Lower Cambrian; they are still rare in the Ordovician; they are greatly increased in the Silurian; and thence onwards there is abundant fossil representation. Elephant's Tooth Shells (Scaphopods) begin with a few forms in the Ordovician, increase slowly until the Cretaceous, and after that rapidly. The Chitons, which are primitive Gasteropods, make their appearance in the Ordovician, are rare in the Silurian and Devonian, more abundant in the Carboniferous, and go on increasing. Gasteropods have gone on increasing in number from the Cambrian until to-day. Of the Tetrabranchiate Cephalopods the Nautiloids began in the Ordovician, and have only one living representative, the Pearly Nautilus; the Ammonoids began in the early Devonian, reached their climax in the Trias, and did not survive the close of the Cretaceous. The Dibranchiate Belemnoids appeared in the Trias, culminated in the Lias and Cretaceous, and then waned rapidly (Spirula is regarded by some as a living representative); the Sepioids began in the Lias, the Octopods in the Late Tertiary.

For anatomy, see Pelseneer in Lankester's *Treatise on Zoology*; for natural history, see Cooke in *Cambridge Natural History* (vol. iii. 1895); for classification, see Woodward's *Manual of the Mollusca* (1875); for palæontology, see Eastman's edition of Zittel's *Textbook of Palæontology* (vol. i. 1900); for development, see MacBride, *Textbook of Embryology* (vol. i. 1914).

Mollwitz, a village of Lower Silesia, 7 miles W. of Brieg. An obelisk (1878) marks the battlefield where 20,000 Prussians (though Frederick himself fled) defeated an equal number of Austrians under Marshal Neipperg, 10th April 1741. The Austrians lost 5340 men, the Prussians 5500.

Molly. See FULMAR.

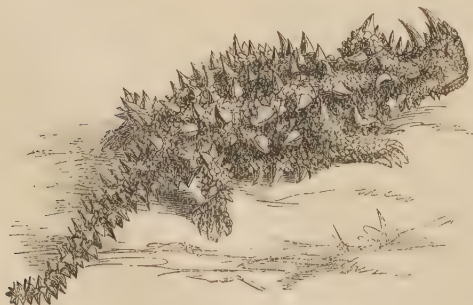
Molly Maguires, an Irish secret society which during the ten years preceding 1877 terrorised the coal regions of Pennsylvania. The name was imported from Ireland, where it had been adopted by a branch of the Ribbonmen whose outrages by night were perpetrated in female disguise (cf. Trench's *Realities of Irish Life*, p. 82). The object of the organisation in Pennsylvania appears to have been to secure for its members, as far as possible, the exclusive political power in the eastern part of the state. Murders were committed in the open day, though much more usually by night; and the terror of the society was on all the coal country until, in 1876-77, a number of the leaders were convicted and executed on the evidence of a detective who joined the society.

Molmenti, POMPEO GHERARDO, born in Venice in 1852, became a lawyer and then professor of Literature in his native city, and has written important works on Goldoni and Fogazzaro, on Giorgione and Carpaccio, as well as on the history of Venice.

Moloch, or more properly MOLECH, is mentioned in 1 Kings, xi. 7, as the 'abomination of the children of Ammon,' and occurs frequently elsewhere in the Old Testament as the name or title of a divinity occasionally worshipped in the kingdom of Judah

with cruel rites. The Hebrew form of the word is invariably *Molech*, almost always with the article ('the Molech'); *Moloch* in the Authorised Version has come through the Septuagint and Vulgate. The word means 'king,' and is the same (*melech*) as appears in the title Melkarth (Malk-kart, Melicertes) applied to the Tyrian Baal, and in a large number of compound divine names in Semitic inscriptions; the change from *Melech* to *Moloch* is due to the later Jews, who gave the word in this connection the vowel-points of *Bosheth* ('shameful thing'; cf. Ishbaal, Ish-bosheth). Of *Moloch* as a deity of the Ammonites nothing special is recorded, and it is not improbable that in 1 Kings, xi. 7, the only place where he is spoken of as such, the kindred word *Milcom* or *Malcam* ought to be read (see the LXX. and compare 1 Kings, xi. 5, 33; 2 Kings, xxiii. 13; Jer. xlix. 1, 3; Zeph. i. 5). In any case the worship of the Ammonite deity in the days of Solomon was essentially distinct from the *Moloch* worship which at a later date came to be practised in Judah, especially in times of great calamity. The first recorded instance of a worshipper of Jehovah 'making his son to pass through the fire to *Moloch*' is that of Ahaz (2 Kings, xvi. 3). The same story is told of Manasseh (2 Kings, xxi. 6), and that the practice had become a common one in the course of the 7th century is shown by frequent allusions in Jeremiah, Ezekiel, and the Book of Leviticus. The victims were slain at the sanctuary (Jer. xix. 4), and afterwards burned as holocausts on a 'tophet' or pyre in the valley of Hinnom (Ge-Hinnom, Gehenna) near Jerusalem (2 Kings, xxiii. 10; Jer. vii. 31, 32; xix. 6, 13, 14); the often quoted description by Rabbinical writers of a calf-headed brazen image of *Moloch*, in which the children were burned alive, is mere invention. On the general question of the origin of human sacrifice, see SACRIFICE. It is probable that the ritual of *Moloch* worship was borrowed by the people of Judah from one or other of the surrounding nations; it was practised, we know, by the Moabites (2 Kings, iii. 27). At Jerusalem it has been held that it was intended to propitiate Jehovah, regarded as the national '*Moloch*' or '*Baal*' or '*King*,' though the prophets speaking in Jehovah's name constantly denounced it as unsanctioned by him (see Jer. vii. 31; xix. 5). See J. G. Frazer, *Adonis, Attis, Osiris* (1914, pp. 219 seq.).

Moloch (*Moloch horridus*), an exceedingly spiny Australian lizard, blotched with orange, red, and black, and covered all over with horny warts and



Moloch horridus.

sharp spines, which give it a grotesque appearance, concealing, however, an inoffensive character. It is sluggish in its movements, attains a length of 10 inches, and is found chiefly in central and West Australia.

Molokai (the Lepers' Island) is situated in the middle of the Hawaiian group to the S.E. of Oahu; area, 261 sq. miles. Between the harbour of Kalaupapa and the *pali* (2000 to 3000 feet) lie fertile pasture lands and the settlements into which the leper colony is divided. Here it was that Father Damien (q.v.) laboured.

Molossians, the most important people of ancient Epirus (q.v.).

Moltke, HELMUTH, COUNT VON, field-marshal of the German empire, who as chief of the general staff at Berlin planned the Prussian campaign of 1866 against Austria, and the German campaign of 1870-71 against France. He was born 26th October 1800, at Parchim in Mecklenburg-Schwerin, his father being a general in the Danish army, of a good old family and considerable wealth. In 1812 he was, with his only brother, sent to the military academy at Copenhagen, where he remained under the strictest discipline for six years, and distinguished himself in the scientific branches of military study. In 1819 he became lieutenant in a Danish regiment, and in 1822 entered the Prussian service. His parents having by this time lost the whole of their property from war and misfortune, he had to undergo many hardships in order to maintain himself on the slender pay of a Prussian officer, and at the same time obtain instruction in various foreign languages. In 1832 Moltke was appointed to the staff, and for three years he continued to develop by scientific and exact study his extraordinary powers of combination and organisation. He then obtained leave to travel, and, arriving in Turkey at a critical moment, he was entrusted by the sultan with the task of remodeling the Turkish army, and remained with Mahmoud II. as military adviser till October 1839, when he returned to his old position at Berlin. From 1858 to 1888 he was chief of the general staff in Berlin, and he at once commenced the reorganisation of the Prussian army. He also elaborated plans for the defence of the German coasts, and the creation of a German navy. His wonderful strategical power was displayed in the wars with Denmark in 1863-64, with Austria in 1866, and with France in 1870-71, bringing them all to triumphant issues. He married in 1845 the daughter of an English gentleman residing in Holstein, but had no family. Known as 'The Silent,' he was a man of great modesty and simplicity of character. His ninetieth birthday was the occasion of numerous honours. He died 23d April 1891.

He wrote a series of letters from Turkey, and an account of the Russian campaign in Turkey in 1839 was published in 1841. His *Letters from Russia*, written in 1856 to his wife, were published in 1877 (Eng. trans. 1878). Histories of the Italian campaign of 1859, the Danish-German war, the Austro-Prussian war, and of the Franco-German war were prepared by the general staff under his direction. In 1891-93 an edition of his works in six vols. was published, containing biography, a novel, a short history of the Franco-German war (Eng. trans. 1892), letters to his mother and brothers (Eng. trans. 1892), speeches and reminiscences. See also *Lives* by Wilhelm Müller (Eng. trans. 1879), F. von Köppen (1888), Müller-Bohn (1889), and Mary Herms (Eng. trans. 1892).—Moltke's nephew, HELMUTH (1848-1916), likewise rose to be Chief of the General Staff in 1906, but was superseded by Falkenhayn early in the Great War (December 1914). See *Erinnerungen: Briefe: Dokumente* (1923).

Molucca Beans. See GUILANDINA.

Moluccas (also called SPICE ISLANDS), the easternmost division of the Malay Archipelago, comprising most of the islands between Celebes and New Guinea west and east, and between Timor and the Philippines south and north. Originally the term *Molucos* was applied by the Portuguese

only to the small islands (Ternate, Tidor, &c.) west of Jilolo, which are now known as the *Little Moluccas*; but it was gradually extended to Jilolo itself, to Buru, Ceram, and all the spice-growing islands of the eastern seas, which, with part of New Guinea, now form politically the Dutch residency of *Amboyna*. Physically they fall into the two groups of the *Northern Moluccas*, disposed in the direction from north to south, and the *Southern Moluccas*, running mainly west and east. The northern group, which is surrounded on all sides by deep waters, ranging from 500 to 2000 fathoms, lies between the Molucca and Jilolo passages west and east, and comprises Morotai (Morty) and Rau (Riao) in the north, Jilolo, Ternate, Tidor, and other islands in the centre, Batchian (Batjan), Tawali, Mandioli, and Great and Little Obi (Oby) in the south, with a total area of nearly 10,000 sq. m., of which Jilolo has 7000, Morotai 1100, and Batchian 850.

The Southern Moluccas are connected by a submarine bed of less than 100 fathoms westwards with Sula and Celebes, but are separated from the northern group by an abyss of over 1500 fathoms, and are washed on the south side by the Banda Sea, which has a depth of 3000, and at one point (near the Banda volcano) of over 4000 fathoms. They comprise the two large islands of Buru (8500 sq. m.) and Ceram (7000), the small Amboyna, Uliasser, Banda, and Ceram Laut sub-groups, the outlying Ké (Kei) and Aru clusters, with some other islands scattered over the neighbouring waters. The people are chiefly Orang-Malayu, or civilised Malays, in the Little Moluccas, Banda, and Amboyna, elsewhere the so-called 'Alfuros'—i.e. uncivilised or non-Mohammedan natives, some Indonesians, some true Malays, some mixed Malayo-Papuans (see MALAYS).

The Moluccas lie partly on the line of the great volcanic fault, which sweeps round in a vast curve from Sumatra to the Philippines and Japan, and in the Moluccas is indicated by the still active Gunong-Api (1870 feet) in Banda, Tidor (5730), Ternate (5650), Motir (2800), by three cones in Jilolo, Tolo in Morotai. Api was the scene of a terrific eruption accompanied by earthquakes in 1825; Ternate is one of the most restless volcanoes in Malaysia; and several other cones appear to be of relatively recent date. A former union with Celebes and the Philippines best explains the many features common to their natural history. The trachitic Morotai was certainly at one time connected with Jilolo, and were the connection restored the resemblance would be complete between the curiously shaped islands of Celebes and Jilolo, which have been compared to a mutilated starfish. Jilolo, also called Halmahera, or the 'Great Land,' largely consists, like Ceram and Buru, of crystalline or metamorphic and very old sedimentary (coralline limestone) rocks, whereas Ternate, Tidor, Banda, and the smaller members of the group are partly of igneous, partly of coralline origin.

Despite their tropical position, being nearly bisected by the equator, the Moluccas enjoy a relatively healthy climate, and in some places the European race (Portuguese and Dutch) has even been acclimatised. The excessive heats are everywhere tempered by sea-breezes and by the mountainous character of the islands, which in Buru and Ceram rise to heights of 8000 and even 10,000 feet. In the Southern Moluccas the north-east trades prevail from May to October, and are accompanied by heavy rains and thunderstorms. They are followed by the west monsoon, which has already discharged most of its moisture before reaching this region. In the north the regular winds become intermingled, with the result that the seasons are here extremely variable, fine and wet weather alter-

nating throughout the year. But the temperature oscillates everywhere within very narrow ranges, seldom rising above 85° or falling below 75° F. on the coast-lands. Rainfall, 150 inches at Amboyna.

Indigenous to most parts of this region are the clove, nutmeg, and other species, although these plants are now cultivated only in Amboyna and the Banda group; elsewhere they were extirpated by the Dutch government with the view of increasing the value of the Banda plantations, and preserving the monopoly of the spice trade. Other valuable plants are the sago-palm, which supplies the staple food of the Moluccas; the pandanus, remarkable for its aerial roots, the canary nut, dammar pine, and Cajeput (q.v.).

In its fauna the Molucca group is connected with Celebes by the Babiroussa (q.v.) found in Buru, and with New Guinea by the birds of paradise (Batchian), the marsupial cuscus and flying opossum occurring in several islands. Here are also found the cassowary, the Australasian megapodius, or mound bird, the crimson lory, the racket-tailed kingfisher, and numerous species of parrots and pigeons of gorgeous plumage. Insects, such as the long-armed beetle of Amboyna and several butterflies, here attain their largest size and display their brightest colours. The shallow waters, especially of the southern group, are also noted for the vivid hues of the anemones, sponges, shells, and corals covering the bed of the sea, and for the immense number of their fishes.

Notwithstanding their small size, Ternate and Tidor have always been the chief centres of political power in the northern, and Amboyna in the southern Moluccas. These islands have long been occupied by civilised Malays, who easily asserted their supremacy over the surrounding lands, which are inhabited chiefly by rude wild tribes at a low stage of culture. Formerly the Mohammedan sultans of Tidor and Ternate were amongst the most powerful rulers in Malaysia, their dominions stretching westwards to Celebes and eastwards to New Guinea, and comprising all the intermediate islands. It was as heirs to these potentates that the Dutch claimed all the western part of New Guinea, as far as the 141st meridian. In Ternate is still centred most of the trade of the northern Moluccas, which export spices, tortoiseshell, trepang, beeswax, bark, and birds of paradise in considerable quantities. The town of Amboyna (pop. 11,000), capital of all the Dutch possessions in the Moluccas, carries on a flourishing export trade in cloves. Banda is the true home of the nutmeg, which here grows naturally, and arrives at the greatest perfection on the slopes of all the volcanic islands, which are disposed round an inner basin like the fragments of some disrupted crater. Neira or Banda, called also Nassau, occupies the southern extremity of Neira Island on the north side of the basin over against Gunong-Api. Besides the nutmeg and mace, Banda yields sago and coconuts for the export trade, long monopolised by the so-called 'Perkeniers,' descendants of Europeans settled in this group since the beginning of the 17th century, and now perfectly acclimatised. Pop. of Amboyna residency (1920) 622,671; area 182,000 sq. m.

Molybdenum (sym. Mo; atomic number 42, atomic weight, 96; sp. gr. 8.62) is a rare metal, which, in a state of purity, is of a silvery white colour, has a strongly metallic lustre, is brittle, and very difficult of fusion. It never occurs native, and its principal ore is the bisulphide, which much resembles graphite. It is also occasionally found oxidised, in molybdate of lead. The metal may be obtained by roasting the bisulphide in a free current of air, when the sulphur goes off oxidised as sulphurous acid, and the molybdenum is also oxidised into molybdic anhydride (MoO_3), and remains

in the vessel. By the action of charcoal, the reduced metal is then obtained from the anhydride. Molybdenum forms a number of compounds with oxygen. Molybdic anhydride is a white, glistening, crystalline powder, which is sparingly soluble in water, fuses at a red heat to a straw-coloured glass, and unites with bases to form well-marked salts, the molybdates, which are either colourless or yellow. A solution of molybdate of ammonia is one of the most delicate tests for phosphoric acid. Molybdenum forms various compounds with sulphur and chlorine. Molybdenum is used in preparation of steels, also to make a blue pigment for porcelain.

Mombasa, or **MOMBAZ**, the chief seaport and the largest town of the Kenya Protectorate (British East Africa), is situated on a coral island 3 miles long by $2\frac{1}{2}$ broad close to the coast, in $4^{\circ} 4'$ S. lat., about 150 miles N. of Zanzibar. The shores of the island are rocky and abrupt, and the greater part of its surface is covered with dense bush. The only object of historical interest is an extensive fort, built in 1594 by the Portuguese, and restored by them in 1635. Mombasa was visited by Vasco da Gama in 1497; it was then a large and prosperous town (as it was when Ibn-Batûta was there in 1331), with a colony of Christians of St Thomas and Banyans from India. It was held by the Portuguese during the greater part of the period from 1505 to 1698, though not without frequent captures. The native chief put it under British protection in 1823; but, Britain soon abandoning it, it was seized by the sultan of Zanzibar, who in 1888 ceded it provisionally to the Imperial British East Africa Company. They were made definitive masters of the place two years later. See **KENYA**. The chief harbour is one of the largest, safest, and healthiest on the east coast of Africa. See also **KILINDINI**. Mombasa is the terminus of the so-called Uganda railway (opened in 1902). The chief exports are ivory, copra, grain, rubber, and hides. Pop. about 30,000, mostly Africans, with some Arabs and Banyans.

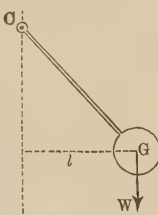
Moment of a dynamical quantity is the importance of that quantity in regard to its dynamical effect relatively to a given point or axis. The most familiar example is the Moment of a Force. For simplicity, take a body movable about a fixed axis—say, a door on its hinges. Everyday experience teaches us that such a door is most easily moved by a push or pull applied as far as possible from the hinge. In moving the door slowly through a certain angle, we must do so much work in, first, causing the necessary acceleration, and then in overcoming the friction of the hinges. If we apply the force at a greater distance from the hinge, it works through a proportionally greater arc, and is therefore proportionately less. Such considerations lead to the definition of the moment of a force about a point as the product of its amount into its perpendicular distance from the point. The tendency of the action of such a force is to cause rotation about an axis perpendicular to the plane passing through the point and containing the force. Thus, in the case of a pendulum, the effectiveness of the force in causing rotation is measured by the moment Wl —where W is the weight of the pendulum, and l is the distance of the line of action of the force W from the centre of rotation C , or (what comes to the same thing) the distance of the centre of mass G from the vertical line through C .

The term moment enters into several other

phrases, all of which relate either directly or indirectly to rotation. Thus, there is the moment of momentum, or angular momentum, whose rate of change is the measure of the moment of the force producing the change. To obtain it for any given body rotating with angular speed ω about an axis, we first imagine the body broken up into a great many small portions of masses m_1, m_2, m_3 , &c. at distances r_1, r_2, r_3 , &c. from the axis, multiply the momentum (mrv) of each mass by its distance, and then take the sum of all these products. The angular speed ω being the same in every expression, the moment of momentum takes the form $\omega (m_1 r_1^2 + m_2 r_2^2 + \text{&c.})$, which it is usual to write in the symbolic form $\omega \Sigma mr^2$. The quantity Σmr^2 , which is the sum of the products of each mass into the square of its distance from the axis, is called the Moment of Inertia about that axis. It is the factor in the moment of momentum, which depends upon the distribution of matter in the body. It enters into all questions of mechanics in which rotation is involved, from the spinning of a top or the action of an engine governor to the stability of a ship. By an obvious extension, the word moment is also used in such combinations as moment of a velocity and moment of an acceleration. Such phrases correspond to nothing truly dynamic, unless we regard velocity as meaning the momentum of unit mass, and acceleration as the rate of change of that momentum. See **DYNAMICS**, **FORCE**, **INERTIA**, **ROTATION**, &c.

MOMENTUM is our modern equivalent of Newton's quantity of motion (*quantitas motus*), which in Definition II. of the *Principia* is stated to be measured by the product of the velocity and the mass. Its dynamic importance is sufficiently discussed under **FORCE**.

MommSEN, **THEODOR**, the most learned historian of Rome, was born the son of a pastor at Garding, in Sleswick, 30th November 1817. He studied at Kiel, next spent three years traversing France and Italy in the study of Roman inscriptions under commission of the Berlin Academy, edited awhile the *Schleswig-Holsteinische Zeitung*, and in the autumn of 1848 was appointed to a chair of Jurisprudence at Leipzig, of which two years later he was deprived for the part he took in politics. In 1852 he was appointed to the chair of Roman Law at Zurich, in 1854 at Breslau, and in 1858 to that of Ancient History at Berlin. Here he was engaged for many years in editing the monumental *Corpus Inscriptionum Latinarum*, projected by the Berlin Academy, and commenced in 1863; and in 1873 he was elected perpetual secretary of the Academy. In 1882 he was tried for slandering Bismarck in an election speech, but was cleared both in the lower court and in that of appeal. His fine library was burned in 1880, whereupon a number of English students presented him with a collection of books to make good at least part of his loss. MommSEN took a share in the work of editing the *Monumenta Germaniæ Historica*, and made his name illustrious by a series of works of vast range and profound erudition. He died 1st November 1903. His greatest work remains his *Römische Geschichte* (3 vols. 1854-56; 8th ed. 1889; Eng. trans. by W. P. Dickson, 4 vols. 1862-67). These three volumes form books i.-v. of MommSEN's plan; vol. v., forming book viii., was issued in 1885 (Eng. trans. by Dickson, *The Provinces of the Roman Empire from Caesar to Diocletian*, 2 vols. 1886). Freeman characterises MommSEN as 'the greatest scholar of our times, well-nigh the greatest scholar of all times . . . language, law, mythology, customs, antiquities, coins, inscriptions, every source of knowledge of every kind—he is master of them all.' But, while admitting readily his wide and sure grasp of



historical sequence, the reader finds Mommsen defective in political and moral insight, and prone to fall down in worship before mere force and success. See *Life* by Bardt (1903).

Other important works of Mommsen's are *Oskische Studien* (1845); *Die Unteritalischen Dialekte* (1850); *Corpus Inscriptionum Neapolitanarum* (1851); his monographs on *Roman Coins* (1850); the edict of Diocletian, *De Pretiis Rerum Venalium* (1851); *Die Rechtsfrage zwischen Cäsar und dem Senat* (1857); *Römische Forschungen* (1864-79); *Res Gestæ Divi Augusti* (1865); *Römisches Staatsrecht* (1871-76; 3d ed. 1887); and his *Digesta Justiniani Augusti* (1866-70).

Mompox, or MOMPOS, a town of north-western Colombia, on the Magdalena, 110 miles SE. of Cartagena. Founded in 1538, it has considerable river-trade. Pop. 15,000.

Monachism, or MONASTICISM (Gr. *monachos*, 'a monk,' from *monos*, 'alone'), may in general be described as a state of religious retirement, more or less complete, accompanied by contemplation, and by various devotional, ascetical, and penitential practices. It is, in truth, Asceticism (q.v.), with the element of religious solitude superadded. The institution of monachism has, under different forms, entered into several religious systems, ancient and modern. That it was known among the Jews before the coming of our Lord appears from the example of the prophet Elijah and from that of the Essenes; and it is probable that religious seclusion formed part of the practice of the Nazarites, at least in the later periods of Jewish history. In the Brahmanical religion it has had a prominent place; and even to the present day the *lamaseries* of Tibet may be said to rival in number and extent the former monasteries of Italy or Spain. The Christian advocates of monachism find in the exhortations to voluntary poverty (Matt. xix. 21) and to celibacy (1 Cor. vii. 37) at once the justification and the origin of the primitive institution. Its first form appears in the practice of asceticism, of which we find frequent mention in the early part of the 2d century. The primitive ascetics, however, lived among the brethren, and it is only in the following century that the peculiar characteristic of monachism begins to appear. The earliest form of Christian monachism is also the most complete—that of the Anchorites or Hermits (q.v.)—and is commonly believed to have in part originated in the persecutions, from which Christians were forced to retire into deserts and solitary places. The hermits maintained from choice, after the cessation of the persecutions, the seclusion to which they had originally resorted as an expedient of security; and a later development of the same principle is found in the still more remarkable psychological phenomenon of the celebrated 'Pillar-saints' (see *STYLITES*). After a time, however, the necessities of the religious life itself—as the attendance at public worship, the participation in the sacraments, the desire for mutual instruction and edification—led to modifications of the degree and of the nature of the solitude. First came the simplest form of common life, which sought to combine the personal seclusion of individuals with the common exercise of all the public duties; an aggregation of separate cells into the same district, called by the name *Laura*, with a common church, in which all assembled for prayer and public worship. From the union of the common life with personal solitude is derived the name *cenobite* (Gr. *koinos bios*, common life), by which this class of monks is distinguished from the strict solitaries, as the hermits, and in which is involved, in addition to the obligations of poverty and chastity which were vowed

by the hermits, a third obligation of obedience to a superior, which, in conjunction with the two former, has ever since been held to constitute the essence of the religious or monastic life. The first origin of the strictly cenobitical or monastic life has been detailed under the name of St Antony (q.v.), who may be regarded as its founder in the East, either by himself or by his disciples. So rapid was its progress that his first disciple, Pachomius (q.v.), lived to find himself the superior of 7000. In the single district of Nitria, the country of the Natron Lakes (q.v.) in the Egyptian delta, there were, according to Sozomen, no fewer than fifty monasteries, and before long the civil authorities judged it expedient to place restrictions on their excessive multiplication. It seems to be admitted that in the East, where asceticism has always been held in high estimation, the example of Christian monasticism had a powerful influence in forwarding the progress of Christianity; although it is also certain that the admiration which it excited occasionally led to its natural consequence among the members, by eliciting a spirit of pride and ostentation, and by provoking sometimes to fanatical excesses of austerity, sometimes to hypocritical simulations of rigour. The abuses which arose, even in the early stages of monachism, are deplored by the very Fathers who are most eloquent in their praises of the institution itself. These abuses prevailed chiefly in a class of monks called *Sarabaitai*, who lived in small communities of three or four, and sometimes led a wandering and irregular life. On the other hand, a most extraordinary picture is drawn by Theodoret of the rigour and mortification practised in some of the greater monasteries. The monks were commonly zealots in religion; and much of the bitterness of the religious controversies of the East was due to that unrestrained zeal; and it may be added that the opinions which led to these controversies originated for the most part among the theologians of the cloisters. An order was called *Acemetæ* (Gr. 'sleepless'), from their maintaining the public services of the church day and night without interruption (see *GREEK CHURCH*).

It was in the cenobitic rather than the eremitic form that monachism was first introduced into the West, at Rome and in Northern Italy by Athanasius, in Africa by St Augustine, and afterwards in Gaul by St Martin of Tours. Here also the institution spread rapidly under the same general forms in which it is found in the Eastern Church; but considerable relaxations were gradually introduced, and it was not until the thorough reformation and, as it may be called, religious revival effected by the celebrated St Benedict (q.v.), in the beginning of the 6th century, that western monachism assumed its peculiar and permanent form. In some of the more isolated churches, as, for instance that of Britain, it would seem that the reformations of St Benedict were not introduced until a late period; and in that church, as well as in the church of Ireland, they were a subject of considerable controversy. One of the most important modifications of monachism in the West regarded the nature of the occupation in which the monks were to be engaged during the times not directly devoted to prayer, meditation, or other spiritual exercises. In the East manual labour formed the chief, if not the sole external occupation prescribed to the monks; it being held as a fundamental principle that for each individual the main business of life was the sanctification of his own soul. In the West, besides the labour of the hands, mental occupation was also prescribed—not, it is true, for all, but for those for whom it was especially calculated. From an early period, therefore, the monasteries of the West, and particularly

those of Ireland or those founded by Irish monks (see COLUMBA, CULDEES), as Iona and Lindisfarne, became schools of learning, and training-houses for the clergy. At a later period most monasteries possessed a *scriptorium*, or writing-room, in which the monks were employed in the transcription of MSS.; and, although a great proportion of the work so done was, as might naturally be expected, in the department of sacred learning, yet it cannot be doubted that it is to the scholars of the cloister we owe the preservation of most of the masterpieces of classic literature which have reached our age.

In the remarkable religious movement which characterised the church of the 12th century (see FRANCISCANS) the principle of monachism underwent a further modification. The *spiritual egoism*, so to speak, of the early monachism, which in some sense limited the work of the cloister to the sanctification of the individual, gave place to the more comprehensive range of spiritual duty, that, in the institute of the various bodies of Friars (q.v.) which that age produced, made the spiritual and even the temporal necessities of one's neighbour, equally with, if not more than, one's own, the object of the work of the cloister. The progress of these various bodies, both in the 12th century and since that age, is detailed under their several titles. The monastic institutes of the West are almost all offshoots or modifications of the Benedictines (q.v.); of these the most remarkable are the Carthusians, Cistercians, Cluniacs, Premonstratensians, and, above all, Maurists. In more modern times other institutes have been founded for the service of the sick, for the education of the poor, and other similar works of mercy, whose members are also classed under the denomination of monks. The most important of these are described under their several heads.

The enclosure within which a community of monks reside is called a Monastery (q.v.), and sometimes convent. By the strict law of the church, called the law of cloister or enclosure, it is forbidden to all except members of the order to enter a monastery; and in almost all the orders this prohibition is rigidly enforced as regards the admission of females to the monasteries of men. To such a length is this carried in the Greek Church that in the celebrated enclosure of Mount Athos not only women, but lower animals of the female sex are rigorously excluded. The first condition of admission to a monastic order is the approval of the superior, after which the candidates remain for a short time as *postulants*. After this preliminary trial, they enter on what is called the *novitiate*, the length of which in different orders varies from one to three years; and at its close they are admitted to the profession, at which the solemn vows are taken. The age for profession has varied at different times and in different orders; the Council of Trent, however, has fixed sixteen as the minimum age. Originally all monks were laymen; but after a time the superiors, and by degrees other more meritorious members, were admitted to holy orders. Amongst the mendicants, those in priest's orders were called 'father,' the lay brothers 'brother' only. In either case, where the order is one of those solemnly approved by the church, the engagement taken at the final profession is life-long and irrevocable.

The name monastery, in its most strict acceptance, is confined to the residences of monks, properly so called, or of nuns of the cognate orders (as the Benedictine), and as such it comprises two great classes, the *Abbey* and the *Priory*. The former name was given only to establishments of the highest rank, governed by an abbot, who was commonly assisted by a prior, sub-prior, and other minor functionaries (see ABBOT). A Priory sup-

posed a less extensive and less numerous community. It was governed by a prior, and was originally, although by no means uniformly (at least in later times), subject to the jurisdiction of an abbey. The distinction of abbey and priory is found equally among the Benedictine nuns. In the military orders the name of Commandery and Preceptory corresponded with those of abbey and priory in the monastic orders. The establishments of the mendicant and, in general, of the modern orders are sometimes, though less properly, called monasteries. Their more characteristic appellation is Friary or Convent, and they are commonly distinguished into Professed Houses (called also Residences), Novitiates, and Colleges or Scholastic Houses. The names of the superiors of such houses differ in the different orders. The common name is Rector, but in some orders the superior is called Guardian (as in the Franciscan), or Master, Major, Father Superior, &c. The houses of females—except in the Benedictine or Cistercian orders—are called indifferently *Convent* and *Nunnery*; their head is styled Mother Superior or Reverend Mother. The monastic institute, from the very earliest time, included women as well as men. The former were called in Greek by the name *nonis* or *nonna*, and in Latin *nonna* (from which the English *Nun*), as also *sancimonialis*. The general characteristics of the monastic institute for females are substantially identical with those of the male orders.

It was to be expected that the monastic foundations in England would not long survive the national rejection of the papal power which was their main support. The monasteries had mostly outlived their days of usefulness, and very inadequately fulfilled the objects of their institution. A general, though not universal decay of religious fervour, and the revelation from time to time of grave scandals within their walls disposed many prudent men to regard them with little favour. But the immediate cause of their downfall was their accumulated wealth with which Cromwell tempted the covetousness of Henry VIII. The dissolution of monasteries was indeed no new idea, for Cardinal Wolsey several years before had obtained bulls from the pope enabling him to suppress certain religious houses and appropriate their funds for other purposes. Henry's proceedings were, however, as unworthy as his motives. He appointed unprincipled agents to visit and report upon the state of all the religious houses in the kingdom. These men performed their work in indecent haste, and upon obviously insufficient evidence brought against the monks generally charges of gross immorality which were embodied in the so-called Black Book, now lost. The king at first acted with considerable craft. He appealed to the selfishness of the greater abbots who had seats in the House of Lords, and silenced their opposition by declaring that in the larger monasteries 'religion was right well kept,' and proposed the confiscation only of the smaller houses (376 in number) with a revenue of less than £200 a year. This ensured the passing of the Act of Suppression in February 1536. But the turn of the 645 greater monasteries soon came. Certain abbots implicated in the rising of the 'Pilgrimage of Grace' were convicted of treason and their houses seized. Then followed another general visitation, and, by bribes, intimidation, and violence, the remaining monastic communities were one by one induced in 1539 to 'surrender' their property to the king. The revenue accruing to the crown by the confiscation is estimated at over £130,000. With this fund six new episcopal sees and certain collegiate churches and grammar-schools were founded, and a few castles built for the defence of the coast. But the greater part of the property fell through purchase or gift into the hands of the nobility and

gentry; and the policy which thus interested powerful laymen in maintaining the new order of things effectually barred the way to the restoration of monasticism in the reactionary reign of Mary. See HENRY VIII.

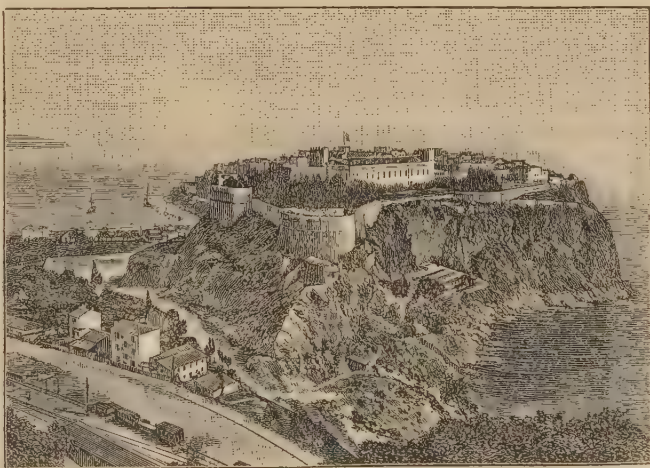
In some of the German states the temporalities of the suppressed monasteries were retained at the Reformation, and were granted at pleasure by the sovereign, to be enjoyed together with the titular dignity. Some of the German churches, however, in later times, have revived the institution, especially for women (see DEACONESSSES). In England there was the religious community of Little Gidding (1625-47), founded by Nicholas Ferrar (q.v.); Father Ignatius (q.v.) worked for Anglican Benedictinism; in 1865 a sort of Anglican mission order, the Cowley Fathers, was established at Oxford by Richard Meux Benson (q.v.); and others have followed; but here, too, Sisterhoods (q.v.) are far more numerous. In all these Protestant revivals of monachism the engagement is revocable at the will of the individual, as among the Roman Catholic Béguines (q.v.). At the French Revolution the monastic establishments of France were utterly suppressed; and in most of the other Catholic countries of Europe the example has been followed to a greater or less extent. After the Restoration a revival of many of the orders took place in France. The French decree of 1880, breaking up 'unauthorised orders,' dealt with 384 houses with 7444 monks, and 602 houses with 14,003 nuns; there were in all at that date some 25,000 monks and nuns in France. The Associations Laws of the 20th century again required authorisation of houses, and most of the French communities have been expelled or dissolved. In 1835 Spain suppressed 900 monasteries, and most of the rest soon thereafter. Many, however, established themselves illegally, till in 1910 a law forbade the setting up of any more, without consent of the government, pending a new arrangement with the Vatican. Portugal dissolved all its religious houses in 1834. Houses illegally established afterwards were suppressed by the provisional government of 1910. In Belgium and Switzerland monasteries are numerous. In Italy, Sardinia put an end to the monasteries in 1866, and the same measure was extended to the whole kingdom after 1870, the orders being expropriated, and their houses made national property; in all upwards of 2200 houses were suppressed. In 1875 Prussia dissolved all orders save those devoted to sick-nursing (at that date there were in all Germany 2588 monks and 16,846 nuns), but in 1887 readmitted all those orders engaged in pastoral duty, Christian charity, or the contemplative life. In England and Ireland and America, largely as a consequence of suppression elsewhere, monastic institutions have made rapid progress of late years. Most of the orders introduced are active, not contemplative.

The following list gives the name and date of foundation of the chief orders; reference is made to the articles on them throughout this work, and to works cited there; as also to other articles quoted above, to ROMAN CATHOLIC CHURCH, CONGREGATION, &c.; and to Helyot, *Histoire des Ordres Religieux* (8 vols. 1714-21; new ed. 1860); Dugdale, *Monasticon Anglicanum* (new ed. 1817-30); Tanner, *Notitia Monastica* (1744); Möhler, *Geschichte des Mönchthums* (1836); Hill, *English Monasticism* (1867); Milman, *History of Latin Christianity* (1854); Montalembert, *Monks of the West* (Eng. trans. 1861-79);

Harnack, *Das Mönchthum; seine Ideale und seine Geschichte*, 4th ed. 1895; Eng. trans. 1901; Cardinal Gasquet, *English Monastic Life* (1903); H. B. Workman, *The Evolution of the Monastic Ideal* (1913); N. F. Robinson, *Monasticism in the Orthodox Churches* (1916); Coulton, *Five Centuries of Religion* (1923 & seq.). For Buddhist monachism see BUDDHISM, BURMA, CHINA, LAMAISM, LHASA; for Jewish, ESSENES, THERAPEUTÆ. The Serapis religion had also its monachism. St Pachomius is said to have been a monk of Serapis before he was a Christian.

	A.D.		A.D.
Basilians (see BASIL).....	363	Brethren of Common Life.....	1376
Benedictines.....	529	Bernardines.....	1425
Monks of Iona (q.v.).....	563	Oblate Nuns.....	1433
Canons Regular.....	763	Minims.....	1435
Cluniacs.....	910	Barnabites.....	1484
Austin Canons.....	1067	Theatines.....	1524
Carthusians.....	1084	Capuchins.....	1525
Cistercians.....	1098	Recollets.....	1532
Hospitallers.....	1104	Jesuits.....	1534
Templars.....	1118	Ursulines.....	1537
Premonstratensians.....	1120	Oratorians.....	1575
Trappists.....	1140	Feuillants.....	1577
Gilbertines.....	1148	Oblate Fathers.....	1578
Béguines.....	1180	Jacobins.....	1608
Teutonic Knights.....	1191	Maurists.....	1621
Trinitarians.....	1197	Lazarists (See VINCENT DE PAUL).....	1624
Poor Clares (see CLARE).....	1202	Sisters of Charity.....	1629
Franciscans.....	1208	Passionists.....	1725
Carmelites.....	1209	Redemptorists.....	1732
Dominicans.....	1215	Ladies of the Sacred Heart.....	1800
Celestines.....	1271	Marist Fathers.....	1813
Olivetans.....	1313	Sisters of Mercy.....	1827
Brigittines.....	1363	Little Sisters of the Poor.....	1840
Observantine Franciscans.....	1368		
Hieronymites.....	1374		

Mon'aco, a small principality on the Mediterranean, 149 miles ENE. of Marseilles, and 9 from Nice. Area, 8 sq. m.; pop. (1873) 5741; (1922) 23,418, of whom 2037 were in the town of Monaco, 10,554 in Condamine, and 10,827 in Monte Carlo.



Monaco.

The territory, which is encircled by the French department of Alpes Maritimes and the sea, consists mainly of the rocky promontory on which the capital is built and a small strip of coast. For more than nine hundred years it has belonged to the family of Grimaldi. Originally of Genoese extraction, they first held lands in France, between Fréjus and Toulon, where the name of the bay of Grimaud still commemorates their sway. They acquired Monaco in 968, Mentone and Roquebrune and Castillon about 1230, and Antibes in 1237. In European politics they sided with the Guelph party. Honoré II. put his country under a French protectorate in 1644. In 1715 the heiress of the Grimaldi of Monaco married Matignon, Comte de Thorigny, and her descendants continued to reign

over their small kingdom. In 1848 Mentone and Roquebrune declared themselves free towns, and in 1860 voted for annexation to France. The prince in 1861 ceded his rights to Napoleon III. for 4,000,000 francs. A constitution was promulgated in 1911. Prince Albert (born in 1848, succeeded 1889, died 1922), a man of science, founded oceanographical and anthropological institutes in Paris, and a great museum (1910) in Monaco. About 1000 of the inhabitants are employed in the rooms and gardens of the celebrated Casino. These gambling-rooms, built at Monte Carlo on ground leased from the Prince of Monaco, belong to a joint-stock company or Société Anonyme. In 1898 the concession was extended to 1947. Large sums go for the upkeep of gardens and houses and management generally; and the company is held bound to defray the municipal expenditure as well. In a single year over 1,000,000 francs has been paid for publicity—i.e. as hush-money—to many newspapers (chiefly Parisian) to suppress hostile criticisms, unpleasant facts, suicides, and the like. The climate of Monaco is milder than that of any other place in the Riviera; palms and aloes grow most luxuriantly.

See Métiévier, *Monaco et ses Princes* (2d ed. 1865); Pemberton, *Monaco Past and Present* (1867); Boyer de Sainte-Suzanne, *La Principauté de Monaco* (1884); Miss Mayne, *Monaco* (1910); and A. Smith, *Monaco and Monte Carlo* (1912).

Monad. See the articles LEIBNIZ, INFUSORIANS.

Monaghan, an inland county of Ulster, in the Irish Free State, lies between Tyrone and Meath; area, 496 sq. m., of which about half is under tillage. Pop. (1841) 200,442; (1881) 102,748; (1911) 71,455 (three-fourths Roman Catholic). The principal towns are Monaghan, Carrickmacross, Clones, and Castle-Blayney. It returns three members to the Dáil Eireann. Monaghan, granted by Henry II. to De Courcey, speedily fell back into the hands of the native chiefs of the sept MacMahon, by whom (with some alternations of re-conquest) it was held till the reign of Elizabeth, when it was erected into a shire. The county possesses two round towers, one, very complete, at Clones, the other at Inniskeen; and there are several raths and Danish forts.

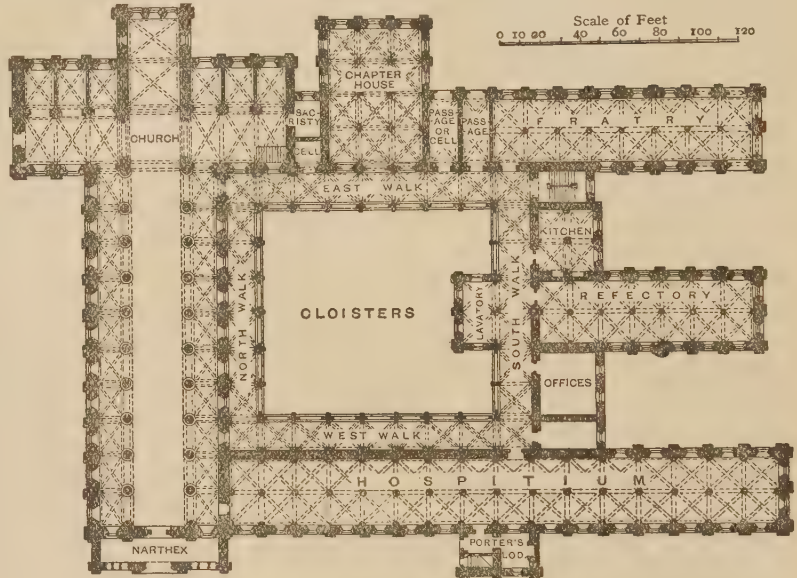
MONAGHAN, the county town, is 76 miles NNW. of Dublin by rail. The town can boast several public buildings of considerable pretensions, among which are the Catholic college and church, the infirmary, and national model school. Population about 4300. See Evelyn P. Shirley's *History of the County of Monaghan* (1877-80).

Monaldeschi. See CHRISTINA.

Monarchy (Gr. *monarchia*, from *monos*, 'alone,' and *archō*, 'I govern;') literally, the government

of a single individual) is that form of government in a community by which one person exercises the sovereign authority; see GOVERNMENT. For Monarchianism, see UNITARIANISM.

Monastery, a class of structures which arose in the middle ages to meet the requirements of the large number of monks that then existed. It is proved by documents that these buildings were



Cistercian Abbey—Model Plan.

at first constructed somewhat after the plan of a Roman house, or rather of a Roman villa or country-house. Records of abbeys as early as the 7th century show that the arrangements were similar then to those of the 12th century. The cloister, which formed the inner court appropriated to the monks, resembles the peristyle of the Roman mansion. The latter was the part of the dwelling communicating with the private apartments of the family, just as the cloister communicated with the refectory, dormitory, and other apartments used by the monks and not entered by the public. There was also in the monasteries, as in the Roman villas, an outer courtyard, in which were situated the various stores, granaries, workshops, and other places required in connection with both these edifices.

There was, however, one entirely new element in the monastery—viz. the church. This was the largest and most important building, and regulated the position of all the rest. The conventual buildings of every abbey in Britain, France, and Germany are so much destroyed that a complete plan cannot be obtained. The annexed plan is a model one made by Mr E. Sharpe, and contains the results of his careful investigation of the Cistercian monasteries throughout Europe (see *Trans. Roy. Inst. of British Architects*, 1871). In northern climates the cloister was usually situated on the south side of the church, for the sake of the sunshine and warmth. It was composed of an open courtyard, square or oblong in shape, surrounded by an open arcade, or covered way. The church formed the north side, and on the east side was situated the chapter-house, with the monks' dormitory over it. The latter was thus in immediate communication with the church, and conveniently placed for the monks' attendance at the services

during the night. The chapter-house in the Cistercian monasteries was usually divided into three compartments by the pillars bearing the arches. The abbot's seat was opposite the entrance door, and a stone seat all round accommodated the monks. The doorway was not closed, and together with an open arch or window on each side of it allowed those in the cloister to hear the discussions in the interior. The sacristy is placed on the north side of the chapter-house, with a door from the church. A similar cell or 'parlour' occupies the south side; then comes a passage or 'slype' leading from the cloister to the gardens, &c. Beyond this is the day-room (miscalled 'fratry') of the monks, a long vaulted apartment running southwards, having a row of columns in the centre and open windows.

The south side of the cloisters generally gave access to the refectory, a large, rather ornamental chamber, usually with an open wooden roof. It was sometimes placed parallel and sometimes at right angles to the cloister. Opposite the door to the refectory and in a vaulted recess stood a fountain or basin where the monks might wash. Adjoining the refectory were the kitchen and offices. The former was frequently a detached building with a large number of hearths, each having a separate chimney in the roof. Along the west side of the cloister, and sometimes extending much farther, lay the hospitium or guest-house, where all travellers were received, and the lay-room above, where they were lodged. A very important room in the monastery was the scriptorium or library, in which the MSS. were written and illuminated; this was situated on the second floor of the chapter-house. The abbot's lodge formed a separate edifice, as also did the infirmary. The whole establishment was surrounded by a wall, and provided with proper gates and defences. The outer gate gave access to the outer court, in which were situated the workshops of the various craftsmen connected with the abbey, and the buildings required in connection with the agricultural employments of the lay brethren.

Such were the arrangements of the Cistercian abbey in the 12th and 13th centuries. In later times the simplicity of the plan was broken in upon. The monks, desirous of more comfortable quarters, divided the dormitory and made it into cells. The open windows were glazed, and even the arches of the cloisters were sometimes enclosed. The early simplicity of the architectural style was also departed from, and the monastic buildings of the 15th century are as rich in decoration as the cathedrals and parish churches. The arrangements of the monasteries of the other orders were, generally speaking, similar to those of the Cistercian, except in the case of the Carthusians. In their convents, where absolute solitude and silence were required, each monk had a small house and garden to himself. These were arranged round the cloisters, which, when the number of monks was large, were greatly extended in dimensions.

See Viollet le Duc, *Dictionnaire et Architecture Monastique*; De Caumont, *Abécédair d'Archéologie*; Dugdale, *Monasticon*; and Mackenzie Walcott's works on the English and Scottish Churches.

Monasticism. See MONACHISM.

Monastir, called also BITOLIA, BITOLJ, a town in Yugoslav Macedonia, in a broad mountain-valley, 136 miles NW. of Salonika by rail (1894). It manufactures carpets and silver filigree, and trades in skins, corn, and agricultural products. Here the Albanian beys were massacred in 1833; it was the scene of terrible atrocities during the troubles in Macedonia (q.v.) in 1902-3. Turkish till 1912-13, it then became Serbian. The Bulgars held it in 1915-16. Pop. 28,000.

Monazite, a rare mineral, a phosphate of

cerium and lanthanum, with some thorium and yttrium, &c., forms brown or yellow monoclinic crystals. It is used as a source of cerium and thorium for incandescent gas-mantles, and is got from monazite sand, which occurs in Brazil and North Carolina, also in India, Canada, South Carolina, and elsewhere.

Monboddo, JAMES BURNETT, LORD, Scottish lawyer and author, was born at Monboddo House, in Fordoun parish, Kincardineshire, in 1714, and was educated at Aberdeen, Edinburgh, and Groningen. In 1737 he was called to the Scottish bar, and soon obtained considerable practice; but the first thing that brought him prominently into notice was his connection with the celebrated Douglas case, in which he acted as counsel for Mr Douglas. In 1764 he became sheriff of Kincardineshire, and in 1767 was raised to the bench by the title of Lord Monboddo. He died in Edinburgh, 26th May 1799. Monboddo's *Origin and Progress of Language* (6 vols. 1773-92) is a very learned, heretical, and eccentric production; yet in the midst of its grotesque crotchets there occasionally flashes out a wonderfully acute observation, that makes one regret the distorted and misapplied talent of the author. Its evolution theory and its assertion of a close relation between man and the orang-utan seems less laughable now; and in his study of man as one of the animals, and of civilisation by the light of savagery, he certainly anticipated the modern science of anthropology. Monboddo published, also anonymously, another work, *Ancient Metaphysics* (6 vols. 1779-99). See Life by Professor Knight (1900).

Monbuttu, a Negro stock in the basin of the Upper Nile and the Upper Welle. See AFRICA.

Moncalieri, a town of Italy, on the Po, 5 miles S. of Turin, with a royal palace (1470), given by the king to the nation in 1919; pop. 15,000.

Monck. See MONK.

Moncontour, a village in the French department of Vienne, situated 48 miles SW. of Tours, saw the defeat of the Huguenots under Coligny by the royal troops on 3d October 1569.

Moncrieff, SIR ALEXANDER (1829-1906), colonel and engineer, born at Edinburgh, was at the siege of Sebastopol, where the silencing of Russian guns suggested the devising of Moncrieff Pits (1868-72). The Moncrieff system of mounting utilises the force of recoil to bring the gun down into the loading position at the bottom of the pit. It is returned into the firing position either, as in the earlier patterns, by a heavy counterweight or by hydropneumatic machinery. In the latter system recoil presses store up the energy of the recoil and enable it to be used to elevate the gun into the firing position.

Moncton, a town and port of entry of New Brunswick, on the Petitcodiac River, 89 miles by rail NE. of St John. It has important railway-shops, and manufactures machinery, iron-castings, woollens, &c. Pop. (1901) 9026; (1921) 17,488.

Mon'dovi, a cathedral city of Italy, 58 miles S. of Turin by rail; pop. 20,000. Here, on 22d April 1796, the Sardinians were totally defeated by Napoleon.

Monera, a class of Protozoa (q.v.) proposed by Haeckel to include the very lowest organisms supposed to be destitute of a nucleus. But this structure has been shown to exist in forms where it was formerly denied.

Monet, CLAUDE, one of the founders of impressionism, was born at Paris 14th November 1840, a Havre merchant's son. Discouraged in his artistic ambitions at home, he was sent in vain on a voyage (like Manet). At Havre he associated with Boudin, and drew caricatures. He served

two years with the Chasseurs d'Afrique, came home with fever, and studied in Gleyre's studio. From 1883 he lived at Giverny (Eure). A landscapist excelling in atmospheric and water effects, he delights in painting the same subject over and over again under changing conditions. He has lived to see violent opposition turned to triumph. See a book by Maclair (trans. 1925).

Money. The term money is used, both in matters of business and in economic theories, in such very different ways that it is impossible to cover them all with a simple definition. Standard coins, bars of bullion which can at once be converted into standard coins, token coins, convertible bank-notes, inconvertible notes, are all included under 'money,' although they present essential differences. In modern societies one of the most important forms of money is 'bank money,' or the money of the money-market, which for the most part consists of neither coin nor notes. The whole of the banking system of the United Kingdom, for example, as well explained in Bagehot's *Lombard Street*, really rests upon the reserve kept by the Bank of England, and every bank receives deposits of 'money,' and makes advances of 'money,' with the use of a very small proportion of coins or bank-notes. A brief survey of the development of the complex monetary system of modern societies from its rudimentary forms will give the best explanation of this uncertainty in the meaning of this familiar word, and also bring out in the clearest way the principal functions of 'money.'

Exchanges first take place by means of barter, but the difficulties of simple barter are obviously very great. A coincidence of mutual wants at the same time and place is the first condition of any exchange, and it is plain that a common *medium of exchange* will obviate one of the principal difficulties of direct barter. If there is some one thing which every one is willing to take, it follows that anything else can be bought or sold against this particular commodity. Accordingly the first function of 'money' is to provide (1) a *medium of exchange*, and its first forms consist of things which are generally desired in simple states of society. Skins, cattle, shells, corn, pieces of cloth, mats, salt, and many other commodities have at different times and places been used as 'money,' in the sense of a common medium of exchange. The commodity chosen, however, will be of little advantage unless it can be used both in large and small quantities. This consideration leads to another primary function of money—viz. (2) as a *measure of value*. Not only is it necessary that things can be exchanged against a common substance, but the rates of exchange must be measured. Finally, as society advances, a basis for (3) *deferred payments*, and also a method of (4) *storing 'values'* without deterioration, become of importance. In order that these four primary functions may be fulfilled, the substance chosen for money must have certain properties, of which the principal are portability or great value in small bulk, durability, sameness of quality, divisibility, stability of value, and cognisability. It was soon discovered that these qualities are possessed in the highest degree by gold and silver. Other metals have been used at different times even for standard money, but all of them fail in one or more of these particulars. Iron is liable to rust, lead is too soft, tin too brittle, and copper too heavy. It may be observed that the importance of the qualities varies according to circumstances. Thus, when, as in modern societies, the greater part of wholesale transactions are effected without the intervention of material money, portability is of comparatively small importance, whilst on the other hand stability of value is of the greatest importance in all kinds of

deferred payments. It is not necessary that all the primary functions of money should be fulfilled by the same thing. In Saxon times, for example, and for long after in England the standard measure of value was the pound-weight of silver, but the actual medium of exchange consisted of silver pennies. At present the actual medium of exchange consists to a great extent of bits of paper—bank-notes, cheques, and various instruments of credit—whilst the standard measure of value is a piece of gold.

So long as the attention is directed to material money, the principal questions that arise are in connection with coinage. At first, after the introduction of the precious metals, it was left to the parties concerned to test their weight and fineness with *caveat emptor* for the rule, and the present unsatisfactory state of the English gold coinage is mainly due to the survival in law of the presumption that it is the duty of the receiver of money to see that it is of full value. But the essential object of coinage is that a responsible authority should affix its stamp to small ingots of metal, in such a way as to signify their weight and purity. Simple and important as this duty appears, history is full of examples of the debasement and deterioration of coins by governments with the view of making a petty gain. It is worth noting, however, that from the earliest times (with the exception of the reign of Henry VIII.) the English silver was kept of the same fineness. It is true that the weight of the coins became gradually less, but it was probably in most cases the recognition of an accomplished fact (through ordinary wear and tear), and was not an attempt to defraud. The evils which arise from the natural or artificial debasement of coins have been well described by Macaulay in his account of the recoinage in the reign of William III. Since the primary object of coinage was simply to furnish a mark of weight and fineness, all metallic money was at first exactly what it professed to be. Thus, the old English silver pound was coined into 240 pennies; and this fact is preserved in the Troy table—20 penny-weights = 1 oz., 12 oz. = 1 pound. In process of time the actual weight of the penny became less than a pennyweight, but the same numbers were still supposed to go to the pound. Finally, a certain amount of gold of a certain fineness was declared to be equal in value to a 'pound of silver,' or rather to 240 pennies. This is historically the answer to Sir Robert Peel's famous question, 'What is a pound?' The technical answer to the question is now given by the Coinage Act of 1870 (in substance the same as that of 1816). The act declares the precise weight of the sovereign in grains, and the proportion of alloy in standard gold. Nominally—until 1914—any one could take standard gold to the mint and get it coined into sovereigns or half-sovereigns free of charge; twenty pounds-weight Troy being coined into 934 sovereigns and one half-sovereign. Practically the time and trouble involved in going direct to the mint induced people to sell their gold in preference to the Bank of England, and at first (within certain narrow limits) the price varied. The bank was compelled to purchase all standard gold at £3, 17s. 9d. per oz., and, as it obtained from the mint £3, 17s. 10½d., there was a small profit by way of brokerage. Allowing for this small difference, it will be seen that the mint price of gold—viz. £3, 17s. 10½d.—simply refers to the number of standard coins made out of a certain amount of standard metal. It follows that this mint price is fixed and invariable so long as the law remains unchanged. Thus, if gold became as plentiful as blackberries, or as scarce as diamonds, the mint price would remain unaffected. At the same time, however, the value

of gold in the sense of its purchasing power over commodities would change according to the variations in the quantity, though the precise nature and extent of the change would depend upon other elements. In some cases government makes a definite charge for coinage—that is to say, practically the weight of the coins returned is so much less than the weight of the bullion brought. This charge is called seigniorage. So long as this charge is paid, however, there is no restriction on the quantity of metal which may be converted into full standard coin.

It is necessary now to notice the distinction between standard money, in the proper usage of the term, and token money. The chief characteristics of the former are that, as just explained, it is coined to an unlimited extent, and further, that for any money contracts it is unlimited legal tender. In 'token' money these two characteristics are absent. The nature and uses of token money are also best explained historically. In the middle ages silver was very scarce, and prices were extremely low. The silver penny was originally about the size of the present threepenny-piece; consequently for the low range of prices then current it was inconveniently large and valuable. In a petition of the date of 1330 it was pointed out that 'beer is one penny for three gallons,' and that a penny is the smallest coin, and the petitioners pray that smaller coins may be struck to pay for their little purchases, and 'for works of charity.' The great practical difficulty, however, was to make very small coins of full standard value. So much was the need of small change felt, however, that by the time of Elizabeth the people had resorted largely to 'tokens' of lead, tin, and even leather. These 'tokens' were at first private issues, and practically were like very small promissory-notes. It was soon found that they were forced into circulation by unfair means, and then the issuers refused to change them for goods or sterling money. The remedy adopted in 1613 was to give a monopoly of striking copper or brass farthings to certain persons for a consideration. This privilege, however, was so much abused, that in many parts of the country, including London, there was hardly any gold or silver left—the whole circulation being brass farthings. The patentees tried to force these farthings on the American colonies, but it is recorded of Massachusetts—March 4, 1634, at the General Court at New Town, brass farthings were forbidden, and bullets were made to pass for farthings. These 'royal' tokens were no sooner suppressed, owing to the abuses which they had caused, than they were again replaced by private tokens, and it is said that over 20,000 different kinds were in use between 1648 and 1672. Evelyn in his *Diary* speaks of the tokens issued by every tavern, 'passable through the neighbourhood, though seldom reaching farther than the next street or two.'

From this slight historical sketch the principles which should regulate the issues of 'token' money stand out clearly. The smallest coins cannot be made of the precious metals of full value—e.g. a silver farthing would be less than one-tenth of the present threepenny-piece—and, accordingly, baser material must be used. Here, however, the danger arises of going to the other extreme and making the coins too large. But this is only a minor difficulty compared with the necessary condition that the token coins must bear a fixed relation to the standard coins in value. Thus we arrive at the fundamental principles of 'token' coins; they should be issued in limited quantities, be legal tender to a limited extent, and their so-called intrinsic value should be less than the

nominal value. Even those nations which use both gold and silver as standard money (see BR-METALLISM) are compelled to use token coins for small values, whilst nations which have a gold standard must make all their silver coins 'tokens.' With the progress of civilisation 'representative' money, as it has happily been styled by Jevons, became of more and more importance. The Romans, for example, had a highly-developed banking system, which, however, was broken up on the disruption of the empire. In the early mediæval period bills of exchange were used for foreign payments; and that they were considered as 'representative money' is shown by the fact that in England, up to the Tudor period, their value was regulated by the Royal Exchanger, a high official connected with the mint. The development of banking in the modern sense was very slow. The earliest banks in Italy were finance companies which provided governments with loans, but the great banks of the north of Europe were expressly designed to provide good money to meet the payment of bills of exchange (see Adam Smith's account of the origin of the Bank of Amsterdam, *Wealth of Nations*, book iv.). The money in the great trading centres was drawn from various countries, and was in general debased and worn. The banks took this bad money from the merchants and gave them good bank money in return. The merchants, however, allowed the money to remain in the bank, and handed one another transfers. It was soon discovered that a small amount of actual coin was sufficient to meet all liabilities, and, accordingly, the remainder was lent. In this manner 'bank money' has in process of time come to consist of a large mass of representative money supported on a metallic basis. See BANKING.

It remains to notice briefly the changes in the monetary system herein described which were introduced in the war period. In 1914 the gold standard (the sovereign) was virtually abandoned, and paper money (the Treasury note), which had no gold basis, was issued by government, with unsatisfactory results. In 1918 the Cunliffe Commission advised a gradual return to the pre-war system. This recommendation is partially given effect to in the Gold Standard Act, 1925.

Compare, on the difficulty of defining 'money,' Sidgwick's *Principles of Political Economy*, book ii. chap. iv.; on the history of material money, Ruding's *Annals of the Coinage*, Dana Horton's *Silver Pound*, Kenyon's *Gold Coins of England*, Hawkins's *Silver Coins of England*; on tokens, Boyne's *Tokens in the Seventeenth Century*; on the 'money market,' Bagehot's *Lombard Street*; on the general principles, Jevons's *Money*, Professor F. A. Walker's *Money*, Professor Nicholson's *Money and Monetary Problems*, Hartley Withers's *Meaning of Money* (1909). See also BULLION, CURRENCY, WEIGHTS AND MEASURES, CROWN, DOLLAR, Groat, GUINEA, INTEREST, MINT, NUMISMATICS, PAWNBROKING, SHILLING, USURY, VALUE, &c.

Money-wort, a name given to various plants—*Dioscorea*, *Lysimachia*, *Thymus*, &c.

Monge, GASPARD, a French mathematician and physicist, was born of humble parentage at Beaune, in the department of Côte d'Or, 10th May 1746. At fifteen he went to study natural philosophy at the Oratorian College of Lyons, and afterwards obtained admission into the famous artillery school at Mézières, where he invented the method known as 'Descriptive Geometry.' In 1780 he was chosen a member of the French Academy, and was called to the Paris Lyceum as professor of Hydrodynamics. During the heat of the Revolution he became minister of Marine, but soon took charge of the great manufactories for supplying republican France with arms and gun-

powder. After he had founded the École Polytechnique, he was sent by the Directory to Italy. There he formed a close friendship with Bonaparte, and, following him to Egypt, undertook the management of the newly-founded Egyptian Institute. On his return to France he resumed his functions as professor in the École Polytechnique, and, though his reverence for Napoleon continued unabated, he hotly opposed his aristocratic and dynastic views. The title of Count of Pelusium was conferred on him by Napoleon. He died 28th July 1818. His principal works were *Traité Élémentaire de Statique* (1788), *Leçons de Géométrie Descriptive* (1795), and *Application de l'Analyse à la Géométrie* (1795).

Monghyr, a picturesque city of Bihar, in India, on the right bank of the Ganges, 80 miles E. by S. of Patna, consists of the fort, a rocky crag projecting into the river, and the native quarters. From the 12th century onwards it was a place of considerable strength; in the 18th century Mir Kasim made it his headquarters. He established an arsenal, and its armourers are still famed. Pop. (1891) 57,077; (1921) 46,825.—The district has an area of 3927 sq. m.; pop. 2,029,000.

Mongol. See IDIOCY.

Mongolia. This word is rather a European geographical name than Chinese or Mongol, which last term, though of ancient origin (see MONGOLS), had no mediæval existence until Genghis Khan adopted it to distinguish the particular sub-tribe of *T'atan* or *T'a-t'a* to which he belonged: he never conceived the idea of Mongolia as an area. In Hiung-nu (Hun) times, 2000 years ago, in indicating the same area, the Chinese spoke of 'North of the Desert' (Urga region), 'South of the Desert' (Great Wall region), and 'Celestial Mountains North' (road to Harashar, Ili, &c.), and these terms have endured throughout Turkish times to this day. Both the first great Hun conqueror (200 B.C.) and the great Turk conqueror (500 A.D.) distinctly conceived the idea of Hun 'empire' and Turk 'empire'; but this expression referred to the ever-shifting tribal units subordinate to Hun and Turk rule, rather than to the elusive territory over which those units wandered, and for which they fought off and on: as the Chinese aptly put it, 'their country is the back of a horse'—it was an ever-moving ocean of riders rather than fixed settlements of cultivators. When, after over a century of imperial rule from what we now call Peking, the millennium-later Mongols were driven helter-skelter beyond the Great Wall, the Chinese of the succeeding Ming dynasty (1368–1644) spoke of them, and officially record them in history, by their old name *T'a-t'a*. At first they only knew of the Genghiside or eastern groups; and when later on they began to hear of the rival westerners, they called them Elut-ê (Eleuths) or 'Allies,' who gradually developed a 'Kalmuck' empire of their own, under a supreme chief whose title was *K'un-t'ai-chai* or 'chief *dai'dji*' (the 'Kontaysha,' so graphically described by John Bell of Antermony two centuries ago). These eastern and western *T'a-t'a*, or Mongols, fought with each other and with China throughout the Ming dynasty, the western chief Essen even capturing a Chinese emperor (1450) and detaining him for some years. For more than a century after this the Chinese lost all touch with the Eleuth or Kalmuck empire. Meanwhile the Manchu power was developing, and the divided, undisciplined, and exhausted eastern Mongols found it to their interest to abandon Ming disorganisation and support Manchu ambitions; the result was the fall of the now thoroughly corrupt and effete Ming dynasty, and a family alliance on equal social

terms between princes of the eastern Mongols and ruling Manchus, which has been prudently continued under the Chinese republic 'of five races.' The Manchus had a century of hard fighting before the western Mongols were reduced to obedience, part of them—the Turgut branch—migrating to Russia, whither in 1712 the Manchu emperor K'ang-hi sent an envoy named Tulishen to try and coax them back from their settlements between the Volga and the Yaik, where their Khan Ayuki was actually visited by Peter the Great in 1722: there were then about 100,000 tents of them. It was not, however, until the brilliant Manchu emperor K'ien-lung had made a clean sweep of the Eleuths or Kalmucks of Ili (1757–58) that the Turgut Eleuths in Russia, disgusted with Catherine's attempt to enlist them for service in her European wars, decided to return in a body to the Ili region, where a miserable remnant of them, numbering 70,000, arrived about 1760: they were received with great kindness, and have remained there ever since.

Mongolia, taken in its popular sense as it appears on modern maps, seems to be an arid tableland, surrounded on all sides by more or less wooded and fertile districts, and intersected by several formidable mountain chains, whose watersheds, however, are only fructifying on the outward faces. As early as 984 B.C. the Emperor Muh, of a dynasty tintured with Tatar colourings in its origins, journeyed over a portion of this desert, including that part, often mentioned in Chinese histories, where millions of birds used to congregate annually for moulting purposes; but it is only after the accession of the unmistakably pure Chinese Han dynasty (200 B.C.) that specific mention is made of the *Moh* (defined by the dictionaries as 'sandy surface'), or *sha-moh*, 'sandy Moh.' The alleged Mongol word *Gobi* is mentioned in one fragment of a long-extinct unofficial Chinese history published about 250 A.D.; but this was long centuries before the word 'Mongol' appeared in any disguise: the 'windy Ko-pih' in question was on the Hami-Turfan road, and may well be some form of Turkish. The mountains and forests, with the fertile tracts which practically surround this inhospitable plateau, of course produce refreshing watersheds, forming river-systems running, as above indicated, northwards towards Siberia, eastwards towards Manchuria, and westwards towards Russian Turkestan; there are none of any bulk, except perhaps the Etzina, running northwards towards the Desert from China, and that perhaps explains how it was and ever has been easy for troops of hardy horsemen, whether Huns, Turks, or Mongols, to swoop upon the half-Chinese settled communities, always tentatively advancing northwards, and, if successful, to carry off booty in the shape of grain, spirits, girls, silks, flosses for wadding, and young men to train up as cavalry or servants. The town of Etzina (mentioned by Marco Polo) was invaded by Genghis in 1226, and seems to be identical with the Kara-Khoto, where Kozloff in 1908 discovered literary treasures. It is not easy to describe in detail this vast Mongolian area of 1,400,000 square miles, which within its four present boundaries has probably never maintained a population of more than 3,000,000: in 180 B.C. the Chinese were told at Hiung-nu headquarters that the whole population did not exceed that of one large Chinese city. These present boundaries are Siberia to the north, of which the Chinese knew and record almost nothing until their attention was drawn more closely to the movements of the Russians in 1858. True, Ivan the Terrible's vague missions of 1567, and Mendez Pinto, the Portuguese adventurer's equally vague explanations of about that date, must have

suggested something of an important region north of the T'a-t'a, even to the already unenterprising Ming dynasty (1368-1644), but nothing is officially recorded. The boundary to the south is now what it has always been since 200 B.C.—i.e. the line of the Great Wall and its extensions. To the west the boundary has always been a shifting one, accordingly as fierce horsemen of 'Mongolia,' whether Huns, Turks, or Mongols, modified by their temporary conquests the political status of what successive Chinese histories have termed the *Si-yü* or 'Western Regions.' To the east the boundary has, again, always been what it is now—that is to say, Manchuria and Korea; always with the reserve, however, that these two nations have themselves shifted ground very much, and that the no-man's-land which in 200 B.C. separated the Hiung-nu horsemen from the pig-breeding Tunguses was, nearly three centuries ago, allotted by the victorious Manchus to friendly Mongols. Accordingly as the successive Chinese dynasties recovered breath and proved vigorous enough to advance westward and form 'turning' alliances, so were the predatory horsemen gradually driven north-westwards, until at last they threatened mid-Europe, and actually reigned as the 'Golden Horde' for several centuries in Russia. It was only by the remarkable political sagacity of the Manchus in first of all granting titular conditions compatible with self-respect, and then unmaning their spirit and keeping down the popular increase by encouraging lamaism and celibacy, that at last they succeeded in taming this secular or progressive link between Far East and Far West. The Great Desert has numerous lakes, which partly or entirely dry up according to season; there are also many elusive 'sand rivers' and genuine oases, which enable the restless denizens to find their way across at all times; the grassy steppes of the easternmost portion are especially refreshing to look at in the spring: this part is what the Chinese call the *ts'ao-ti* or 'grass-land,' now occupied by the Inner Mongols. The mountains of Mongolia range from the Süeh Shan and the Altai in the west to the Peh Shan or White Mountains of Hami and the Alashan north of the Great Yellow River Bend; then eastwards past the Yin Shan, K'i-lien (= Heaven) Shan, Nan Shan; and finally the famous triple Hing-an system, roughly dividing Mongolia from Manchuria. Chinese historians apply all these terms very loosely, and the confusion to the casual reader is further confounded by the irregular use of Mongol or Turkish equivalents, such as Bogdo-ula, Ong-ku, Tengri-dagh, Ak-tagh, &c., which are in any case, even when the respective positions are clearly indicated, only satisfactorily understood by specialists. Any attempt to describe and define topography is futile without a clear map, and, given a clear map, laboured description is unnecessary. North and south of the Desert there are fine forests and pasture tracts, but in the *sha-moh* or *Gobi* itself there are only found at distant intervals a few dwarf or stunted willows, elms, mugworts, with occasional patches of struggling grass. Hence it is clear that horsemanship was always indispensable to get from one desirable point to the other, whether for purposes of war, hunting, or mere casual distraction. It is curious that the Chinese princes, who used three-horse chariots (in form not unlike the Egyptian and Assyrian) in their wars against each other, never seem to have acquired the art of mounted horsemanship until they found they were, in their steady advance north from the Yellow River, liable to Tatar surprises at great disadvantage. Accordingly, about 300 B.C. we find one of the most powerful Chinese feudal kings (North Shan Si) deliberately adopting Tatar costume at

his court so as to facilitate military operations on horseback; yet even a century after this, when the Hiung-nu Khan Baghdur surrounded the founder of the Han dynasty with half a million horsemen, we are told that the Chinese had perforce to submit to shameful terms of peace because their army of 400,000 men consisted entirely of infantry. The accounts of early Babylonia and early Egypt seem to show clearly that the introduction of the horse into those regions for warlike purposes was comparatively recent, probably by way of Elam and Syria; and thus, in one sense, the Scythian horsemen may indirectly and unconsciously have been the earliest effective link between Far East and Far West, for there does not appear to be any other instance in the world's history of self-supporting mounts careering fearlessly over thousands of miles in search of adventure, carrying all indispensable things with them, and as often as not accompanied by their women and children.

When the petty tribe of Manchus (about 1560) became conscious of its own relationship with the kindred tribes, and linguistically also with the Kitans and Nüchiens who had preceded the Mongols as emperors of North China, it proceeded methodically to organise itself, by means of understandings with certain Mongols and with China, in such a way that when at last Peking fell helplessly into Manchu clutches, it could safely set about securing its Mongol rear before marching upon its South China front. As stated in official Manchu history, 'the Mongols may be divided into four grand categories: (1) the Inner Mongols, south of the Desert; (2) the Outer Mongols, north of the Desert; (3) the Eleuths, west of the Desert; and (4) the Mongols of Kokonor.' The Inner Mongols practically continue the organisation into Six 'Ten Thousands' of the Genghis-Kublai times, except that, under the Manchus, these *Tumans* or 'Ten Thousands' have always been termed the Six *Mêng* or Leagues, embracing between them twenty-four tribes of forty-nine flags, one to three flags a tribe, only two leagues of the six having so many as six or seven flags to one tribe. Until the republic slightly modified the Chinese control, which in military matters lay with two generals at Kalgan and Jêhol respectively, in civil matters with the viceroy of Chih Li province, the so-called Mongolian Superintendency at Peking (*Li-fan-yüan*, or department for managing protected states, which also dealt with Tibet and lamaism generally), reserved to itself questions of rank and succession; but now there is a 'Mongol-Tibet Court' (*Mêng-Tsang Yüan*), which from 1912 to 1922 was under the competent and faithful direction of Prince Kungshang Norbo of the Kartsin Flag (direct descendants of Genghis Khan); however, in 1922 his second in command seems to have successfully intrigued him out of power. Meanwhile three new 'places'—akin to, but not actually regulation provinces—have been created at Jêhol, Kalgan, and Kwei-hwa Ch'êng (the site of Marco Polo's Tenduc), charged with the mixed administration of mixed Mongol-Chinese affairs. Administrative confusion, corruption, and incompetency is such all over China that it is not easy precisely to define any governmental arrangements. A healthy instinct, however, teaches the corrupt provincial governments of Tibet, Kokonor (Mongols, Tibetans, Mussulmans), and Kan Suh, as well as the highly honourable and competent government of Shan Si, that these non-Chinese or mixed peoples must be treated fairly, and the organisation of a new province called Kan-pien will bring all these races into more harmonious touch with one another. The Outer Mongols, north and west of the Desert, were not subdued

by the Manchus until long after the friendly incorporation of the eastern Mongols just described. Those north of the Desert have been called Kalkhas ever since the accession of the Manchu dynasty. There are four great tribes or divisions of them, each under a native *han* or khan, in many respects ruling independently. The lamaist dignitary, who under the Ming dynasty had settled at Kwei-hwa Ch'eng, south of the Desert, finally fixed his residence at Urga, north of the Desert; both these places were once Hiung-nu and Turkish capitals, so that in a certain way the Kalkhas are carrying on old traditions. The last lama dignitary died in May 1924, and at present the rivalries of Soviet Russia, 'White' Russia, and certain Chinese military cliques have led to various wars and confusions in and around Urga, so that there is some prospect of China's coming into her own again. Previous to the republic the western Kalkhas were to a certain extent under the control of a Manchu pro-consul at Uliasutai, whilst the eastern were more or less influenced by a similar official at Urga.

The Eleuths or Mongols west of the Desert were not entirely subdued until the Manchu dynasty had occupied the Chinese throne for a century, during which century the Eleuths had had a certain 'milk-kine' control over the Perso-Turki populations of the Tarim valley. An attempt was made by Yakub Bey towards the end of the 19th century to establish a new empire over the Kashgar, Ili, and Harashar regions, but this ambitious effort was thwarted by an exceptionally capable general in the employ of the Manchu government, and by 1881 both Sungaria (Eleuths) and Kashgaria (Tajiks) were firmly established as 'New Province.'

In the year 1890 Professor Heikel of Helsingfors University discovered near a *tsaidam* or marsh in the Orkhon valley a remarkable stone slab dated 731 A.D., with inscriptions in Chinese and in an unknown and then indecipherable language, since discovered to be early Turkish. Quite an extensive literature in Finnish, Swedish, Danish, Russian, German, French, &c., has since grown up in connection with this question. Suffice it to say here that the site of the stone slab was the headquarters or capital of the then ever-shifting and restless Turks; just as, a thousand years before that, it had been the 'north of the Desert' encampment of the Hiung-nu or (presumably) Huns. Moreover, the terms used in the Chinese emperor's lament over a distinguished Turk warrior prove clearly that the Turks had directly inherited the more ancient organisation, and even titles, of the Hiung-nu. Farther west, a number of Ouigour and other Turkish monumental inscriptions have since been discovered and deciphered. This is not the place to enlarge upon a purely scientific subject, having only indirect reference to Mongolia; but the fact that some one had 1200 years ago adapted a form of Aramean script to the (then) Turkish language, and that Aramean itself—as indeed every form of European alphabet—was most probably based upon the earliest alphabet of all—the Phœnician—creates another secular link between Far East and Far West.

Mongols, an Asiatic people belonging to what is commonly called the Ural-Altaic branch of the human family, are said (on somewhat doubtful authority) to derive their name from a word *mong*, which means 'brave,' 'bold.' Their origin and early history are lost in a dim antiquity. Chinese annals first speak of them as dwelling (6th to 9th century) in what is now Mongolia north of the desert of Gobi, and in the regions well to the south-east of Lake Baikal. The origin of the royal house is enshrouded in myths, the maternal

ancestor being by tradition a she-wolf; possibly (it has been suggested) the house was descended from a ruling family of the Turks (Hiung-nu); but the cradle of the Mongol people seems to have been on the plains between the river Onon, the Orkhon, and the Kerulon, the latter a tributary of the Argun, and this was at least a century before the word *Turk* came into use. The Old and New T'ang dynasty histories speak of the Mung-uh or Mung-wa as being the southernmost of five tribes grouped under the name Shih-wei, and about 550 A.D., when the Turkish conquests began, the Turks sent three military officers of *tudun* rank to govern these Shih-wei. It was in that region that Genghis Khan was born, and in that region that he fixed his permanent camp or capital, at a place called Karakorum (in Chinese Ho-lin). An ancestor of the great conqueror ruled in the middle of the 12th century over a confederation of Mongol tribes powerful enough to be a serious menace to the Nüchên or Kin empire of North China; and at the same time he was able to carry on a bitter contest against the other neighbouring Tatars. That the confederation was loose—probably the only tie was the compelling will of the energetic chieftain—is indicated by Temujin's (i.e. Genghis Khan's) early struggles. It was only by dint of hard fighting and tenacious persistence that he was able to maintain undiminished the power possessed by his father, and his father's father before him. But the conqueror's genius was in him, and he died supreme monarch of all central Asia (see GENGHIS KHAN). By his will his conquests and territories were divided amongst his sons; the third, Ogotai, succeeded him in 1229 as khakan or chief khan of all the Mongol people. Batu and Orda, the sons of the eldest son (Juchi), were invested with Khwarezm, the region watered by the rivers Ural, Oxus, and Jaxartes; Jagatai, the second son, received the territories between Bokhara; the Irish, and the Gobi; the region between the Irish and Lake Baikal was assigned to Ogotai; and to the youngest son, Tuli, was given the home country south of the Baikal. The first care of Ogotai was to complete, in conjunction with his brother Tuli, the conquest of North China. The capital of the Nüchên or Kins was taken in 1234, and, the last emperor of the dynasty having hanged himself, the Mongol ruler became emperor in his stead. North China having been thus subdued, Ogotai proceeded to conquer China south of the Yellow River, then governed by the Sung (Marco Polo's Manzi) dynasty, and to reduce Korea. Meanwhile another army, commanded by Batu, attacked and subdued the principalities of what is now Russia—Bulgaria on the Volga, Riazan, Moscow, Vladimir, Kieff. The force then divided: one division under Batu entered Hungary, crushed the Hungarians on the river Sayo, an affluent of the Theiss, and captured Pesth and Gran (1241); the other division overwhelmed the Poles and their German allies near Liegnitz; after some delay, they pushed on into Moravia. During the same period yet another Mongol army was assailing Khwarezm, which the son of the former ruler had recovered. This army drove Jelal-ud-Din out of his kingdom, overran Azerbaijan, and in 1236 Armenia and Georgia, in all of which campaigns their path was marked by terrible cruelties and atrocities. Ogotai died in 1241. Kuyuk, his son and successor, reigned seven years, and he was followed by his cousin Mangu, a son of Tuli. Both princes favoured Christianity. During Mangu's reign his brother Hulagu won great fame as the punisher of the Assassins (Ismaelites) in Persia, and as the destroyer of the khalifate of Bagdad. Moreover, he subjugated Syria, captured Aleppo and Damascus, and threatened Jerusalem. In-

vested with these countries, he founded the kingdom of the Ilkhans in Persia (q.v.). Mangu's successor was his illustrious brother Kublai (q.v.) Khan, whose descendants ruled over China (q.v.) from 1294 to 1368. This eastern division of the Mongols (the T'a-t'a of Chinese history, 1368-1644) finally was expelled from China, and its power crushed by the Chinese, in the end of the 14th century. It was reserved for the Manchus to crush the western division or Eleuths in the 18th century; they have uniformly used the term *Mengku* or Mongols for the northern and eastern groups since 1644. The same Manchu rulers gradually absorbed the various small bodies of Mongols scattered over the centre of Asia, from the Great Wall to the Altai Mountains on the west and Tibet on the south-west. Of other Tatar tribes which had formed part of the Mongol empires, in the west of Asia and the east of Europe were formed the Kipchak (q.v.) states—in Russia, the Golden Horde, which subsequently broke up into the Tatar (q.v.) khanates of Kazan, Astrakhan, and the Crimea; in Turkestan, the Uzbek (q.v.) principality, out of which grew the khanates of Bokhara and Samarkand. Towards the end of the 14th century Toktamish made himself chief of the eastern Kipchaks, and united thereto the chieftainship of the Golden Horde; but in 1395 his power was crushed by the greater Tamerlane (q.v.). In 1519 Baber (q.v.), a descendant of Genghis' son Jagatai, founded the Mogul empire in India. The Kalmucks (q.v.) or Eleuths (as we have just seen) also belong to the western branch of the Mongols.

The total number of Mongols now under Chinese rule is loosely estimated at two millions. They live for the most part in the immense plateau of central Asia called Mongolia (area, 1,288,000 sq. m.), which is girdled on all sides by lofty mountain chains (Altai, T'ien-Shan, Hing-an, &c.). Its southern portion consists of the vast desert of Gobi. These people are still nomads, as their historic ancestors before them always were. Their wealth consists in flocks of sheep, herds of horses (small, but very enduring), cattle, camels, and goats. They are mostly Buddhists, though those in the west are in part followers of Shamanism, as most Turanians or Tatars were before the days of the great Mongol conqueror. As a rule they are hospitable, though indifferent to personal comfort, addicted to cattle-stealing and to drink, but when sober good-hearted and friendly; on the whole, life being easy and their wants few and simple, they display a lack of foresight, and are lazy and dirty. They dwell in strong circular felt tents, which are their only protection against the violent sandstorms of summer and the still more terrible snow-hurricanes of winter. They are fond of making religious pilgrimages to Urga (q.v.), the religious capital of the country, and to various other shrines in China and Mongolia. Kalgan and Kiachta are the principal commercial centres; but what with the Russian political interference before the Great War, coupled with the Soviet complications, both commerce and policy have been unsettled. It is difficult to estimate the numbers of the western Mongols, as they have in many parts commingled with their Turkic neighbours; but see such articles as Kipchaks, Kirghiz, Russia, Siberia, Tatars, Turkestan, &c. See also **TURKS, ASIA**. The Buriats (q.v.), almost entirely subject to Russia, are a branch of the Mongol race.

The term Mongolic is used by ethnologists to describe the group of cognate languages which constitute one division of the Turanian (q.v.) family of speech. What Mongol literature there is consists for the most part of translations of religious works from Tibetan and Chinese, historical works (notably the chronicles of the Lama Ssanang

Setsen in the middle of the 17th century), of folk and fairy tales, and a few poetic productions. Perhaps the best known of the folk-tales are the collection entitled *Siddhi-Kâr* (ed. Jülg, 1868). Others have been published by him (1866-69), by Bergmann (1804-5), I. J. Schmidt (1839), and Russian savants.

See Howorth, *History of the Mongols* (1876-88); Gil-mour, *Among the Mongols* (1888), *More about Mongolia*, *More about the Mongols* (1893), and his *Diaries* (ed. Lovett, 1892); Parker, 'Mongolia after the Genghizides and before the Manchus,' in *R.A.S. Journal* (North China Branch), 1913.

Mongoose. See **ICHNEUMON**.

Monica. See **AUGUSTINE**.

Monier-Williams. See **WILLIAMS**.

Monism, a philosophical theory that all being may ultimately be referred to one category. Thus idealism, pantheism, materialism are monisms, as opposed to the Dualism (q.v.) of matter and spirit. See **PHILOSOPHY**, **HAECKEL**.

Moniteur, **LE**, a French journal, started by the publisher Panckoucke, 5th May 1789, under the title of the *Gazette Nationale, ou le Moniteur Universel*. During the Revolution its reports, &c., were of very great importance, and its value was immensely increased when, in 1800, it was made the official organ of the government. It retained the privilege (without the first title, *Gazette Nationale*, which was dropped in 1811) down to 1869, when it was supplanted by the *Journal Officiel*. Afterwards it was issued as an Orleanist or private Conservative paper.

Monitor, a name given to a genus of Lizards somewhat isolated from other lizards in structural characters. They are the largest of existing lizards; a specimen acquired by the College of Surgeons in London measured 6 feet 10 inches. The tail of the greater number is laterally compressed, the better to adapt them to aquatic habits. They have received the name Monitor from a notion, due originally to a confusion between the Arabic name *Varan* and the German word *Warnung*, that they give warning by a hissing sound of the approach of a crocodile or alligator. There is only one genus, with many species.—The Monitor or *Varan* of the



Monitor (*Varanus niloticus*).

Nile (*Varanus niloticus*) is of a rather slender form, and has a long tail. It is olive-gray, mottled with black. It attains a length of five or six feet. Crocodiles' eggs or young crocodiles form the chief part of its food. It is a curious superstition in India that the young of the monitor is more deadly than the most venomous serpent.

Monitor. See **NAVY**.

Monitorial System, employed by Dr Andrew Bell (q.v.), when superintendent of the Orphan Hos-

pital, Madras, in 1795, and by Joseph Lancaster, makes use of the more advanced boys in the school to instruct the younger pupils. See EDUCATION (*England*). The monitorial system is not, as is commonly supposed, a method of teaching; it is simply a method of organising schools, and of providing the necessary teaching power. At a time when the whole question of primary education was in its infancy, the state refusing to promote it on the ground that it was dangerous to society, and the public little disposed to contribute towards its extension, it was of great importance that a system should be adopted which recommended itself as at once effectual and economical. But its value as an educational agency was universally overrated, and in the end it broke down.

Monk. See MONACHISM.

Monk, GEORGE, Duke of Albemarle, soldier of fortune and restorer of the English monarchy, was the second son of Sir Thomas Monk of Potheridge, near Torrington, North Devon, and was born either there or at Lancross on 8th December 1608. He saw service first in the expeditions to Cadiz and Rochelle (1625-27), and then for nine years in Holland, returning to England in 1639, in time to take part in the two Bishops' Wars with the Scots. In 1642-43 he commanded a regiment against the Irish rebels, in 1644 was taken prisoner at Nantwich by Fairfax. He lay two years in the Tower, where he solaced himself with frail, ugly Nan Ratsford or Clarges (his future duchess), and whence he freed himself by taking the Covenant—Clarendon hints that he did so for money. As major-general in Ulster he so commended himself to Cromwell, still more by his brilliant conduct at Dunbar (1650), that next year he was left to complete the subjection of Scotland. In 1653 he was associated with Blake and Deane in naval operations against the Dutch, and won two great sea-fights over Tromp (q.v.); in 1654 Cromwell sent him back to Scotland as governor, in which difficult office he acquitted himself with vigour, moderation, and equity. Even the Highlands were reduced to order. His home for five years was Dalkeith, where he 'was ever engaged in business or in planting, which he loved as an amusement and occupation.' After Cromwell's death, seeing everything in confusion, and a splendid chance open to him who dared seize it, on New-year's Day 1660 he crossed the Border with 6000 men, and five weeks later entered London unopposed. So far he had kept his intentions profoundly secret. Still every one felt that the decision lay with 'Old George'; every party courted him; the Republicans even offered him the protectorate. But, while he offended nobody, he declined to connect himself with any of the sectaries, and waited patiently the course of events. From the first, his own wish, dictated by no high motive, had been to bring back the Stuarts; and before long he saw that the nation at large was with him. The freeing of the Rump parliament from the army, the re-admission of the excluded members, and the election of a new parliament—these were his wary steps towards the Restoration; on 23d May he welcomed Charles II. on the beach at Dover. Monk now was made Duke of Albemarle, and entrusted with the highest offices in the state. But he soon retired from political affairs. In 1665, when the plague ravaged London, and every one fled that could, as governor of the City he stuck bravely to his post, and did his best to allay the panic and confusion. Next year he was employed as second in command of the fleet sent under the Duke of York against the Dutch, and was defeated by De Ruyter in a sea-fight off Dunkirk, but soon after gained a bloody victory over him off the North

Foreland. He died on 3d January 1670, and was buried in Westminster Abbey.

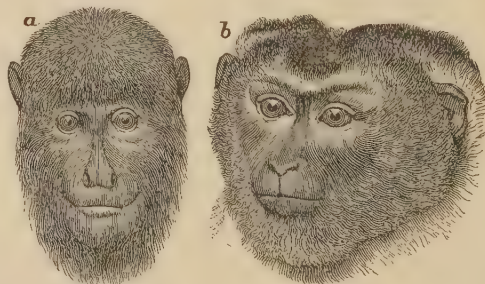
See, besides works cited at CHARLES I., CROMWELL, and CHARLES II., the *Lives of Monk*—or *Monck*—by Gumble (1671), Skinner (1723), Guizot (trans. 1851), Corbett (1889), and E. F. Ward (1915); Gardiner's *Civil War* (1865-1903); Firth's *Last Years of the Protectorate* (1910); and the notes and introduction to an *Address from the Gentry of Norfolk to General Monk*, 1660, published in 1913.

Monk, MARIA (c. 1817-50), pretended in 1835 to have escaped from the Hôtel Dieu nunnery at Montreal, and coming to New York, found many credulous people to believe in her (lying) *Awful Disclosures*.

Monk, WILLIAM HENRY (1823-89), composer of church music, born in Brompton, was music editor of *Hymns Ancient and Modern*, and composed *Abide with Me*.

Monkey, a term best restricted to all the Primates exclusive of the Anthropoid Apes (q.v.); sometimes applied to the tailed forms only, the rest being spoken of as Apes—an ill-judged distinction, implying that the non-anthropoid Primates are divisible into tailed and tailless species. The real distinction is not to be found in this character. The quadrumana as a whole are divisible into three great groups—(1) Anthropoid Apes; (2) Platyrrhini, the New-World monkeys; (3) Catarrhini, the Old-World monkeys. It is the two latter divisions that are dealt with in the present article.

In Platyrrhini the nostrils are far apart and look outwards; tail mostly prehensile, and number of premolar teeth greater than in Catarrhini, the dental formula being (for molars and premolars) p.m. $\frac{2}{1}-\frac{3}{2}$, m. $\frac{3}{2}-\frac{3}{2}$. In the marmosets the formula is p.m. $\frac{2}{1}-\frac{3}{2}$, m. $\frac{2}{1}-\frac{2}{2}$; this, coupled with some other peculiarities in their anatomy, led to the institution of a distinct group—Arctopithecini, regarded as equivalent to either the Platyrrhini or Catarrhini. They are now, however, more usually referred to the Platyrrhini, though placed in a separate family.



a, Platyrrhine face (*Mycetes villosus*); b, Catarrhine face (*Macacus leoninus*).

In Old-World monkeys, or Catarrhini, the nostrils are near together, and look downwards; the number of teeth 32, and these arranged as in the anthropoid apes and man; the molars and premolars being p.m. $\frac{2}{1}-\frac{3}{2}$, m. $\frac{3}{2}-\frac{3}{2}$ —the reverse of the condition seen in the Marmosets. The tail, when present, is not prehensile; and there are frequently ischial callosities developed, which are entirely unknown among the American monkeys.

The two divisions of the monkey tribe based upon those characters are absolutely distinct in their geographical distribution. The Platyrrhini are only found in America, the Catarrhini are limited to the Old World; further than this, the fossil species, which have not been found in strata earlier than of the Miocene period, show the same rigid correspondence between structure and distri-

bution. No Platyrrhine has been met with in the Old World, and no Catarrhine in the New. Whether this indicates that the monkeys of the two hemispheres have had an independent origin or not, is a matter for further inquiry; it must indicate in any case the remoteness of the period during which there was a passable land connection between Asia and America.

In both the Old and New Worlds monkeys are almost confined to the more tropical districts; and yet this is not entirely due to an incapacity for bearing a rigorous climate, for monkeys occur high up on the sides of mountains in India. Monkeys do not occur in the tropical parts of Australia. During the Miocene and Pliocene periods these animals inhabited Europe and even England, for the remains of a Macaque have been described from the county of Essex. At present the only trace left in Europe of these inhabitants is the *Macacus inuus* or Barbary Ape, which occurs on the Rock of Gibraltar as well as on the opposite coast of Africa. But this animal is perhaps not truly indigenous; it may have been introduced.

In the New World monkeys are most abundant in South America. The forests of the Amazon and the Orinoco may be regarded as their headquarters. There are only ten species which occur north of the Isthmus of Panamá, and only one of these extends its range into Mexico; this is a Spider Monkey. The West Indian islands contain no indigenous monkeys. The American monkeys are all arboreal; and this of course limits their range to forest-clad districts. The prehensile tail, not found in the Marmosets, has an obvious relation to their mode of life. It is remarkable that the long-tailed monkeys of the Old World, which might often gain considerable advantage from being able to use their tail as a grasping organ, are unable to do so.

Some of the more remarkable kinds of monkeys are noticed in separate articles (BABOON, BARBARY APE, ENTELLUS, HOWLER, MARMOSET, &c.).

Monkey-bread. See BAOBAB.

Monkey-flower. See MIMULUS.

Monkey-nut. See GROUND-NUT.

Monkey-puzzle. See ARAUCARIA.

Monk-fish, another name for the Angel-fish (q.v.), was also given to a large Squid.

Monkshood. See ACONITE.

Monk's Rhubarb. See DOCK.

Monkwearmouth is now included in Sunderland (q.v.)

Monmouth, the county town of Monmouthshire, stands, girt by wooded hills, at the influx of the Monnow to the Wye, 16 miles N. of Chepstow, 18 S. of Hereford, and 26 WSW. of Gloucester. Its chief features are the ruined castle of John of Gaunt, in which Henry V. was born; the parish church, dating from the 14th century, and restored in 1882 by Street, with a graceful spire 200 feet high; the bridge over the Monnow (1272), with its 'Welsh gate,' and near it a small Norman chapel; a fragment of a Benedictine priory, with 'Geoffrey of Monmouth's study,' the town-hall (1888); and a grammar-school (1614). The Nelson Museum has a good collection of Nelson's belongings. In the neighbourhood are the temple-crowned Kymin (800 feet), commanding a glorious view; the Buckstone, a rocking-stone, displaced by tourists in 1885, but since re-poised; and, 7 miles SW., the superb ruins of Raglan Castle, defended for ten weeks in 1646 against Fairfax by the old Marquis of Worcester. First chartered by Edward VI., Monmouth united till 1918 with Newport and Usk to return a member, but is now merged in the county. Pop. 5200.

Monmouth, capital of Warren county, Illinois, is 179 miles by rail WSW. of Chicago. It is the seat of Monmouth College (United Presbyterian, 1856), and manufactures pottery, ploughs, and cigars. Pop. 8000.

Monmouth, JAMES, DUKE OF, was born at Rotterdam, 9th April 1649, the son of 'browne, beautiful, bolde, but insipid' Lucy Walter (1630-83), by Charles II., she said, but more likely by Colonel Robert Sidney, to whom and to whose brother Algernon she had lately been mistress. When in 1656 she came with her son to London, she was treated as the king's wife, and by Cromwell was sent to the Tower, and then back to Paris. Charles sought out the boy and committed him to the care of Lord Crofts, who gave him his own name. In 1662, after the Restoration, 'Mr James Crofts' came to England with the queen-dowager, and was handsomely lodged at Hampton Court and Whitehall. In 1663 he was created Duke of Monmouth, and wedded to a rich heiress, Anne, Countess of Buccleuch (1651-1732); in 1670 he succeeded Monk as captain-general of the forces, and in 1673 received the additional title of Duke of Buccleuch. A poor, weak libertine, he yet became the idol of the populace, thanks to his beauty and his affability, to his humanity towards the Covenanters at Bothwell Bridge (1679), to the agitation of the Popish Plot and the Exclusion Bill, and to his two semi-royal progresses in the west and the north of England (1680-82). There were rumours of his legitimacy, the proofs in a certain 'black box,' and Shaftesbury knew well how to pit the 'Protestant Duke' against the Popish heir-presumptive to the throne, how to enmesh him in the Rye-house Plot (1683), on whose discovery Monmouth fled, as four years before, to the Low Countries. There he remained until Charles's death, when, in concert with Argyll's Scottish expedition, with eighty-two followers he invaded England. On 11th June 1685 he landed at Lyme-Regis, and issued a manifesto branding James as a murderer and popish usurper, and asserting his own legitimacy and right to the crown. He was received with acclamations at Taunton, where he was himself proclaimed King James II.; and on the early morning of 6th July, after a roundabout march to near Bristol and Bath, he attempted with 2600 foot and 600 horse (peasants mostly and miners), to surprise the king's forces, 2700 strong, which under the Earl of Feversham were encamped on Sedgemoor, near Bridgwater. His men could not cross a broad drain, and were mowed down by the royal artillery, 300 falling on the field, 1000 more in the pursuit. Monmouth himself had fled, but on the 8th was taken, disguised as a shepherd, in a ditch near Ringwood. His bearing before James was dastardly. He wept; he crawled to his feet; he even offered to turn Catholic. No: on 15th July he was bunglingly beheaded upon Tower Hill, and buried in the chapel of St Peter-ad-Vincula. His duchess had borne him six children; but his last thoughts were all with his mistress, Lady Henrietta Wentworth, who died of sorrow nine months after him. In the 'Bloody Assize' that followed the rebellion, Judge Jeffreys hanged 331 rebels, transported 849 to the plantations, and whipped or fined 33 others.

See LIVES by G. Roberts (1844) and Allan Fea (1901), with works cited at CHARLES II. and JAMES II.

Monmouthshire, a county in the west of England, bounded NE. by Hereford, E. by Gloucester, S. by the estuary of the Severn, and W. and NW. by South Wales. With a maximum length and breadth of 32 and 28 miles, it contains 546 sq. m., of which more than one-half is under permanent pasture, and about one-twelfth in woods. Pop. (1801) 45,582; (1841) 134,368; (1881) 211,267;

(1911) 395,719; (1921) 450,700. Its surface is hilly, especially in the north and north-west (the Sugar Loaf is 1954 feet high), but the Caldicot and Wentloog Levels, which for a distance of 25 miles skirt the southern coast, are so low as to require in places the protection of sea-walls and earthworks. The Wye, with its tributary the Monnow, the Usk, Ebbw, and Rumney, all flowing south into the estuary of the Severn, are the principal rivers. In the rich valleys of the three former wheat is the principal crop raised, whilst on the poorer soils on the west side of the county oats and barley are chiefly grown. There are also extensive orchards. The great wealth, however, of Monmouthshire is derived from its minerals, coal and ironstone abounding in the region of Pontypool and Rhymney, and much fireclay, limestone, and other building stone being produced. In the county are the municipal boroughs of Monmouth, Abergavenny, and the county borough of Newport. Five members (since 1918) are returned to parliament for the county, and one for the borough of Newport; the County Council numbers 64. Towns other than the above are Abertillery, Blaenavon, Caerleon, Chepstow, Ebbw Vale, and Tredegar. Monmouthshire, which until 1535 formed part of Wales, is still for many purposes so treated. In 1921 it was detached from Llandaff and made a separate see of the Episcopal Church in Wales. Monmouthshire is noted for its beautiful scenery and for the many remains of feudal castles, &c., scattered throughout it. Of these the finest examples are the castles of Raglan, Caldicot, and Chepstow, and the abbeys of Llanthony and Tintern. See the county histories by Williams (1796), Coxé (1801), and Bradney (1904, &c.).

Monochlamydeæ. See CALYX, FLOWER.

Monochord, an apparatus constructed to exhibit the mathematical proportions of musical intervals. It consists of a flat board of 4 or 8 feet long, or better 16 feet, where space can be spared. The breadth of the board is according to the number of the strings, which are from two to six. The board is covered with fine white paper. A straight line is drawn from end to end below each string, and each line is accurately divided into the different proportions into which the full length of the string, as a fundamental sound, harmonically divides itself (see HARMONICS). The string is fixed at one end, and rests on a bridge; while at the other end, where it also rests on a bridge, it is stretched by a peg or weight. A bow is used.

Monoclinical Strata are those which are so folded as to resume their original direction, forming as it were one-half of an Anticline (q.v.), or syncline.

Monoclinic System or OBLIQUE SYSTEM, a crystallographic system in which two of the three unequal axes are oblique to each other and perpendicular to the third.

Monocotyledons are an enormous group of flowering plants usually characterised by having leaves with parallel veins and the parts of the flowers in threes; they are mostly herbaceous, trees and shrubs being less usual and almost entirely tropical. While the distribution of the woody forms is limited chiefly to the warmer zones, some of the herbaceous types abound from Arctic to Antarctic. These plants are further distinguished from Dicotyledons (q.v.) by the possession of a single evident cotyledon in the seed stage, and by the fibro-vascular bundles of the stem being more or less isolated from one another, and never forming a distinct cylinder of woody tissue. The procambial strands responsible for the formation of these bundles do not persist and form

a cambium, hence there can be no secondary growth either of wood or bark as in woody dicotyledons and gymnosperms. The stem bundles instead of forming a cylinder of wood, which in transverse section resembles a ring, appear in such a section as if scattered without order throughout the fundamental or ground tissue; in many cases, however, a cross-section reveals a helicoidal, i.e. watch-spring-like spiral, arrangement. The young stem-axis in many cases does not elongate but becomes stunted, and when this is surrounded and enclosed by modified leaf-like parts such structures as corns and bulbs are formed, as in crocus, hyacinth, lily, &c. When, on the other hand, the axis ceases to grow after producing a strong lateral bud, the elongation of whose axis is quickly arrested by the formation of another similar bud, and so on repeatedly, a false axis or sympodium results. Such a structure, generally termed a rhizome, is usually more or less subterranean, and from it the roots arise as in Solomon's seal, iris, &c. When the elongated portions of the false axis between a succession of bud origins have each the length of a few inches a kind of stolon or runner results, as in many grasses, sedges, &c. All these subterranean structures are used for storing food, for perennating the plant over an unfavourable season, or as a means of vegetative increase. These structures, as gardeners well know, are very typical of monocotyledons, and attempts at the formation of similar organs in dicotyledons may be observed in primrose, wood-sorrel, cyclamen, potato, &c., and even in ferns the same adaptation is evident, as in male-fern, &c. If a growing bulb of a daffodil and the rhizome of a male-fern are cut longitudinally and examined it will be clear that in each the axis is shortened and the old leaf bases surrounding it utilised as storage organs for food substances. The daffodil has beaten the fern on the same evolutionary line, that is all. In the case of persistent, cylindrical, woody, aerial stems, such as those of palms, the growing point from the seedling stage continues to expand the young axis in diameter until it has reached a certain maximum without simultaneously developing it to any considerable height. Several years may be occupied in this growth, during which the stem is wider above than below. This is due to the new woody bundles and fundamental tissue of each season being formed by the growing apex on the inner side of that produced in a previous season. The older, harder wood is therefore continually pushed to the outer side in contradistinction to that of dicotyledons, and with this fact in view palms were formerly said to possess endogenous stems while dicotyledons were termed exogenous. This endogenous apical mode of growth naturally limits the diameter of the trunk, so that when a young palm-stem has attained its maximum diameter it continues to elongate but does not perceptibly increase in girth. In this curious way the tall, almost uniformly cylindrical stems of many palms are produced. In the case of *Dracæna* (Parlour Palms and Dragon Trees, q.v.) the stems may reach an enormous diameter. This is due to a peripheral layer of the fundamental tissue of the stem retaining its juvenile condition, and giving origin to a sort of cambium, instead of hardening as in palms. This cambial layer gives origin to additional fundamental tissue year by year, and among it a series of separate fibro-vascular bundles, thus slowly increasing the diameter of the stem. In addition to this another exterior cambial layer is produced which forms an outer layer of cork. These monocotyledons are therefore exogens, and some of them are enormous in both size and age. The leaves are usually alternate, and seldom opposite or whorled; they

have no stipules, but in many cases possess a sheathing base, as in grasses, sedges, iris, &c. In germination the seed commonly produces a strong primary root, as in dicotyledons. This, however, soon ceases to grow, and is replaced by lateral roots, which are produced adventitiously from the base of the stem, hence the fibrous tufts of grass roots compared with the tap-root of parsnip, &c. On this account the wide-spreading root systems of such trees as oak and pine are not produced by ordinary monocotyledons; even palms have fibrous roots.

The general reader will readily recognise plants of this group by the simple features first mentioned, and his ideas will be widened by a consideration of the examples mentioned below, which are arranged more or less in order of evolutionary progression from the simple and primitive to the complex and more recent. This, however, is impossible truly to represent in a linear series. The evolution of monocotyledons may be better understood by drawing a small circle to represent the primitive ancestral stock. Then from different parts of its periphery inscribe seven spirals of different colours and lengths, the first making one round of the circle and the last seven. The shortest (1st) marks pond-weeds, 2d palms, 3d grasses, 4th pine-apple, 5th lilies, 6th banana, 7th orchids. These spirals should then be connected with a few oblique, dotted cross-lines, especially between 3 and 4, 4 and 5, 5 and 6, and 6 and 7. On the spirals might be placed a succession of names representing genera both recent and fossil, and on the cross-lines names of intermediate connecting types. A scheme of this sort drawn on paper serves to impress one with the complex relationships introduced during the gradual evolution of modern monocotyledons, and is more truthful than a linear, radial, dendroid, or zigzag arrangement. The following are a representative set of monocotyledons: bur-reed, club-rush, screw-pine, naiad, grass-wrack, pond-weed, Triglochin, water-thyme, water-soldier, water-plantain, grasses, sedges, cotton-grass, aroids (e.g. Nile-lily, cuckoo-pint), duck-weed, palms, Restio, pipe-wort, spider-wort, Tillandsia, pine-apple, rush, lily, hyacinth, onion, tulip, Solomon's seal, New Zealand flax, Smilax, butcher's-broom, Yucca, Aloe, dragon-tree, parlour-palm, daffodil, snowdrop, Amaryllis, Agave, Alstremeria, Chinese yam, black bryony, Crocus, Gladiolus, Iris, banana, Manila hemp, ginger, Canna, Burmannia, and orchids.

To picture this series of plants in the mind's eye, together with the general characters already given, will afford the reader a basis for a more serious study of the monocotyledons as well as emphasise the vast importance of this group of plants to man and his food animals. Many of them provide the main source of supply for food, medicine, fibre, clothing, dwellings, &c., especially to people of warm regions, while others adorn the surface of the earth with beautiful flowers which raise and stimulate the higher nature of mankind.

The naturalist is prone to allow himself free rein when dealing with evolution. Here, however, this subject is introduced merely to indicate possible lines along which Nature has travelled: frankly, we have no exact knowledge of details. The annexed suggestions merely indicate how Nature may have proceeded in slowly evolving the more floristic monocotyledons from primitive types which were doubtless less floristic. First achlamydeous, acyclic flowers with an indefinite number of parts would be followed by more highly evolved kinds possessing dichlamydeous, pentacyclic, trimerous flowers. Going hand in hand with this rise of the floristic type would probably be the tendency for a higher specialisation from actinomorphic to zygo-

morphic flowers, in response to the general progression from the anemophilous to the entomophilous habit. Such progression in type would be accompanied by a gradual suppression of the floral axis, and hypogynous forms would evolve towards the epigynous type, and consequently the apocarpous towards the syncarpous. Such changes in plastic forms of plants have doubtless proceeded imperceptibly over so vast a period of the world's history that within the span of human record the existing plant population appears almost static. But besides the upward trend retrogressions have undoubtedly occurred. Plants like nations progress to a certain stage of complication or super-specialisation where the act of 'carrying on' becomes difficult or impossible in the face of a changing environment. Under such conditions modification of structure to match any necessary physiological variation must take place. Such structural modifications may be of greater or lesser complexity of body form (progression or retrogression), or, where plasticity has been insufficient for response, the type will suffer extinction, and a few examples of such have been handed down to us in the form of fossils. When considering the evolution of a group the foregoing, among other considerations, must be kept in view.

The seed of monocotyledons usually has a copious endosperm, and in germination, while the root from a rather small embryo grows vigorously, the cotyledon usually serves for the absorption of the endosperm; it consequently remains within the seed coat, and is commonly termed the haustorium or scutellum. The systematic study of the monocotyledons is most easily undertaken by clearly familiarising one's self with the Liliaceæ and their immediate allies, Amaryllidaceæ, Iridaceæ, &c.; and next by studying the progress of the floral specialisation, through Scitamineæ to its extreme in Orchidaceæ. Starting again from the lilies and their scarcely distinguishable allies, the rushes (Juncaceæ), we easily distinguish a series of still less floristic types, culminating in the sedges (Cyperaceæ) and grasses (Gramineæ), commonly grouped together as Glumifloræ. Another somewhat analogous line of change gives us the palms and Aroideæ, grouped as Spadicifloræ. These exhibit a connection with a lower type, the Pandanales, which include bur-reed, club-rush, and screw-pine. The Helobia (including Naiad, grass-wrack, pond-weed, as well as the Juncaginæ, Alismaceæ, and Hydrocharidaceæ) are also of special interest, as representing in some respects more primeval forms, and pointing back to a common ancestry with dicotyledons.

See VEGETABLE KINGDOM, and minor special articles; also Engler's *Pflanzenfamilien*, or the *Genera Plantarum* of Bentham and Hooker; Rendle, *Classification of Flowering Plants*, vol. i.; Warming and Potter, *Systematic Botany*; Wettstein, *Systematische Botanik*, Bd. ii.; Mrs Arber, *Monocotyledons* (1925); and the usual botanical text-books and floras.

Monod. ADOLPHE, an active theologian of the Reformed Church, was born in 1802 at Copenhagen, the son of a preacher, himself a native of Geneva. He studied at Geneva, and laboured as a preacher at Naples and Lyons, as a professor at Montauban, and again as a preacher in Paris until his death, 6th April 1856. He published sermons and many religious works which were widely popular.—His brother, FRÉDÉRIC, born 17th May 1794 at Monnaz, in the canton of Vaud, was thirty years a prominent pastor in Paris, and founded in 1849, together with Count Gasparin, the Free Reformed Church of France. He edited until his death, 30th December 1863, the *Archives du Christianisme*. See Adolphe's Life and Letters (Eng. trans. 1885).

Monodon. See NARWHAL.

Monodora, or CALABASH NUTMEG. See NUTMEG.

Monœcious, a term introduced by Linnæus to describe those plants which have the stamens and pistil in different flowers, but upon the same plant. Such plants formed one of the classes (*Monœcia*) of the Linnean system, but were obviously a specially artificial alliance, since that partial or complete separation of the sexes to which we apply the terms monœcious or diœcious respectively arises continually among the most unrelated plants.

Monogenists. See ETHNOLOGY.

Monogram (Gr.), a character composed of two or more letters of the alphabet, often interlaced with other lines, and used as a cipher or abbreviation of a name. A perfect monogram is one in which all the letters of the word are to be traced. They are found on early Greek coins, medals, and seals, and on the family coins of Rome, but not on the coins of the earlier Roman emperors. Constantine placed on his coins one of the earliest of Christian monograms, composed of the first and second letters of ΧΡΙΣΤΟΣ (*Christos*), a monogram which also appeared on the Labarum (q.v.; see also CROSS, and CONSTANTINE); we often find it combined with the first and last letters of the Greek alphabet (Rev. i. 8). Another well-known monogram is that of the name of Jesus, IHS, from the first three letters of ΙΗΣΟΥΣ. Popes, emperors, and kings of France during the middle ages were in the practice of using a monogram instead of signing their names. Fig. 1 represents that of Charlemagne, a perfect monogram, in which all the letters of *Karolus* can be traced. Painters and engravers in Germany and Italy have used monograms to a large extent as a means of distinguishing their works. Fig. 2 is the monogram of Albrecht Dürer. The first typographers made use of monograms or ciphers, a series of which, well known to the bibliographer, fixes the identity of the ancient editions, German, Italian, and English, from the invention of printing down to the middle or end of the 16th century. Those of William Caxton and Gaspard Philippe, an old Paris printer, will be found at BOOK. Potters' marks will be found at POTTERY.

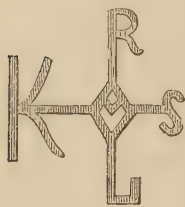


Fig. 1.



Fig. 2.

Monolith. See STANDING-STONES.

Monomania. See INSANITY.

Monometallism. See BIMETALLISM.

Monomotopa, a 16th-century name for SE. Africa, apparently transferred in error from a prince to the country. See AFRICA (*Exploration*).

Monongahela, a river which rises in West Virginia and flows north to Pittsburgh, where it unites with the Alleghany to form the Ohio.

Mono'physites, Christians who hold that Christ has only *one* nature. See GREEK CHURCH.

Monopoli, a town of Southern Italy, on the Adriatic, 43 miles by rail NW. of Brindisi, with a cathedral, ancient walls, and a castle built in 1552 by Charles V.; pop. 30,000.

Monopoly is properly definable as the sole or exclusive right of selling or trading enjoyed by an individual or group of individuals. In its strict sense monopoly belongs to an economic era which has passed away. During mediæval times and the period that followed, exclusive rights prevailed in almost all departments. There were manorial

rights which circumscribed individual action. The city and the guild had their spheres of production and of trade more or less clearly defined, and more or less thoroughly recognised in practice. The central governments which arose on the ruins of the mediæval system continued to recognise such exclusive rights, sometimes conferring on favoured individuals the sole privilege of selling the most necessary articles of life, in other cases granting to great companies the monopoly of trade over immense regions of the world. It is with these instances that the name monopoly is most strictly associated in history. The last parliament of Elizabeth, held in 1601, pronounced an emphatic condemnation of the monopolies granted by that queen, and even she had to yield to the storm. Salt and coal were among the articles whose sale was thus subject to monopoly. One of the members made a sensation by asking: 'Is not bread among the number?' Curiously enough, the previous year saw the foundation by royal charter of the greatest of the companies which were based on the exclusive right of trade in an immense foreign market, the East India Company. The opposition to monopolies at home continued under the Stuarts, and their abolition may be regarded as one of the important results of the great parliamentary struggle of that time.

The spread of freedom has tended to the abolition of such monopolies, whether vested in individuals, in trade corporations, or in great companies engaged in foreign commerce. But, while the monopoly of law has so far passed away, new tendencies towards a monopoly of fact have been setting in. Under the prevalent system it is still the aim of the competitor to secure as far as possible the exclusive sale of the commodity in which he deals, either in the world-market or over a given portion of it; and when the single competitor is not strong enough to accomplish this, he seeks to attain his object by combination with a group of those engaged in the same business. The modern *trust* syndicate or union is the outcome of such efforts; and the great danger attendant on such gigantic combinations is the establishment of a monopoly injurious to society. The trust considered in its social and economic aspects offers a wide problem for discussion; there can be no doubt that it establishes or seeks to establish a monopoly of fact. For the recent growth of trusts in this sense in the United States and Britain, and attempts to control them by law, see ASSOCIATIONS, TRUSTS, AND CARTELS. In Australia the Federal Parliament endeavours to control by legislation attempts to monopolise trade to the detriment of the public. Some monopolies, as in tobacco, are retained by certain governments, but purely for revenue purposes. See also FARMERS-GENERAL.

Monorail. See RAILWAY.

Monotheism, the term usually employed to denote a belief in the unity of the Godhead, or belief in and worship of one God. It is thus the opposite of *Polytheism*. The doctrine of the Trinity is thought by some (e.g. the Unitarians) to be incompatible with the monotheism taught by Jesus Christ, and is therefore rejected as no part of His teaching. Mohammedans and Jews, of course, reject with vehemence the least approach to a Trinitarian conception of the Deity.

Monothelism (Gr. *monos*, 'single,' and *thelein*, 'to will'), the doctrine that Christ had only one will. It is a modification of Eutychianism. See EUTYCHES; GREEK CHURCH.

Monotremata (Gr. *monos*, 'single'; *trēma*, 'an opening'), the lowest order of mammals, sometimes called Prototheria and Ornithodelphia. There are but three living genera—Ornitho-

rhynchus (q.v.), Echidna (q.v.), and Proechidna, confined to Australia, Tasmania, and New Guinea, and very few fossils are known. The Monotremes differ in many ways from all other mammals, and some of their peculiarities may be called reptilian. Most striking of all are the two facts, that they are oviparous, and that the relatively large eggs (about 12 by 15 mm. when laid) show partial (or meroblastic) not total (or holoblastic) segmentation. The milk glands are without teats, and the milk oozes out by numerous apertures on the skin, whence it is licked off by the young. The cerebral hemispheres of the brain, smooth in Ornithorhynchus, convoluted in Echidna, are without the transverse bridge of fibres, the corpus callosum, which is characteristic of placental mammals. The pectoral girdle, which recalls that of some reptiles and amphibians, has a strong coracoid reaching the breast-bone, whereas in other mammals the coracoid is a mere process, fused to the shoulder-blade or scapula. There is a large T-shaped prosternum or 'interclavicle.' The hip-girdle shows marsupial or epipubic bones, as in marsupials. There are no hints of teeth in Echidnidae, and those of Ornithorhynchus last only until the animal is half-grown, when they are shed and replaced by horny pads. The heart, as compared with that of other mammals, is less differentiated in respect to the valve between the right auricle and the right ventricle. The temperature of the body is lower than usual (about 28° C.), and is notably variable. In other words, the 'warm-bloodedness,' characteristic of mammals and birds, is not quite perfect. The urinary and reproductive arrangements are peculiar, and, as the name monotreme suggests, there is one common terminal chamber, or cloaca, by which ureters, genital ducts, and food-canal communicate with the exterior. Monotremes might be briefly defined as oviparous mammals with meroblastic ova. Their nearest relationships are probably with the extinct Multituberculata. See F. E. Beddard, 'Mammalia,' *Cambridge Natural History*, vol. x. (1902).

Monreale, a city of Sicily, 5 miles SW. of Palermo. The 'royal mount,' from which it gets its name, is 1231 feet high, and on it stands the famous cruciform Norman cathedral (1176), which measures 333 by 132 feet, and within is entirely covered with mosaics. Pop. 27,000.

Monro, ALEXANDER, founder of the medical school of Edinburgh, styled *primus* to distinguish him from his son and successor, was born in London, September 8, 1697. His grandfather, Sir Alexander Monro, a colonel in the army of Charles II. at the battle of Worcester in 1651, was afterwards an advocate at the Scottish bar. Alexander studied at London under Hawksbee, Whiston, and Cheselden, at Paris under Bouquet, and at Leyden under Boerhaave, and after 1719 lectured at Edinburgh on anatomy and surgery. His lectures, with those of Alston on botany, led to the founding of the medical school, when Monro was appointed professor of Anatomy in 1721. He was received into the university in 1725. For forty years he lectured regularly on anatomy and surgery from October to May, students coming from all parts of Britain to hear him. Of the establishment of the Royal Infirmary of Edinburgh he was one of the two principal promoters, and he there delivered clinical lectures. In 1759 he resigned the anatomical chair to his youngest son, Dr Alexander Monro, but continued his clinical lectures at the Infirmary. His principal works are *Osteology* (1726), *Essay on Comparative Anatomy* (1744), *Observations Anatomical and Physiological* (1758), and an *Account of the Success of Inoculation of Smallpox in Scotland*

(1765). He died July 10, 1767. He was a Fellow of the Royal Society of London, and of various foreign societies. A collected edition of his works, with Life, was issued by his son (1781).

ALEXANDER MONRO, *secundus* (1733-1817), youngest son of the preceding, studied at Edinburgh, Berlin, and Leyden, and succeeded his father in the chair of Anatomy, and as secretary of the Royal Society of Edinburgh. He published works on the nervous system (1783), on the physiology of fishes (1785), and on the brain, the eye, and the ear (1797).—He again was succeeded by his son, ALEXANDER MONRO, *tertius* (1773-1859), who wrote on hernia, and on the stomach, and an *Anatomy of the Human Body* (4 vols. 1813).

Monroe, a city of Michigan, on the Raisin River, 2 miles by a ship-canal from Lake Erie, and 35 miles SSW. of Detroit, has tile, paper, flour, and other works; pop. 11,600.

Monroe, JAMES, fifth president of the United States, was born in Westmoreland county, Virginia, 28th April 1758, the descendant of a family of Scottish extraction which had emigrated to Virginia a century before. He entered William and Mary College at the age of eighteen, but soon threw aside his books, with a number of his fellow-students, to join the army under Washington. He was present at several battles, and was wounded at Trenton; he afterwards attained the rank of lieutenant-colonel as an aide-de-camp and military commissioner but was disappointed in his efforts to obtain a commission in a Virginia regiment, and attached himself to Jefferson, with whom he studied law. In 1782 he was elected to the assembly of Virginia and appointed one of the executive council. Next year he was returned to congress, where he sat for three years, and in 1785 was chairman of a committee whose report ultimately led to the conventions at Annapolis and Philadelphia in 1786 and 1787, at which the constitution of the United States was framed. Monroe himself was a member of the Virginia convention held to consider the ratification of the proposed constitution, which, along with Patrick Henry and other States' Rights men, he opposed, fearing the power and encroachment of the Federal government. He was a member of the United States senate from 1790 to 1794, and offered a determined opposition to Washington and the Federalists; yet the government appointed him to succeed Gouverneur Morris as minister to France, where he made himself very popular with the revolutionary government, until he was recalled in 1796 for displaying too decided French sympathies. On his return he published (1797) an attack on the executive for their treatment of him, and, although Washington himself, who had then retired, took no notice of it, the book brought on a bitter controversy and made Monroe the darling of the Democrats. He was governor of Virginia from 1799 to 1802, and then Jefferson sent him as an extra plenipotentiary to France, where in 1803 he and Robert R. Livingston effected the purchase of Louisiana (q.v.). The next four years were spent in less successful diplomacy at London and Madrid; he failed in his negotiations with Spain for the cession of Florida, whilst a treaty which he finally concluded with Great Britain provided neither against the impressment of American seamen nor for an indemnity for American losses by seizures at sea, and Jefferson refused to refer it to the senate. Monroe promptly returned home and drew up another defence, and the Virginians endorsed his conduct and policy by a third time electing him to the assembly. In 1811 he was again chosen governor of Virginia. In the same year Madison made him secretary of state; this

post he retained till 1817, and during 1814-15 he acted also as secretary of war.

In 1816 Monroe was elected president of the United States, and four years later he was re-elected almost unanimously; the acquisition of Florida from Spain (1819), and the settlement of the vexed question respecting the extension of slavery by the Missouri Compromise, by which, after the reception of Missouri as a slave-state, the institution was prohibited above the line of latitude 36° 30', helped to secure this result. His most popular acts, perhaps, were the recognition of the independence of the Spanish American republics, and the promulgation in a message to congress (1823) of what has since been called the 'Monroe Doctrine.' This utterance embodied the principle, 'in which the rights and interests of the United States are involved, that the American continents . . . are henceforth not to be considered as subjects for future colonisation by any European power. . . . With the existing colonies or dependencies of any European power we have not interfered, and shall not interfere. But with the governments who have declared their independence and maintained it, and whose independence we have . . . acknowledged, we could not view any interposition for the purpose of oppressing them, or controlling in any other manner their destiny, by any European power, in any other light than as the manifestation of an unfriendly disposition towards the United States.' In 1825 Monroe retired to his seat at Oak Hill, Loudon county, Virginia, where he acted as justice of the peace, a regent of the university of Virginia, and member of the state convention; but a profuse generosity and hospitality caused him to be overwhelmed with debt, and he found refuge with his relations in New York, where he died in 1831—like his predecessors, Adams and Jefferson, on the 4th of July.

See *Monroe's Writings*, ed. Hamilton (1898, &c.); *Lives* by J. Q. Adams (1850) and D. C. Gilman (1893); and books on the 'Monroe Doctrine'—really formulated by J. Q. Adams (q.v.)—by Tucker (1885), Reddaway (1898), Pollock (1903), Edgington (1905), Kraus (1913), Hart (1916), Alvarez (1924).

Monrovia. See **LIBERIA**.

Mons (Flem. *Bergen*), the capital of the Belgian province of Hainault, on the Trouille, 38 miles SSW. of Brussels. Its fortifications, renewed and strengthened since 1818, were demolished in 1862; but the country around can be laid under water. The Canal de Condé connects Mons with the Scheldt. The church of St Waudru (1450-1589) is a masterpiece of Gothic; and there are a town-hall (1458), a belfry (1662) 275 feet high, a good library, &c. The manufactures include woollen and cotton goods, cutlery, and sugar; whilst the vicinity forms an extensive coalfield. Pop. 28,000. Mons, occupying the site of one of Cæsar's camps, was made the capital of Hainault by Charlemagne in 804. France, Spain, and Austria often contended for its possession. The retreat of the British from Mons in August and September 1914 has given it a new fame. See Boussu's *Histoire de Mons* (2 vols. 1868).

Monsignore, a title of honour given to prelates of the Roman Catholic Church. Formerly in France the corresponding title of *Monseigneur* was allowed to all high dignitaries of the church, to the princes of the blood-royal, to the higher nobles, and to the presidents of the superior law-courts. But from the time of Louis XIV. *Monseigneur* without further addition was appropriated as the title of the Dauphin.

Monsoon is derived from the Arabic *Mausim*, 'a set time,' 'season,' and was for long applied to

those winds prevailing in the Indian Ocean which blow from the south-west from April to October, and from the opposite direction, or north-east, from October to April. The monsoons, in common with all winds whether regular or irregular, depend primarily on an unequal distribution of temperature and moisture over that portion of the earth's surface where they occur, which in its turn gives rise to an unequal distribution of atmospheric pressure. From this unequal distribution of the mass of the earth's atmosphere winds take their rise—winds being simply the flow of the air from a region of higher towards a region of lower pressure, or from where there is a surplus to where there is a deficiency of air. The term monsoon has in recent years come to be used with a wider significance than formerly; it is now generally applied to the winds connected with all continents which are of regular occurrence with the periodical return of the seasons. The winds of Australia are thus strictly monsoonal; over the greater part of North America the prevailing winds have a well-marked monsoonal character; similarly, monsoons occur on the coasts of Brazil, Peru, North Africa, and all other regions that happen to lie between regions whose temperature, and necessarily their pressures also, differ markedly from each other at different times of the year. See **WIND**.

Monstrance (Lat. *monstrare*, 'to show'), called also **OSTENSORY**, the sacred utensil employed in the Catholic Church for the purpose of presenting the consecrated host for the adoration of



Monstrance.

the people, as well while it is carried in procession as when it is exposed upon the altar on occasions of special solemnity and prayer. It consists of two parts, the foot or stand upon which it rests, and the repository or case in which the host is exhibited. The latter contains a small semi-circular holder called the *lunula*, or crescent, in which the host is fixed; and it appears anciently to have been of a cylindrical or tower-shaped form, in the central portion of which, consisting of a glass or crystal cylinder, the host was placed. At present it is more commonly in the form of a star or sun with rays, the central portion of

which is of glass or crystal, and serves to permit the host to be seen. This portion, or at least the crescent, is of gold or of silver gilt; the rest is generally of the precious metals, or at least gilt or silvered, although the lower portion is occasionally of bronze artistically wrought.

Monstrosity is the term applied in human and comparative anatomy to an aberrant formation of the body consequent upon early disturbances in the developmental processes in the embryo. Teratology (q.v.), the special and very interesting branch of biology which deals with the causes of such occurrences and with the classification of the 'monsters' so produced, has been advanced by the researches of Geoffroy Saint-Hilaire, Förster, and others to the position of a special science, and one that throws a valuable side-light on that of normal

embryology. The malformations to be dealt with may affect the whole organism or portions only of its structure. Monsters are, however, usually classified under three headings: (1) Those with exaggerated or supernumerary parts (*monstra per excessum*); (2) those lacking parts (*monstra per defectum*); and (3) those with abnormally arranged parts (*monstra per fabricam alienam*). Those of the first class, where supernumerary limbs or a double head or trunk exist, are generally recognised as due to the more or less complete fusion of two embryos, originally separate, during the process of development. Cases of this kind show that almost every possible degree of fusion of separate embryos may occur, resulting in a correspondingly great variety in the shapes of the monsters produced. Two otherwise complete bodies may be attached by an external bond, as in the case of the Siamese twins and the 'two-headed nightingale,' or the one may be wholly or partially enclosed by the tissues of the other. A case of such complete inclusion is found in the Hunterian Museum. Much more frequently, however, only imperfect relics of the one remain attached to, or fused with, the fully-developed structures of the other. Thus arise two-headed monsters, those with double trunks or double sets of limbs, and those in which a shapeless mass representing the blighted embryo remains attached to the fully-formed body of the other. In this same class of monsters by exaggeration must be placed also cases of general or local gigantic development, due not to fusion of separate embryos but to general or local precocity of growth in the tissues of a single organism. Not less interesting are monsters of the second class, where entire parts of the body may be suppressed during development. Here again it is shown that the non-development may occur in any region and to any extent: consequently numerous and widely separated varieties of monster are found in this class. For instance, a headless or brainless monster is of necessity incapable of living; whereas one with suppression of a limb is viable, and might more properly be described as a case of congenital deformity. In the third class are the cases of transposition of viscera, malposition of limbs, congenital dislocations of joints, &c. and cases more resembling lower types of animals, dogs, or apes, &c. See DEFORMITIES, CLUB-FOOT, and, for monstrosity in plants, TERATOLOGY.

Montagnana, a town of Northern Italy, 32 miles SW. of Padua; pop. 12,000.

Montagnards, or simply MONTAGNE, 'the Mountain,' the name given to the extreme democratic politicians in the first French Revolution, because they seated themselves on the highest benches of the hall in which the National Convention met. The body included both Jacobins and Cordeliers; its principal members were Danton, Marat, Robespierre, St Just, and Collot d'Herbois, the men of 'the Reign of Terror.' The antagonistic party were 'the Plain,' the Girondists (q.v.), who sat on the lowest benches, on the floor of the house. After the overthrow of the Girondists this part of the house was styled 'the Marsh or Swamp,' and included all the members whose votes were under the control of 'the Mountain.' In 1848 the extreme party in the National Assembly, composed of revolutionary democrats and communists, sometimes flattered itself by assuming the title of 'the Mountain.'

Montagu. The illustrious family of Montagu springs from Drogo de Montacute, who came from Normandy with the Conqueror. Sixth in descent from him was Simon de Montacute, grandfather of the William de Montacute created Earl of Salisbury in 1337, many of whose successors have

been great historical personages. The subsequent family of Montagu descended from Simon (younger brother of the third Earl of Salisbury), who was the ancestor of Sir Edward Montagu, Speaker of the House of Commons and afterwards Lord Chief-justice, who died in 1557. His son, Sir Edward Montagu of Boughton, had six sons; Edward, the eldest, was made Baron Montagu of Boughton; and his grandson Ralph, third baron, was (1689) created Earl of Montagu, and in 1705 Duke of Montagu. In his son John the male line of the first Baron Montagu became extinct. The third son of Edward of Boughton was Sir Henry Montagu, the famous lawyer and orator, who was Lord Chief-justice, and created Lord Montagu of Kimbolton, and afterwards (*temp.* Charles I.) Earl of Manchester (q.v.). His son (second earl) was a general in the parliamentary army, who gained distinction by his victory over Prince Rupert at Marston Moor, but subsequently gave in his adhesion to Charles II. on his restoration. The fourth Earl of Manchester was an enthusiastic follower of William III., fighting with him at the battle of the Boyne, and taking part in the siege of Limerick; he was eventually created Duke of Manchester in 1719 by George I. The sixth son of Edward of Boughton was Sir Sydney Montagu, whose son, Edward, was a considerable mathematician, and serving first in the army, then in the navy, became the first sole commander of the English navy, and was created by Charles II. Lord Montagu of St Neots, Viscount Hinchinbroke, and Earl of Sandwich.

Montagu, CHARLES. See HALIFAX (LORD).

Montagu, ELIZABETH (1720-1800), daughter of a Yorkshire squire named Robinson. After the death of her husband (a grandson of the Earl of Sandwich) became 'the Queen of the Blue-Stockings,' and wrote on Shakespeare against Voltaire. See books by Miss Climençon (1906) and R. Huchon (1907); also articles BLUE-STOCKINGS, SALON, and books there named.

Montagu, LADY MARY WORTLEY, born about 1690 at Thoresby, Nottinghamshire, was the eldest daughter of Evelyn Pierrepont, Earl (afterwards Duke) of Kingston, who, a widower, introduced his daughter to society at a very early age. In 1712 she married, without the consent of her father, Edward Wortley Montagu, grandson of the first Earl of Sandwich. For more than three years after her marriage she lived at Wharnccliffe Lodge, near Sheffield, where her son was born, her husband during this time being kept principally in London by his parliamentary duties. On the accession of George I. Mr Montagu obtained a seat at the Treasury Board, and from this time Lady Mary lived in London, where she gained a brilliant reputation by her wit and beauty, and was on terms of intimate friendship with Addison and Pope, and other literary men of the day. In 1716 Mr Montagu was appointed ambassador to the Porte, and in August of that year he set out for Constantinople, accompanied by his wife. They remained abroad till 1718, and during this time Lady Mary wrote the well-known *Letters* to her sister, the Countess of Mar, Pope, and other friends. The *Letters* give a true description of Eastern life and manners, and are written in a clear, lively style, sparkling with wit and humour. While in Turkey she witnessed Inoculation (q.v.), and introduced it into England on her return, having so much faith in its safety that she tried it first on her own son. The next twenty years of her life she passed in England, and fixed her abode at Twickenham, where she renewed her intimacy with Pope, and then quarrelled with him, but not, as was said, because of the publication by Lady Mary of six satirical sketches entitled *Town Eclogues*. In

1739, for reasons which are not well known, she left England and her husband, from whom, however, she parted on very good terms, though they never met again. She lived in Italy, first on the shores of the Lake of Iseo, and afterwards at Venice till 1761, when, at the request of her daughter, the Countess of Bute, she returned to England. She died 21st August 1762. A collected edition of her works, with Life, was published by her great-grandson, Lord Wharncliffe (3 vols. 1837; 3d ed. 1887). See a book by G. Paston (1907), and numerous editions of selected Letters.

Montague, CHARLES EDWARD, born in 1867, in 1890-1925 was on the staff of the *Manchester Guardian*, well known as a brilliant journalist. In 1910 he published *A Hind let Loose*, a novel dealing with journalistic life; and *Dramatic Values* in 1911, but it was only in 1922 when his *Disenchantment* appeared that he became the great modern exponent of the language of indignation. This book of rare literary grace and style is a burning indictment of war with its abuses and super-abuses, and is worthily followed by *Fiery Particles* (1923).

Montaigne, MICHEL EYQUEM DE, was the third son of Pierre Eyquem, Seigneur de Montaigne. He was born 28th February 1533 on the family estate in Périgord. His father had ideas of his own on education, and his third son was to have the full benefit of them. The first novel step was the putting of Michel out to nurse in a village on the estate, that he might be early inured to simple habits of living, and learn to sympathise with the lot of the poor. Whether or not the result of this early association, it is the fact that in his after life Montaigne always spoke of his poorer neighbours with a respect and kindness of tone remarkable in the age and class to which he belonged. It was the received opinion at the period of Montaigne's childhood that no boy could grow into a creditable citizen without a severity of discipline which would now be called brutal terrorism. It was the distinctive feature of Pierre de Montaigne's system, however, that boyhood should be made as happy as parents and teachers could make it, and in the upbringing of his famous son he was even whimsically humane. Every morning he had the boy awaked by the sound of some musical instrument, because he had heard 'that it disturbs the tender brain of children to awake them suddenly.' As he wished to make his son a scholar, and Latin was, therefore, an indispensable acquisition, he had the idea of converting a task into a natural pleasure. Till the age of six the boy was taught to speak no language but Latin, his tutor (a German), his parents, and even the domestics addressing him in that language. The result was that in the conversational command of Latin Montaigne had from boyhood the advantage of the best scholars of the day. His father was less successful in a novel method he also adopted in having him taught Greek.

When Montaigne reached the age of six his father 'allowed himself to be won over to common opinion,' and sent him to a school in the neighbouring city of Bordeaux—the Collège de Guienne, then, he himself tells us, the best in all France. His father, who as a former mayor had considerable influence in the city, 'made several stipulations against the rules of colleges, though, all the same, it still remained a college.' At this school Montaigne remained for seven years, boarding in the rooms of his successive teachers, among whom were two scholars of European celebrity, George Buchanan and Marc-Antoine Muret. The course of study in the college was almost exclusively the reading of Latin authors, and in after life Montaigne affirmed

that, so far as he could judge, all these years were lost.

As a third son he had to choose between law and the church—only the eldest having the privilege of wearing the sword. All his life Montaigne had an insuperable difficulty in making up his mind, and on this occasion his father saved him the trouble by setting him to the study of law. In what school he pursued his legal studies has not been discovered, all that we know of them being summed up in his own sentence—'While a child I was plunged up to the ears in law, and it succeeded.' From the age of thirteen to twenty-four Montaigne is almost lost sight of. Casual references in his *Essais* prove that during this period he was frequently in Paris, that he knew something of court life, and that he took his full share of its pleasures. His legal studies received their reward in his appointment as member of the Court of Aids in the district of Périgord; and in 1557, by the consolidation of this court with the Parlement of Bordeaux, Montaigne became a city counsellor. The office was an honourable one; but it was little to Montaigne's taste, who, in truth, is never weary of telling us that every form of restraint was against all his natural inclinations. It was during his tenure of this office that he formed his famous friendship with Etienne de la Boétie (1530-1563), a relation which he always regarded as the happiest and most memorable of his life. To Montaigne La Boétie seemed in gifts of soul and intellect the equal of the greatest characters of antiquity. From the writings La Boétie left behind him (poems and a political pamphlet, *Le Contr' Un*, advocating extreme republicanism), it seems probable that Montaigne exaggerated his powers. This devoted friendship, so soon cut short by La Boétie's death, never failed to raise Montaigne above himself, and adds the one romantic touch to his epicurean temper.

Montaigne held the office of counsellor for about thirteen years; but of this period of his life, also, no definite history has been recovered. From incidental remarks of his own we gather that he was familiar with the court of Francis II., that he saw and greatly admired Mary, Queen of Scots, and that at some time or other he was 'gentleman of the bedchamber in ordinary,' an office that did not necessitate residence at court. From Charles IX. he received the order of St Michel, instituted by Louis XI., and once a coveted honour, but in Montaigne's day somewhat faded in its lustre. On 27th September 1565 he married Françoise de la Chassaigne, the daughter of one of his fellow-counsellors in Bordeaux, though in taking the step he assures us that he merely yielded to convention, as of his own inclination 'he would not have married Wisdom herself.' As the times went, Montaigne was a faithful and considerate husband; but he makes no secret that his wife held but a subordinate place in his thoughts. He lost 'two or three' children (the expression is his own) in their infancy, and was survived by one daughter, of whom, as he speaks little in his writings, it may be concluded that she was bound to him by no peculiar tie of affection. At the request of his father (who died in 1568) he translated (and published in 1569) the *Natural History* of Raymond de Sebond, a Spaniard, who in the preceding century had professed theology, philosophy, and medicine at Toulouse. This translation is noteworthy as being Montaigne's first effort in literature, and as having afterwards supplied the text for one of his most famous essays, the *Apologie de Raymond Sebond*, in which he exhibits in all its bearings the full scope of his sceptical philosophy. Two years later he published certain literary remains of his friend La Boétie (1571).

In 1571, his two elder brothers being dead, Montaigne retired to the Château de Montaigne, and here till his death in 1592 he lived the life of a country gentleman, varied only by a few visits to Paris, and by eighteen months' travel in Germany, Switzerland, and Italy. It was during this period that he achieved his immortality. Finding on his retirement to his château that some mental occupation was imperatively necessary to save him from morbid fancies, he began those *Essais* which were to give him a place among the first names in literary history. If we know few incidents regarding this period of his life, we have at least the minutest record of his entire surroundings, of his daily manner of life, of his tastes, his habits, his speculations and imaginings. In 1580 two volumes of *Essais* appeared at Bordeaux, in 1588 a third volume was added, and in 1595 a new and augmented edition was published. In June 1580, partly on account of his health, and partly from his strong natural curiosity to know strange countries, he set out on the prolonged course of travel above mentioned. His record of this journey, dictated to his secretary, and partly written in his own hand in French and Italian, was discovered in his château, and first published in 1774. While at the baths of Lucca, the announcement came to him that he had been unanimously elected mayor of Bordeaux. He at first refused the appointment, but at the instance of his friends and on the command of Henry III. he withdrew his declination. The office, which had been held by his father before him, was of high military as well as civil rank, his immediate predecessor having been the Duc de Biron, one of the marshals of France. In spite of his natural indolence and indecision he must have performed his duties to the satisfaction of the citizens, as they did him the unusual honour of re-election. Of his last years the only circumstance deserving special record is his relation with Mademoiselle de Gournay, who won his heart by her enthusiastic admiration of his essays when she was only nineteen. After a meeting in Paris a romantic friendship sprang up between them, which lasted till Montaigne's death; and it is to Mademoiselle de Gournay, his *fille d'alliance*, as he called her, that we owe the valuable edition of the *Essais* published in 1595 (final ed. 1635) from Montaigne's annotated copies. Montaigne in his later years suffered much from stone and gravel, but at the last he died of quinsy after a few days' illness in his sixtieth year, 13th September 1592. Notwithstanding the free expression of scepticism in his writings, he devoutly received the last offices of the church.

The conclusive attestation to Montaigne's varied power is the fact that three centuries after his death the circle of his readers widens every year, and that he has now almost as large a following of antiquaries as Shakespeare himself. Of his admirers in every generation it has also to be remarked that they are of all types of mind and creed, and that among them are found men like Pascal, who, while separated from him as by an abyss on all the fundamental problems of life, have acknowledged their debt to his fearless and all-questioning criticism. To have thus commanded the attention of the acutest intellects of every age since his own by haphazard remarks, devoid of all method, and seemingly inspired by the mere caprice of the moment, could be the privilege only of a mind of the highest originality, of the very broadest sympathies, and of a nature capable of embracing and realising the largest experience of life. In achieving this distinction, what are reckoned among his chief defects have doubtless stood him in as good stead as his merits. His inconclusive philosophy, his easy opinions on many points of morals, his imperfectly developed sense of duty, the total

absence of any heroic strain in his nature, were but the necessary conditions of that general attitude towards men and things which make him the unique figure he is in the history of European literature.

There are translations by Florio (q.v.; new ed. by Saintsbury, 1893) and by C. Cotton (q.v.), revised by Hazlitt (1865; new ed. 1923); and of the *Journals* by Waters (1903-4). See books on him by St John, Lucas Collins, Miss Lowndes (1898), Dowden (1906), Merezkowski (1907), Miss Sichel (1911); essays by Emerson, Mark Pattison, Dean Church; Miss Norton's *Studies in Montaigne* (1905); Grün, *Vie Publique de Montaigne* (1855); and monographs by Bonnefon (1893, 1898), Paul Stapfer (1895, 1896), Strowski (1906). There are editions of the *Essays* by Courbet and Royer (5 vols. 1873-91), by Motheau and Jouaust (7 vols. 1886-88), Strowski (1903 et seq.). An important edition of the *Œuvres Complètes*, ed. Armaingaud, was begun in 1923.

Montalcino, a cathedral city of Central Italy, on a hill, 22 miles SSE. of Siena; pop. 9500.

Montalembert, CHARLES FORBES RENÉ DE, born in London, 15th May 1810, was the eldest son of a noble French *émigré* and his English wife. His grandfather, Mr Forbes, a retired Indian merchant, living at Stanmore, near Harrow, had charge of him from an early age, as his father went back to France with the restored Bourbons and was rewarded for his zeal in their service by being named a peer of France and minister-plenipotentiary to Stuttgart. When Charles was eight years old he was sent to school at Fulham, but was there for a very short time, as the following year his grandfather died, and he went to his parents in Paris. He was fourteen when the head of the Collège St Barbe induced them to place him under a regular course of study. At sixteen he entered the college, and left it at nineteen to join his father, then ambassador at Stockholm. He returned to Paris in 1829, and during a period of uncertainty as to his future career occupied himself by writing an article upon Sweden, which appeared in the *Revue Française*. In 1830 he went to Ireland, and, returning full of enthusiasm for religious freedom, at once eagerly joined himself to the Abbé Lamennais and Lacordaire in their enterprise of the *Avenir*, the well-known High Church Liberal newspaper. In 1831 Montalembert and Lacordaire opened a free school in Paris, which was immediately closed by the police, and a prosecution commenced against the schoolmasters. The death of Montalembert's father at this time having raised him to the peerage, he appealed to be tried by his peers, and pleaded with great eloquence the cause of the church and the common interests of religious liberty. Though he was reprimanded and fined 100 francs, this defeat had the effect of a victory. In the same year the *Avenir* was temporarily suspended, and finally given up, being condemned by the pope. After this Montalembert for a time withdrew from France and lived in Germany, where he was inspired with the idea of writing the *History of St Elizabeth*, which was published in 1836. In 1835 he returned to Paris, and made his first speech as a member of the Chamber in defence of the liberty of the press.

He married a daughter of Count Félix de Mérode in 1836. The winter of 1842 he spent in Madeira for his wife's health, and while there wrote a pamphlet entitled *Devoir des Catholiques dans la Question d'Enseignement*, in which he protested against the monopoly of education by the French University, and pleaded for free education, or, in other words, religious education guaranteed by common liberty. For this cause he fought unweariedly in parliament till it was won. His protests against tyranny, however displayed, came to a climax in a great speech in January 1848 upon Switzerland. The Revolution took place a month later; and in April Montalembert was elected a

member of the National Assembly. When the *coup d'état* of December occurred he supported Louis Napoleon till the confiscation of the Orleans property. Then he at once resigned his post as a member of the Consultative Commission, and became thenceforth a determined opponent of the imperial régime. He was admitted to the Academy on 5th February 1852, and from that time occupied himself with literary work. After a visit to England in 1855 he wrote *L'Avenir politique de l'Angleterre*. Three years later he published an article in the *Correspondant*, called 'Un Débat sur l'Inde au Parlement Anglais,' in which he made such exasperating allusions to the imperial government that he was prosecuted and sentenced to six months' imprisonment and a fine of 3000 francs. The sentence was, however, remitted by the emperor. His great work (unfinished, somewhat panegyric) was *Les Moines d'Occident* (7 vols. 1860-77; trans. 1861-79). He also wrote *Une Nation en Deuil: la Pologne* (1861), *L'Eglise libre dans l'Etat libre* (1863), *Le Pape et la Pologne* (1864), &c. During the last ten years of his life he suffered from the malady of which he died in Paris on 13th March 1870, sixteen days after writing his celebrated letter on papal infallibility.

Montalembert was one of the best French orators of his day, a great statesman and author, an accomplished man of the world, and a devoted, noble-minded son of the church. He loved freedom more than all the world, and the Catholic religion more than freedom; and thus, while he fought all his life for freedom, in questions of faith he submitted his will and intelligence to the judgment of Rome. See *Lives* by Mrs Oliphant (1872), *De Meaux* (1897), and *Lecanuet* (3 vols. 1895-1902).

Montana, one of the north-western states of the American Union, extends from 104° to 116° W. long., and from 44° 15' to 49° N. lat., and is bounded N. by the Canadian provinces of British Columbia, Alberta, and Saskatchewan, E. by North and South Dakota, S. by Wyoming and Idaho, and W. by Idaho. In area—146,080 sq. m., or nearly five times the size of Scotland—it ranks third among all the states and territories, but in population only thirty-ninth; the density of the population is but 3·8 persons per square mile.

The Rocky Mountains, with their subsidiary ranges, occupy fully one-fifth of the surface, in the south and west; the rest of the state is made up of valleys or high, rolling prairies, treeless, but yielding nutritious grasses. The head-waters of two of the largest rivers in North America—the Columbia and Missouri—have their sources in Montana. The mean elevation of the state is about 3000 feet; the average height of the Rocky Mountains—whose sides are covered with dense forests of pine, fir, and cedar—is about 6000 feet, while the highest peaks rise to 10,000 or 12,000 feet. The Yellowstone National Park (q.v.) forms part of the southern boundary of the state. In the south-east the Bad Lands extend into the state from Wyoming (q.v.). The climate of Montana is more moderate than that of the Dakotas and Minnesota, since the warm westerly winds prevail more than the north winds in winter here; there are but few excessively cold days, and, as there is little moisture in the air, the winters are less chilly and more exhilarating than in the east. The atmosphere is remarkable for its clearness, and cyclones are unknown.

The soil of Montana contains all that is needed for sustaining vegetation, but it is almost valueless without irrigation; with that, however, the yield of grain, temperate fruits, and vegetables is enormous. The federal government is constructing storage reservoirs all along the Rocky Mountain range, to store water for this purpose from the

melting snows in spring-time. It is calculated that 20,000,000 acres of land can thus be brought under cultivation. Placer mining being practically exhausted, a large part of the population has turned its attention to stock-raising, for which Montana is better suited than for agriculture. The prairies produce several varieties of bunch grass, which cures on the stalk in August, and retains all its nourishing qualities throughout the year; stock on the range receive no other feed, summer or winter, and very little shelter is required.

But the great industry of Montana is the mining and reduction of her gold, silver, copper, zinc, and other ores. Her minerals first attracted immigration, and have hitherto been her principal wealth. The first systematic working of placer mines for gold commenced in 1862; in 1863 the first gold-quartz mill was built. Montana is one of the three most important states in the production of copper. Other mineral products are coal, lead, manganese, sapphires, petroleum, lime, tungsten, and clay.

History.—The portion of Montana east of the Rocky Mountains was part of the Louisiana Purchase; that lying to the west formerly composed a part of the territorial district of Oregon. It was first visited by the French in 1742-43, and by Lewis and Clarke in 1804-6; these were followed by fur-traders and trappers, and by Jesuit missionaries, who established schools for Indian boys and girls. Gold was discovered in 1861, and mining began in earnest the following year. In 1864 the territory was organised, and on 8th November 1889 Montana became a state of the Union. Education, for a frontier state, is well organised, there being, besides the district schools, the State University at Missoula, the Agricultural College at Bozeman, and the State School of Mines at Butte. The chief cities are Butte (41,611), Great Falls (24,121), Billings, Missoula, and Helena (12,037), the capital. Pop. (1880) 39,159; (1900) 243,329, including 10,746 Indians; (1910) 376,053; (1920) 548,889. Troubles with the Indians have been frequent: in 1876 General Custer (q.v.) and his command were all killed on the Little Big Horn by the Sioux.

Montanism, a heresy which grew up within the Christian church in the second half of the 2d century; its founder was Montanus, a religious enthusiast who appeared at Ardaban in Phrygia in the year 156, with a mission to purify and re-organise the church. Christianity had now become adopted by men in all classes, and already it had to a great extent ceased to be what it was originally—a society of enthusiastic devotees shut off from the world. At the same time the church adapted to her use everything of value in the social and political arrangements of the world around her, and thus fitted herself for the rôle of a great world-religion. Side by side with this growing secularism there sprang up a natural reaction in favour of the old discipline and severity, and nowhere was this so strong as in Phrygia, where it was linked with a belief in a new and final outpouring of the Spirit. Here there quickly formed themselves societies of *spiritual* Christians who gladly hailed the appearance of the 'Paraclete,' and were gradually compelled to withdraw from the church, branded as Montanists and Kataphrygians. Montanus selected the small Phrygian towns of Pepusa and Tymion as the Jerusalem of the church, and for twenty years his movement was limited to Phrygia and the surrounding district. He himself enjoyed a continuance of the prophetic gift, as well as the two women Prisca and Maximilla; his most zealous missionaries were Alcibiades and Theodotus. The persecution that began after the year 177 spread the movement wider by deepening the earnestness of conviction in those that held fast their faith. In Phrygia they were sternly repressed by the bishops,

and formally excommunicated; but elsewhere than in Asia Minor they did not at once leave the church, but formed small conventicles within it. In Gaul and Rome it was long held that communion should be maintained with them. But gradually separation became necessary, as the Montanists became stronger in their demand for a return to primitive discipline, for more fasting, the prohibition of second marriages, and a severer life generally. Denunciation and exclusion produced their natural effect in making them still more narrow, severe in their judgments, and arrogant in their asceticism. At Carthage a numerous body of Montanists had grown up, and from 202 to 207 they strove hard, but in vain, to remain within the church, but at length quitted it because it refused to recognise the new outpouring of the Spirit. It was now that the great Tertullian joined their ranks, having become profoundly convinced of the necessity for a return to primitive Christianity in order to heal the secularism of the church. Montanism survived in the East till the 4th century; in the West it was ever less aggressive, and did not grow up until the Catholic Church had firmly established its organisation. Therefore it never became more than a mere sect; and from a genuine desire for reform and simplicity it degenerated into an artificial strictness and mere legalism. Yet down to 400 A.D. there were still Tertullianists at Carthage.

See Ritschl's *Entstehung der Altkatholischen Kirche* (2d ed. 1857); De Soyres, *Montanism and the Primitive Church* (1878); Bonwetsch, *Die Geschichte des Montanismus* (1881); Weizsäcker in *Theol. Lit.-Zeitung* (1882); and Harnack, *Das Mönchthum, seine Ideale und seine Geschichte* (4th ed. 1895; Eng. trans. 1901).

Montargis, a town in the French department of Loiret, 47 miles E. by N. of Orleans, with a fine church (12th century—1868) and ruins of a vast castle, once 'le berceau des Enfants de France.' Here in 1371 is said to have occurred the famous judicial combat between 'the dog of Montargis' and Macaire its master's murderer. The dog not only showed the spot in the forest of Bondy where its dead master was buried, but singled out the murderer, and, when Charles VI. granted the ordeal of battle to test his guilt, the dog flew at his throat and so proved its charge upon his body. Pop. 13,000.

Montauban, the capital of the French department of Tarn-et-Garonne, on the river Tarn, 31 miles N. of Toulouse. A well-built, handsome place, it has a modernised brick bridge (1335), 224 yards long; a fine cathedral (1739) in the Italian style; and a monument (1871) to Ingres, the painter, a native. Besides considerable woollen manufactures, it carries on a great trade in wine, grain, leather, &c. Montauban was founded in 1144 by Count Alphonse of Toulouse, became the seat of a bishop in 1317, embraced the Reformation in 1560, and acquired historical celebrity as the great stronghold of the Huguenots, being vainly besieged for three months by De Luynes for Louis XIII. in 1621. It suffered much in the Dragonnades; but nearly half the inhabitants still are Protestants, and maintain a theological college. Pop. 26,000.

Montbéliard (Ger. *Mömpelgard*), a town in the French department of Doubs, 48 miles NE. of Besançon. It lies in a valley between the Vosges and Jura Mountains, is surmounted by an old château (now a prison), and carries on manufactures of watch-springs, watchmaking tools, and cotton. A possession of the House of Württemberg from 1397, it was a Protestant centre from 1525, was formally ceded to France in 1801, and suffered much in the Franco-German war. Cuvier was a

native; and there is a statue of him, as also of Colonel Denfert, the heroic defender of Belfort. Pop. 10,000, mostly Lutherans.

Mont Blanc, the highest mountain in Europe (if we regard the Caucasus, q.v., as Asiatic), 15,782 feet above sea-level, is situated in France, close to the Italian frontier, 40 miles S. of the Lake of Geneva. The waters which spring from its western slopes are drained off to the Rhone, those which originate on the east side to the Po. It rises into several sharp peaks (*aiguilles*) and forms great glaciers—the Glacier du Géant, Mer de Glace, &c. In 1760 Saussure offered a prize for the discovery of a practicable route to the summit of Mont Blanc, which was gained, in June 1786, by Dr Paccard of Chamonix and Balmat, a guide. Saussure himself ascended the mountain the following year; and since Albert Smith published a description of his ascent in 1851 the mountain has been climbed by great numbers. A funicular railway is being built. There is an observatory (1890) at a height of 14,271 feet; another on the summit became unsafe, and was demolished in 1909. See ALPS; and Whymper's *Guide to Chamouni and the Range of Mont Blanc*.

Montbrison, a French town in the department of Loire, 35 miles SW. of Lyons, with mineral wells and some ribbon manufacture; pop. 8000.

Montcalm. Louis Joseph, Marquis de Montcalm Gezan de Saint Véran, was born in the château of Candiac, near Nîmes, 29th February 1712. At fifteen he entered the army. In 1746 he was severely wounded and made prisoner at the battle of Piaccenza. In 1756 he assumed command of the French troops in Canada, and soon after his arrival captured the British post of Oswego. The succeeding summer he crossed Lake George with about 8000 French and Indians, and captured Fort William Henry. After the French had taken possession of the fort, the defenceless prisoners, comprising men, women, and children, were massacred by the Indians. Montcalm has been blamed even by his apologists for not foreseeing the danger, and taking effectual measures to avert it. In 1758 General Abercromby advanced on Ticonderoga with 15,000 regulars and provincial troops. The place was defended by Montcalm with a much smaller force of regular troops. The British troops displayed heroic daring and courage, but after repeated attempts to force the defences, which were in themselves almost impregnable, and were defended with great gallantry, they withdrew with a loss of about two thousand men. This French success was, however, much more than counterbalanced by the loss of Louisburg and Fort Duquesne about the same time. Montcalm then removed to Quebec, and prepared to defend it against a British attack. Of the 16,000 troops under his command the majority were militia and Indians. In 1759 General Wolfe ascended the St Lawrence with about 8000 troops, and a naval force under Admiral Saunders. After repeated attempts to scale the heights of Montmorency, and a severe repulse about the end of July, he surprised a French outpost before dawn on 13th September, scaled the heights with about 5000 men, gained the plateau of Quebec, and formed in line of battle on the Plains of Abraham. In the battle that ensued the French ultimately broke in disorder and retreated on the city. Montcalm tried in vain to rally his force, and, having been borne back by the pressure of the retreat, he was mortally wounded at the St Louis gate, and died the following morning. See the article WOLFE; Parkman's *Montcalm and Wolfe* (Boston, 1884); Falgairolle's *Montcalm devant la Postérité* (Paris, 1886); Casgrain's *Wolfe and Montcalm* (1906).

Mont Cenis, or MONTE CENISIO, an Alpine peak and pass between Savoy and Piedmont. Height of the mountain, 11,792 feet; of the pass, 6884 feet. Over the pass a road was constructed (1802-10) by Fabbioni, under Napoleon's orders, at an expense of £300,000. Thirteen miles west of the pass a railway tunnel, $7\frac{1}{2}$ miles long, was begun in 1857 on the Italian side, and in 1863 on the French, and was finished in 1870 at a cost of £3,000,000. Through this tunnel passes one of the main continental overland routes from London *via* Paris to Brindisi, for Asia, Australia, and East Africa, now of diminished importance.

Mont-de-Marsan, capital of the French department of Landes, at the confluence of the Midou and Douze, 92 miles by rail S. of Bordeaux. It has a mineral spring, and manufactures of chemicals, iron, resin, turpentine, pit-props, &c. Pop. 10,000.

Mont de Piété, called in Italy MONTE DI PIETA, a charitable institution the object of which is to lend money to the poor at a moderate rate of interest. It was closely modelled on the 'Monte,' a precursor of the modern bank, in which the creditors, or the parties who supplied the capital, formed a close corporation, with privileged claims upon certain sources of income. These conditions were designed to avoid the laws against usury. But the Monte di Pietà did not at first levy regular interest, only a small percentage to cover the expenses of administration. The earliest of these institutions was established at Orvieto in 1463; and another followed at Perugia, 1467; yet the right to levy for the expenses of management was only conceded in 1515. The system was introduced in Spain, France, Belgium, Germany, the Netherlands, and Mexico. There exists at Paris a national pawn-broking establishment, called Mont de Piété. See PAWN BROKING.

Montdidier, a town of the French department of Somme, 21 miles SE. of Amiens, has zinc and leather industries; pop. 4500.

Mont-Dore-les-Bains, a village of Auvergne, in the department of Puy de Dôme, 26 miles SSW. of Clermont-Ferrand. It lies 3412 feet above the sea-level, in a picturesque valley, through which the river Dordogne flows, and which is bordered on both sides by rugged volcanic hills, and closed towards the south by a semicircle of jagged mountains, the highest point of which, the Pic de Sancy (6183 feet), is the loftiest mountain in central France. The Mont Dore mineral springs, which were used by the Romans, contain bicarbonates of soda, iron, and arsenic.

Monteagle, LORD. See GUNPOWDER PLOT.

Montebello Casteggio, a village of Northern Italy, 14 miles S. by W. of Pavia, where the Austrians were defeated by a French army under General Lannes (afterwards Duke of Montebello), after a desperate conflict, 9th June 1800. In May 1859 the Austrians were again defeated here by the united French and Piedmontese army.

Monte Carlo, a small town in Monaco (q.v.), 1 mile NE. of the town of Monaco, notorious on account of its gaming-tables, and the numerous suicides of ruined gamblers; pop. 10,000.

Monte-Cassino, the monastery built (529) by St Benedict, founder of the great Benedictine order, stands on beetling cliffs, in a magnificent situation, 70 miles by rail NW. of Naples and 92 SE. of Rome. It has been four times destroyed—in 589 by the Longobards, in 884 by the Saracens, in 1030 by the Normans, and in 1349 by an earthquake. It was dissolved in 1866; but a few monks still remain. In 1313 the abbot was elevated to episcopal rank, and from 1504 he was official 'head of all the abbots of the Benedictine order.' The

existing church, replacing one erected in 1066, was built in 1727, and possesses an 11th-century Byzantine bronze portal, mosaics, frescoes, carvings, &c. The former monastic buildings contain valuable archives, a picture-gallery, a library, and a seminary. See Tosti, *Storia della Badia di Monte Cassino* (1843), *Archivio Cassinese* (1847), and Mackey's *Life of Bishop Forbes* (1888).

Monte Catini, a watering-place of Italy, by rail 30 miles NW. of Florence and 19 E. of Lucca. Its mineral springs range between 82° and 86° F. Near here the Florentines were defeated by the Pisans in 1315. Pop. 3400.

Monte Cristo, an uninhabited islet of granite off the Italian coast, 26 miles S. of Elba. For the novel whose hero bears this name, see DUMAS.

Montecuculi, RAIMONDO, COUNT, was born at Modena in 1608, and entered the Austrian service, distinguishing himself during the Thirty Years' War (especially at Breitenfeld and Nördlingen), in a campaign against the Turks (1664), and against the French under Turenne on the Rhine (1672-75). He was made a Prince of the Empire and Duke of Meli, and died at Linz, 16th October 1681. A second edition of his *Opere Complete* appeared in 1823; there is a *Life* by Campori (1876).

Montefiore, SIR MOSES HAIM, philanthropist, was born in Leghorn, 24th October 1784, son of a banker whose parents had emigrated from Italy to London. He retired with a fortune from stock-broking in 1824, and from 1829 was prominent in the struggle for removing Jewish disabilities. After long exclusion and repeated re-election he was admitted Sheriff of London in 1837, being knighted the same year, and made a baronet in 1846. Between 1827 and 1875 he made seven journeys in the interests of his oppressed countrymen in Poland, Russia, Rumania, and Damascus. He endowed a Jewish college at Ramsgate in 1865. In his hundredth year he was still hale and well, but died at Ramsgate 28th July 1885. See JEWS, and the *Diaries of Sir Moses and Lady Montefiore* (1890).

Montego Bay, a port of Jamaica (q.v.).

Montégut, ÉMILE (1826-95), French critic, born at Limoges, contributed to the *Revue des Deux Mondes*, and published books of travel, a study of Marshal Davout, works on Italian and English literatures, and translations of Shakespeare, Macaulay, and Emerson.

Montélimar, in the French department of Drôme, 85 miles S. of Lyons; pop. 13,000.

Montelius, OSCAR (1843-1921), born at Stockholm, wrote many works on early culture in Sweden and elsewhere, and was director of archaeology at Stockholm.

Montemayor, JORGE DE (c. 1515-61), Portuguese lyrical poet, wrote *Diana* (pastoral romance), &c., in Castilian, and influenced Sir Philip Sidney.

Montenegro (the Italian translation of the native name *Črna gora*, 'Black Mountain'), part of Yugoslavia, till 1918 an independent state in the Balkan Peninsula, between Herzegovina and Albania, about 100 miles long by 100 broad. Its area was extended in 1878 by the addition of a large district on the north, a long narrow strip right down its east side to Lake Scutari (Skadarsko Jezero), and the port and district of Antivari (Bar) on the south, in 1880 by the addition of the port and district of Dulcigno (Ulkin, Ulëinj), and in 1913, by some 2000 sq. m. in the north-east and east wrested from Turkey, making a total of about 5600 sq. m. Beyond the low coastal fringe, which has a climate like that of the south of France, comes a rugged mountain-region ranging up to 6500-8000 feet, not in a series of chains, but

in a confusing maze of peaks and gigantic crags and blocks, wild ravines and gorges, fissures and natural caves, the bare gray crystalline rock being everywhere visible. In this region the streams in some cases have underground channels, and even pass for miles beneath the mountains. The centre of the country is occupied by the branching valleys of the rivers Zeta and Morača, which flow south into Lake Scutari. East and north of them the mountains are well wooded, principally with beech and pine, and afford good pasturage to the sheep, goats, and cattle of the people. The climate in these mountainous regions is characterised by temperate heat in summer and a rigid winter. The east drains by the Lim, Drina, and Save, and by the Ibar and Morava to the Danube, and the south-east to the Drim or Drin. Comparatively little of the surface is cultivated, except in the coast region; it is too sterile. Yet agriculture is the principal occupation of the people; of industry there is virtually none. All the farms are small, the fields often patches of soil a few square yards in extent clinging to the mountain-side. The land in most cases belongs to the family, not to the individual, and woods and pastures are common to the clan. Maize, rye, oats, barley, potatoes, buckwheat, capsicums, tobacco, with fruits in the south, are the more important products. Wine for home consumption is grown on the shores of Lake Scutari; and the mulberry is cultivated for silkworms. The same lake, and some of the rivers flowing into it, yield an abundance of fish, especially of scorantza or bleak. The exports consist chiefly of cattle, goats, hides, smoked fish and mutton, cheese, sumach, fruits, and wine. A railway (1908) runs from Antivari to Lake Scutari. Good roads connect the chief towns or villages in the south; bridle-paths and footpaths only exist in the rest of the country. Cetinje is the capital. Other villages are Podgoritza or Podgorica, Dulcigno, Antivari, Nikšić, Plevlja, Djakova or Đakovica, and Peć.

The Montenegrins, a race of primitive mountaineers, whose principal business in life has for generations been to fight the Turks, are a brave, warlike, and simple people, noted for their honesty and their chastity. The men are stalwart and handsome, but the women, who until recent years did all the hard work whilst the men fought, or idled, or hunted, soon grow old and lose their good looks. The people live in small stone houses, in small villages—there is not a town, strictly so called, in all Montenegro. They belong mainly to the Serbian branch of the Slavs, with some Albanians. Pop. 200,000.

In the 14th century the country, known as the principality of Zeta, was tributary to the Serbian empire; but, when the latter was subjugated by the Turks (1389), Zeta, assisted by fugitive Serbians, successfully maintained its independence. From that time the Montenegrins waged almost incessant war against the Turks. In 1516, when the last prince of the second native dynasty abdicated his throne, the people elected their bishop to be ruler over them; and the little state was governed by ecclesiastical princes (vladikas) down to 1851, when Danilo, of the house of Petrovitch Nyegush, on succeeding his uncle Peter II. abandoned the title and ecclesiastical functions of vladika, and had the principality declared hereditary in his family, which had ruled since 1696. The prince or Gospodar was an absolute sovereign; but he was assisted by a state council and a ministry. The government both of the country and of the family was really, however, patriarchal, the will of the prince deciding all things only in so far as it did not conflict with the will of the people. In 1905 Prince Nicholas I. granted a constitution with a single chamber

elected by manhood suffrage and ballot, and in 1910, by act of the Skupschтина, he was proclaimed king. Montenegrin precipitation began the Balkan war of 1912, which increased the kingdom's area by more than half, and doubled the population. In the Great War Montenegro, siding with the other Serb kingdom, was overrun by the enemy (1916). A National Assembly which met at Podgoritza in 1918-19 declared King Nicholas deposed, and the country united with Serbia in the new state of the Serbs, Croats, and Slovenes. See YUGOSLAVIA. The vladika Peter II. (1830-51) is accounted one of the greatest poets who have written in Serbian. In their patriotic songs and ballads the Montenegrins possess a treasure of great value and of great influence upon the national temperament. The first Slavonic books to be printed were issued from presses at Cetinje and Rieka in the end of the 15th century.

See Denton, *Montenegro* (1877); Freeman in *Macmillan's Magazine* (1876); Schwarz, *Montenegro* (1882); W. Carr, *Montenegro* (1884); Coquelle, *Montenegro et Servie* (1896); W. Miller, *The Balkans* (1896); Wyon and France, *The Land of the Black Mountain* (1903); F. S. Stevenson, *History of Montenegro* (1912); A. Devine, *Montenegro in History, Politics, and War* (1918).

Montenotte, a small village of Northern Italy, 26 miles W. of Genoa, where Napoleon won his first victory over the Austrians on 12th April 1796.

Montepulciano, a town of Italy, a bishop's see, situated on a high hill, 43 miles by rail S.E. of Siena. It was the birthplace of Politian and Belarmino, and is famous for its red wine. Pop. 16,000.

Montereau, a town in the French department of Seine-et-Marne, at the confluence of the Seine and Yonne, 49 miles S.E. of Paris. At the bridge here, in 1419, Jean-sans-Peur, Duke of Burgundy, was assassinated in the presence of the young Dauphin, afterwards Charles VII.; and in the immediate vicinity Napoleon, on 18th February 1814, gained his last victory over the allies. Pop. 10,000.

Monterey in California, 120 miles S.E. of San Francisco, and in 1840-45 capital of the province, has a population of 5500.

Monte Rosa, an Alpine mountain mass with four principal peaks, in the Pennine ridge which separates the Swiss canton of Valais from Italy. The highest peak, the Dufourspitze, 15,217 feet high, is extremely difficult of ascent, and was first climbed by Mr Smyth in 1855.

Monterrey, capital of the Mexican state of Nuevo León, lies in a fertile plateau-valley, by rail 670 miles N. of Mexico city; pop. 88,500. Founded in 1599, it was taken by General Taylor in 1846.

Monte Sant' Angelo, a city of Southern Italy, 23 miles N.E. of Foggia. It stands 2790 feet above sea-level, on one of the Gargano hills, and is famed for its exquisite honey. Pop. 23,500.

Montespan, FRANÇOISE ATHÉNAÏS, MARQUISE DE, mistress of Louis XIV., was born in 1641, the daughter of Gabriel de Rochechouart, Duc de Mortemart, and married in 1663 the Marquis de Montespan, and became attached to the household of the queen. Her beauty and wit captivated the heart of the king, and about 1668 she became his mistress, without, however, as yet supplanting La Vallière. The marquis was flung into the Bastille, next banished to his estates, and finally in 1676 his marriage was formally annulled. Montespan reigned till 1682, and bore the king seven children, which were legitimised, but at last her influence paled before the rising star of the astute widow of Scarron, afterwards Madame de

Maintenon, whom she had engaged as governess to her children. Gradually she lost all hold over the king, and in 1687 left the court, in 1691 Paris itself. Later, like so many women of her class, she found relief in devotion, and died 27th May 1707.

See her *Mémoires* (1829; trans. 1895), and books on her by Houssaye, Clément (1868), and Noel Williams (1904).

Montesquieu, CHARLES DE SECONDAT, BARON DE LA BREDE ET DE, a celebrated French writer on politics and law, was born 18th January 1689, at the château La Brède, near Bordeaux. Jacques de Secondat, the father of the future author, was second son of the Baron de Montesquieu, president and chief-justice of the parliament of Guienne. Charles-Louis de la Brède, as Montesquieu was called, after studying the ancient classics, philosophy, and law, became councillor of the parliament of Bordeaux in 1714, and its president in 1716, succeeding his uncle, who left him all his property on condition of his assuming the name and title of Montesquieu. The young president discharged the duties of his office faithfully, but he gave himself by preference to the study of nature under the influence of Newton. In his discourses before the Academy of Sciences of Bordeaux he dealt with the causes of echoes and of the weight and transparency of bodies, and with the use of the renal glands, and sketched a project of a physical history of the earth (*Discours Académiques*, 1716-21). But defective vision compelled him to abandon experimental research. His first great literary success was the publication of his *Lettres Persanes* in 1721. These contain a satirical description of the contemporary manners, customs, and institutions of society in France, and owed much of their popularity to the ingenuity of their form and the piquancy of their style. Two Persians, Rica and Usbek, are represented as coming from Persia to Paris, and exchanging their impressions by letters to each other, as well as corresponding with their friends at home. The idea was borrowed from Dufresny, and it has been frequently imitated since. The libertinage, the political decadence, and the irreligious insincerity of the first years of the regency that followed the death of Louis XIV. are limned with masterly art. For his delineations of Persian manners and institutions he drew from the accounts of Sir John Chardin and other travellers; but his vivid, and at times wantonly sensuous, imagination created most of his situations and characters. Along with much that is frivolous and ephemeral, the *Persian Letters* contain solid reflections on the nature and relations of social institutions, and an adumbration of the author's later views on government, toleration, and the influence of climate on population, customs, and religion. In 1725 Montesquieu wrote and published anonymously at Paris a prose poem entitled *Le Temple de Gnide*, in the artificial French style of the time. Returning to Bordeaux, he read to the Academy a treatise on duty from the Stoic standpoint, and delivered an admirable discourse on the motives which ought to give encouragement in the sciences (1725). Eager for larger observation and enjoyment of the life of society, and weary of the routine of his parliamentary duty, he sold his office in 1726, and then settled in Paris. Thereafter he travelled for three years in order to observe and study the political and social institutions of other countries. He visited Vienna, where he studied the constitutions of Hungary and Poland; Venice, where he formed a close friendship with Lord Chesterfield; and Rome, where he studied Italian art, and was favourably received by the pope. He then passed by Switzerland and the Rhine to Holland, where he again met Chesterfield, who took him to Eng-

land. He remained in England from October 1729 to August 1731, mixing with its best society, frequenting the Houses of Parliament, studying the political writings of Locke, and analysing the organisation and working of the English constitution, whose essential principles he may be said to have discovered. After returning to France he divided his time between Paris and La Brède, mingling the pursuit of pleasure and an unostentatious charity with the preparation of his great works on the science of politics and law.

His *Considérations sur les Causes de la Grandeur des Romains et de leur Décadence*, the ablest, if not the most important, of his works, appeared in 1734. In it he surveys the vast political development of ancient Rome from the rude beginnings of the Eternal City till the Turks gathered around the walls of Constantinople, and his elucidation of the causes that determined the character and detail of the movement may be regarded as the first genuine application of the modern scientific spirit to history, and as an enduring contribution to its philosophy. His characterisations of the great Romans, his analysis of complex influences, his filiation of events, his estimates of political and social causation have been generally accepted and reproduced by subsequent historians. His great monumental work on the spirit of laws, *De l'Esprit des Loix*, appeared in 1748 in 2 vols. at Geneva. It was the product of all the work of his life, and of the deliberate and concentrated effort of twenty years. Although published anonymously and put on the Index, the work passed through twenty-two editions in less than two years; and it soon vindicated its claim to be the most original and popular book ever published on the science of law. Montesquieu indicated his consciousness of its originality by prefixing to it the epigraph: *Prolem sine matre creatam*. French Jurists of the 16th century, Cujas and others, had led the way to the historical treatment of Roman law, and Domat had written a chapter on 'the nature and spirit of laws,' but the universalisation of the historical and comparative method in dealing with the reason and relations of all laws is Montesquieu's own, and he applies it more lucidly, and also more widely than Vico did. By the spirit of laws he means their *raison d'être* in time, their historical causation, or the natural and social conditions by which their origination, development, and forms are determined. The discussion of the influence of climate was the most characteristic element of the work; it advances beyond the old abstract discussions of right, and, although pushed in some points too exclusively, it formed the prelude to all the more recent work of the positive and ethnological school. The analysis of the forms and principles of government carried the subject farther than had been done by any one since Aristotle; and the exposition of the constitutional government of England, with its clear distinction of the legislative and executive powers, made an advance upon Locke, and held up the free English constitution to the admiration and imitation of all Europe. The influence of Montesquieu's great work upon political and legal thought directly, and upon government and laws indirectly, was immense. It came too late to save France from the political errors that culminated in the Revolution, but it inspired and guided its best thinkers and its greatest men. In 1750 he published a clever *Défense de l'Esprit des Loix*, followed afterwards by *Lysimaque* (1748), a striking dialogue on despotism, *Arsace et Isménie*, a romance, and an essay on taste in the *Encyclopédie*. Severe study had exhausted his energy and still further weakened his eyes till he became totally blind. He died at Paris 10th February 1755.

The best edition of Montesquieu's works is that of E. Laboulaye (7 vols. Paris, 1875-79); that of Lahure (3 vols. 1856) is convenient and serviceable. See Vian's *Montesquieu* (2d ed. 1879), also Sorel (1887), Zevort (1887), Barkhausen (1907), Dedieu (1913); Churton Collins, *Voltaire, Montesquieu, and Rousseau in England* (1908); Sir C. Ilbert's *Romanes Lecture on Montesquieu* in 1904; and Faquet's *Selections from the Lettres Persanes*, with an introduction (1907).

Montessori, MARIA, born at Rome in 1870, was the first woman to take the degree of M.D. in Rome University. As a doctor in an asylum at Rome about 1895-1900 she developed a method of educating defective or feeble-minded children, which she afterwards applied to normal children. It insists on spontaneity (as in 'liberal' kindergarten schools), and looks askance on artificial restraints, rigid discipline, and conventional rules; as expounded in *The Montessori Method* by her (trans. 1913). See EDUCATION.

Mont' Estoril, a Portuguese watering-place north of the mouth of the Tagus and 15 miles W. of Lisbon.

Monteverde, CLAUDIO, composer and harmonist (1568-1643). See HARMONY, MUSIC.

Montevideo, the capital of the republic of Uruguay, is situated on the north shore of the La Plata estuary, about 125 miles E. by S. of Buenos Aires. It was built originally on a low promontory between the ocean and a horseshoe-shaped bay, 2 miles across; but its extensive suburbs now stretch far into the flat country behind, and have crept round the bay to the landmark which gives the city its name—the Cerro, a smooth, isolated cone, 505 feet high, crowned with a lighthouse and an old fort. At its base are great *saladeros*, or beef-salting establishments; and here, too, is the largest of the city's dry-docks. The city proper covers an area of about 5 square miles, the old town, on the little peninsula occupying nearly 1 square mile; and the sea-breezes make its climate both pleasant and healthy. Montevideo is an attractive town, with broad streets exceptionally well paved—the Calle 18 de Julio, which is 85 feet wide, has been declared 'incomparably the finest street in South America.' The houses are flat-roofed, mostly of two or three stories, and often crowned with small square belvederes. High above these rises the cathedral (133 feet), with two side towers and a dome covered with green and blue and yellow tiles. The next most prominent building is the large opera-house; and others are the town-hall, the custom-house, the exchange, the Cabildo (law-courts and parliament house), the school of arts and trades, the university, the museum, the English and Basque churches, two convents, the Hospital de Caridad and the British hospital, the extensive public markets, and several of the banks and hotels. The tramway system is very extensive. Water is brought by a pumping-main from the river Santa Lucia, a distance of 34 miles.

The depth of water in the bay formerly ranged from 9 to 15 feet, and vessels of heavy draught were compelled to anchor in the roadstead outside, which is exposed and often very rough. If a satisfactory port had been constructed in the years before 1864, when the Buenos Aires trade was diverted by the Paraguayan war, Montevideo might have permanently taken the place now occupied by the Argentine port; as it is, possessing the advantage of a large natural harbour, it may even yet become again a dangerous rival on the completion of the new harbour-works. Its foreign trade is that of Uruguay (q.v.). The manufactures are more numerous than important, but have increased of late years nearly as fast as the population. In 1877 there were 110,167 inhabitants, in 1890 some

215,000, in 1922 some 350,000; of these nearly half were foreigners. This foreign element—mainly drawn from Italy, France, and Spain, and engaged principally in retail trade—is a very noticeable feature of Montevideo life.—A fort was built on the Cerro, by the Spaniards, in 1717, and the first settlement of the town made in 1726; a century later (1828) it became the capital of the newly-formed republic of Banda Oriental. Its later history will be found under URUGUAY.

Montez, LOLA, adventuress, was born in 1818 at Limerick, and was christened Marie Dolores Eliza Rosanna, her father being an Ensign Gilbert, her mother of Spanish descent. Taken out to India, she there lost her father by cholera; and, her mother having remarried, Dolores (or 'Lola') was sent home in 1826 to Europe, and brought up at Montrose, in Paris, and at Bath. To escape the match, arranged by her mother, with a gouty old judge, she eloped with a Captain James, whom in July 1837 she married at Neath; but the marriage ended in a separation and in her return from India (1842). She now turned dancer, coming out at Her Majesty's Theatre; and after visits to Dresden, Berlin, Warsaw, St Petersburg, and Paris (where she formed a *liaison* with Dujarrier, a young Republican editor, who fell in a duel), she came towards the close of 1846 to Munich. There she soon won an ascendancy over the eccentric artist-king, Louis I., who created her Countess of Landsfeld, and allowed her £5000 a year. For more than a twelvemonth she was all-powerful, her power directed in favour of Liberalism and against the Jesuits; but the revolution of 1848 sent her once more adrift on the world. Again she married (this time a Lieutenant Heald), a marriage as unlucky as the first; and, after touring (1851-56) through the States and Australia, and after two more 'marriages' in California, in 1858 she delivered in New York a series of lectures written for her by C. Chauncey Burr. She died, a penitent, at Astoria, Long Island, on 17th January 1861, her last four months devoted to ministering in a Magdalen asylum near New York. See her *Autobiography* (1858); Hawks, *The Story of a Penitent* (1867); and the Life by E. B. D'Auvergne (1909, new ed. 1924).

Montezuma (more correctly and fully spelt MOTECHUHZOMA), the ablest of the Mexican emperors, son of the ruler of Tenochtitlan, ascended the throne about 1437, and soon after commenced a war with the neighbouring monarch of Chalco, which resulted in the annexation of that kingdom to Mexico. He next crushed a confederacy of the Tlascalans, and reigned safely till his death in 1471.—MONTEZUMA II., the last of the Mexican emperors, succeeded to the throne in 1502. Already distinguished as a warrior, henceforth he devoted his chief attention to the improvement of the laws, and indulged his taste for pomp and luxury at the cost of heavy taxation, leading to frequent revolts among his subjects. When Cortes landed in Mexico with his small army in 1519 Montezuma tried to buy off the dreaded enemy, but all his temporising could not prevent the conqueror's progress to his capital. Soon he himself was practically a prisoner in the Spanish camp, and when the citizens rose in revolt Cortes brought out Montezuma in order to pacify them; but an accidental wound from a stone flung from amongst the crowd of his own subjects proved a climax to all the indignities he had suffered. He repeatedly tore the bandages from his wound, and soon after died broken-hearted, June 30, 1520. Some of his children adopted the Christian religion, and his eldest son received from Charles V. the title of Count of Montezuma. One of his descendants was viceroy of Mexico from 1697 to

1701. His last descendant, Don Marsilio de Teruel, Count of Montezuma, was banished from Spain by Ferdinand VII., and afterwards from Mexico, on account of his liberal opinions, and died at New Orleans in 1836. See CORTES.

Montferrat, formerly an independent duchy of Italy, between Piedmont, Milan, and Genoa, now forming part of the kingdom of Italy. It consisted of two separate portions, both lying between the Maritime Alps and the Po, and having a united area of over 1300 sq. m. The capital was Casale. After the downfall of the Frankish empire, Montferrat was ruled by its own marquises till the beginning of the 14th century. This house sent its most illustrious sons to take part in the Crusades, especially Conrad, the defender of Tyre against Saladin, and the competitor with Guy de Lusignan for the crown of Jerusalem; and Boniface, who became ruler of Thessalia. Iolande or Irene, sister and heiress of the last male of the house, was empress of Constantinople; her second son became the founder of the family of Montferrat-Palaologus, which became extinct in 1533, and Montferrat then passed to the Gonzagas of Mantua. In 1631 the Dukes of Savoy obtained a portion of Montferrat, and in 1703 the remaining portion.

Montfort, L'AMAURI, the name of a noble French house, traditionally descended from a marriage (end of 10th century) between the heiress of Montfort and Epernon and William of Hainault, great-grandson of Baldwin, Count of Flanders, the third husband of Judith, daughter of Charles the Bald. The name was taken from the castle of Montfort between Paris and Chartres. Its most famous members were the great Simon de Montfort and his father, Simon IV., Comte de Montfort and Earl of Leicester, subsequently Comte de Toulouse, the ruthless persecutor of the Albigenses. He was born about the year 1160, went on a fruitless crusade to Palestine, but began about 1208 the more congenial crusade of extermination against the harmless heretics in the south of France. He was killed by a stone at the siege of Toulouse, 25th June 1218. See ALBIGENSES.

Montfort, SIMON DE, Earl of Leicester, the fourth son of the preceding, and of Alice de Montmorency, was born about the beginning of the 13th century. The title of Earl of Leicester came to him by his grandmother, Amicia de Beaumont, sister and co-heiress of Robert, Earl of Leicester; and in 1230 we find him in England, where he was well received by Henry III., and confirmed in his title and estates two years later. He married in 1238 the king's youngest sister Eleanor, who had been betrothed to the Earl of Pembroke, and who, in the grief of an enthusiastic girl of sixteen, at his death had taken in her haste a vow of perpetual chastity, but never proceeded to take the veil. The marriage aroused the jealousy of the barons and the denunciations of the church, whereupon Simon repaired to Rome, and there succeeded by gold in obtaining the pope's sanction. In June 1239 he was godfather at the baptism of Prince Edward, but three months later was denounced as an excommunicated man, and driven from his presence by the king. Simon crossed to France, but soon returned and was nominally reconciled. It is probable that he went on crusade to the Holy Land, but at anyrate he was again in England by 1242. We know but little of his life during the next six years, save that he lived the while at Kenilworth in intimate friendship with Robert Grosseteste, Bishop of Lincoln, and the learned Franciscan, Adam Marsh. Meantime the whole community was becoming exasperated by the misgovernment and faithlessness of the king, the extortionate exactions of the

pope, and the fresh influxes of aliens on whom the court lavished its favours.

In 1248 Simon was sent as king's deputy to Gascony, and there he put down the prevalent disaffection with a heavy hand. But his jealous master listened eagerly to the complaints brought against his vigorous rule, and actually arraigned him before a special commission of inquiry, which only acquitted him after a lengthened trial. Earl Simon resigned his post in the winter of 1252-53, and returned to England, where he again comes into prominence in 1258 in the last act of the constitutional struggle. Bad harvests, famine, and fresh exactions of Rome, added to the rapacity of foreign parasites and protégés of the king, at length exhausted the endurance of the country, and in 1258 the barons appeared in arms at the parliament at Westminster, demanding the expulsion of all foreigners, and next the appointment of a committee of twenty-four—twelve from the king and twelve from the barons—to govern the realm. Later in the year the parliament met again at Oxford, and drew up the famous Provisions of Oxford, which the king swore solemnly to observe. A council of fifteen with a baronial majority was formed to advise the king; the old parliaments were superseded by a body of twelve chosen by the barons, to meet three times a year in order to transact business along with the fifteen; and foreigners were to surrender their castles—a self-denying ordinance in accordance with which Simon himself set the example by giving up Kenilworth and Odiham. This was almost entirely a baronial policy, and did little for the sub-tenants, with whom Prince Edward now began to intrigue for influence, whilst ere long breaches followed amongst the barons themselves, so that by 1261 the king felt strong enough to announce that the pope had declared the Provisions null and void. All men now looked to Earl Simon as leader of the barons and the whole nation alike, and he at once took up arms against the king. After some varying success, both sides agreed to submit to the arbitration of Louis IX. of France, who decided in the *Mise* of Amiens for an unconditional surrender to the royal authority. London and the Cinque Ports at once repudiated the agreement, and Simon hastily collected his forces, surprised the king's army at Lewes, and captured the young prince, May 14, 1264.

After his victory he arranged the *Mise* of Lewes, by which matters were anew to be submitted to arbitration. There were to be three electors, Earl Simon, the Earl of Gloucester, and the Bishop of Hereford, who were to appoint nine councillors to nominate the ministers of state. To aid these councillors in their task a parliament was called, in which, together with the barons, bishops, and abbots, there sat four chosen knights from each shire, and for the first time two representatives from certain towns. This was the fullest representation of England that had yet been convened, and may be looked upon as in a special sense the germ of our modern parliaments. But the great earl's constitution was premature; the barons soon began to be dissatisfied with the rule of Simon the Righteous, the arrogance of his sons injured his influence, and the young Earl of Gloucester abandoned him and went over to the king. Prince Edward, escaping from confinement by a stratagem, combined with Gloucester and fell with vastly superior force upon Simon at Evesham, and completely defeated him, August 4, 1265. The earl died upon the field, and his body was barbarously mutilated by Edward's soldiers, but the people and the native clergy, with the true instinct of a democracy, cherished him as a saint. His memory was enshrined in song and ballad, and miracles

were ascribed to him long after his death.—The famous *Song of Leves* is the most complete extant contemporary statement of the views of the constitutional party, of which Simon de Montfort was the champion and martyr. It was first printed by Thomas Wright in his *Political Songs* (1839) for the Camden Society, but a more adequate edition, furnished with introduction and notes, is that by C. L. Kingsford (Oxford, Clarendon Press, 1890).

See Blaauw, *Barons' War* (1844; 2d ed. 1871); vol. ii. (1876) of Stubbs's *Constitutional History of England*; and Lives by Reinhold Pauli (1867; Eng. trans. by Una M. Goodwin, 1876), M. Creighton (1876), and especially G. W. Prothero (1877).

Montgolfier, JOSEPH MICHEL (1740–1810), and JACQUES ÉTIENNE (1745–99), two brothers, the sons of a manufacturer at Annonay, distinguished as the inventors of the first kind of Balloons (q.v.).

Montgomerie, ALEXANDER, Scottish poet, was born probably at Hessilhead Castle, near Beith, in Ayrshire, about 1545. Servitor and 'maister poet' to the king, he was awarded a pension of 500 merks a year. Traditionally he lived at Compston Castle, near Kirkeudbright. He travelled in France, Flanders, and Spain; was detained in a foreign prison; and was embittered by the loss of a long law-suit involving the loss of his pension. Implicated in Barclay of Ladyland's Catholic plot, he was denounced as a rebel in 1597. He may have died about 1611. He was small in stature, given to drinking, and unhappy in his amours. Montgomerie was the chief of a small school of court poets who wrote under Italian, French, and English influences. He had something of the tastes of the scholar, but his poems, especially the *Sonnets*, reveal a pitiful meanness and servility of character. His pasquinades are savage without being strong; *The Flying between Montgomerie and Polwart* [Sir Patrick Hume], in imitation of Dunbar, is merely coarse, vulgar, and unclean. His miscellaneous poems, mostly amatory, are laboured in style. *The Cherrie and the Slae* at once leapt into popularity. Its earlier portion is a love-allegory; its later, moral and didactic. Here at least are real freshness and descriptive power, with dexterous mastery of rhyme. See editions by Irving (1821) and Dr J. Cranston (S.T.S., 1886–87; with supplement, ed. G. Stevenson, 1910); important studies in German by Hoffmann (1894) and Brotanek (1896); and Stevenson's introduction, &c.

Montgomery, capital of Alabama, on the left bank of the Alabama River, some 400 miles above Mobile by water, contains a fine state-house and a handsome Masonic hall, and has a large number of manufactories, including foundries, flour-mills, fertiliser-factories, cotton-mills, and cotton-seed oil-works. Several railways meet here, and the river is navigable for steamboats all the year round; an active trade is carried on, and large quantities of cotton, especially, are shipped. Montgomery became capital of Alabama in 1847, and was for a time capital of the Confederate States. Pop. (1880) 16,713; (1920) 43,464.

Montgomery, a district of the Punjab, in the Multan division, and bounded by the Sutlej. The area is 4623 sq. m.; population, 714,000. Its capital, Montgomery, midway between Lahore and Multan, has 14,600 inhabitants. It was named in 1865 after the governor of the Punjab.

Montgomery, FLORENCE SOPHIA (1843–1923) writer of books for children, daughter of Sir Alexander Leslie Montgomery, Bart., of The Hall, County Donegal. Her first book, *A Very Simple Story* (1867), was warmly praised by Whyte-

Melville. Of its successors the chief was the widely popular but not entirely satisfactory *Misunderstood* (1869).

Montgomery, GABRIEL, COMTE DE, a French knight of Scottish extraction, and an officer in the Scottish Guard of the king of France, was born about 1530. At a tournament given, 30th June 1559, by Henry II. in honour of his daughter's marriage with Philip of Spain, the king insisted upon young Montgomery entering the lists with him. Montgomery reluctantly complied, and, the shaft of his broken lance entering the king's visor at the eye, Henry was borne insensible from the ground, and so continued for eleven days, when he died. Montgomery, though blameless, felt it impossible to remain about the court, and retired to the family estate in Normandy, afterwards travelling in Italy and England. On the commencement of the religious wars in 1562 he returned to support the Protestant cause, and defended Rouen with great bravery. In the third religious war he was one of the leaders of the Protestants, and gained many advantages over the royalists in Languedoc and Béarn. During the massacre of St Bartholomew he happened to be in Paris, but escaped by the swiftness of his horse, and took refuge, first in Jersey, then in England. In April 1573 he appeared off Rochelle with a small fleet, but failed in accomplishing anything, and was obliged to retire. Next year, at the head of a band of Huguenots, he landed in Normandy, and commenced war there; but being compelled at last to surrender the castle of Domfront, where he had entrenched himself, he was carried to Paris; and although the general to whom he surrendered had assured him of his life, he was beheaded, 27th May 1574.

Montgomery, JAMES, minor poet, was born at Irvine, Ayrshire, 4th November 1771, the eldest son of a Moravian pastor, and at six was sent to Fulneck in Yorkshire (see FULNEK). He there spent ten dreamy years, and then was dismissed as unfit for the ministry; but meanwhile he had read by stealth many of the poets, and had tried his own hand at verse-making. After four years of various employment—with a baker at Mirfield (from this place he ran away), a general dealer at Wath, and a bookseller in London—in 1792 he became clerk to the editor of the *Radical Sheffield Register*. In 1794 he started a weekly paper of his own, the *Sheffield Iris*; and this he continued to edit till 1825. In 1795 he was fined £20, and sentenced to three months in York Castle, for striking off some copies of a 'seditious' ballad; in 1796 it was £30 and six months for describing a Sheffield riot. Yet by 1832 he had become a moderate Conservative; and in 1835 he accepted from Peel a government pension of £150. He died, unmarried, at Sheffield, 30th April 1854. His collected Poetical Works (4 vols. 1849) include *The Common Lot* (1805), *The Wanderer of Switzerland* (1806), *The West Indies* (1809), *The World before the Flood* (1813), *Greenland* (1819), and *The Pelican Island* (1827). 'Bland and deeply religious,' these poems have outlived their vogue; but ten at least of his hymns keep their place in the hymnals. His *Memoirs* by Holland and Everett (7 vols. 1854–56) is perhaps the worst Life in the language.

Montgomery, ROBERT, poetaster, was born at Bath in 1807, the son of one Gomery, a famous clown. In 1830 he entered Lincoln College, Oxford; in 1833 took his B.A. with a fourth class; in 1835 was ordained; and, with the exception of a few years in Glasgow (1836–43), was minister of Percy Chapel, London, until his death at Brighton on 3d December 1855. Of his thirty-one works in verse and prose, two—*The Omnipresence of the Deity* (1828; 29th ed. 1855) and *Satan* (1830)—are still

remembered, but only by Macaulay's onslaught in the *Edinburgh Review* for April 1830.

Montgomeryshire, an inland county of North Wales, 40 miles long and 35 broad, bounded NE. and NW. by the counties of Denbigh and Merioneth, E. by Shropshire, and S. and SW. by Radnorshire and Cardiganshire. Area, 796 sq. m., or 510,110 acres, of which more than one-third is permanent pasture, and about one-ninth under tillage. Pop. (1801) 47,978; (1831) 65,700; (1881) 65,718; (1911) 53,146; (1921) 18,324. Its surface is most barren, and in places mountainous, Plinlimmon (2469 feet), on the Cardiganshire border, the Berwyn Mountains in the NE., and the Breidden Hills—some 12 miles E. of Shrewsbury—being the principal elevations; but towards the English border its character changes, and the predominating feature is that of a series of fertile and well-wooded valleys, in which grain of all kinds, but chiefly oats, is raised, and a small area is under cultivation as fruit orchards. On the uplands the soil is poor, and principally adapted for pasturing the large flocks of sheep reared thereon. The Severn, with its tributary the Vyrnwy, and the Dovey—alike noted for their fishing—are the most important rivers, whilst Offa's Dyke (q.v.) traverses the south-east corner of the county. The mineral wealth of Montgomeryshire is not great, but lead and zinc are mined, and slates, slabs, and limestone quarried. Of manufactures, that of Welsh flannel at Newtown is the most extensive. The county contains the municipal boroughs of Montgomery, Llanfyllin, Llanidloes, and Welshpool. One representative is returned to the House of Commons for the county, as was also (till 1918) one for the Montgomeryshire district of boroughs—viz. Llanfyllin, Llanidloes, Machynlleth, Montgomery, Newton, and Welshpool, which, too, are the chief towns.—The *county town*, Montgomery, with a ruined castle, is 7 miles S. of Welshpool; pop. 1000.

Month. This, the earliest of the natural cycles to be observed, was at first reckoned from new moon to new moon. That period is now called a *lunation* by astronomers to distinguish from *sidereal month*, the time in which the moon passes round the ecliptic to the same star, and from the *tropical month*, reckoned from the moon's passing the equinox till she again reaches it. Those three periods are also called, respectively, synodic month = 29.5306 days, stellar month = 27.3217 days, and periodic month = 27.3216 days. The first, or 'lunar month' proper, consists of 29 days, 12 hours, 44 minutes, 3 seconds. The 'solar month' is the time which the sun takes to pass through 30° (see *CALENDAR, CHRONOLOGY*). From the month, by subdivision, was obtained the week, used by the Chaldeans, Indians, Egyptians, and others from prehistoric times; and as soon as the year became an object of measurement there were numberless attempts to reconcile the solar computation of time with the lunar. The Attic year was of twelve months, alternately 29 and 30 days long, each month being divided into three decades. The Jews and (in part) the Mohammedans still reckon by lunar months of 29 and 30 days, and therefore the Jews, like the ancient Greeks, insert an intercalary or 'embolismic' month. The French republicans in 1793 divided the year into twelve months of 30 days, with five odd days (six in leap year) to be utilised as national festivals, each month being subdivided into three decades of 10 days each, as with the ancient Greeks. Another distribution of the months has since been suggested, should such opportunity again occur—viz.: 1st, 3d, 5th, 7th, 9th, 11th months, each 30 days; 2d, 4th, 6th, 8th, 10th months, each 31 days; and the remain-

ing month 30 days in the ordinary year and 31 in leap year. The existing 'calendar' or 'civil' months are as irregular in length as they were left by the Romans; the 4th, 6th, 9th, and 11th having 30 days, the second 28 days (or 29 in leap year), and the seven others 31 days. To complicate this disorder, a month in English law is 'a lunar month or 28 days unless otherwise expressed;' 'a lease for twelve months is only for 48 weeks' (Blackstone, ii. 141). Besides the archaic division of the month into four, as already mentioned, the early Greeks of Homer's time and previously seem to have had only two parts, the earlier half and the 'waning half;' and a trace of that probably remained in the Roman *Ides*, the middle day.

Montholon, CHARLES TRISTAN, MARQUIS DE, was born at Paris, 1783. Having served in the navy, he entered the army, and was severely wounded at Wagram. Napoleon made him his chamberlain in 1809. During the Hundred Days Montholon was Napoleon's adjutant-general. He accompanied his master to St Helena, and along with Gourgaud published *Mémoires pour servir à l'Histoire de France sous Napoléon* (8 vols. 1822–25). As chief of the staff to Louis Napoleon in 1840, he was condemned to twenty years' imprisonment; he regained his freedom in 1848, having published in 1846 *Récits de la Captivité de Napoléon* (2 vols.). He died 24th August 1853.

Monthyon. See MONTYON.

Monti, VINCENZO (1754–1828), an Italian poet of the classical school, anti-French, Napoleonist, pro-Austrian in turn. He was professor at Pavia, and, under Napoleon, state historiographer.

Montia, or BLINKS, a genus of Portulacaceæ. The only species (*M. fontana*), a small variable succulent herb of world-wide range, grows in water and wet places. It has opposite leaves, and cymes of small inconspicuous flowers, often cleistogamic. It is eaten as a salad.

Monticelli, ADOLPHE (1831–85), a noteworthy modern painter, 'creator of the phantom genre,' was born at Marseilles, studied at Paris, where he lived mainly till 1870. He subsequently settled in Marseilles, and died there in poverty. His paintings fall into three periods, of which the last and most characteristic is notable for masses of warm and gorgeous colouring, with vague, almost invisible figures—nymphs dimly discernible in luxuriant green meadows against a background of glorious cloud masses.

Montjoie St Denis, the French war-cry, old at least as Wace's day (12th century), from the hill near Paris on which St Denis (q.v.) underwent the joy of martyrdom. See *HERALD*.

Montjuich. See BARCELONA.

Montluçon, a town in the French department of Allier, on a castle-crowned hill whose base is washed by the Cher, 202 miles S. of Paris. It owes its rapid development to the Commentry coalfield, and has large iron, plate-glass, and chemical works. Pop. 36,000. Nérès-les-Bains, 18 miles SE., is the *Nerionagus* of the Romans—of whom many traces are left—and since 1821 has again risen into repute through its warm alkaline mineral waters (126° F.).

Montmartre. See PARIS.

Montmédy, a town in the French department of Meuse, 25 miles N. of Verdun and 31 miles by rail SE. of Sedan, consists of two portions, the citadel and upper town overlooking the lower town, which lies in the valley of the Chiers, a tributary of the Meuse. Built and fortified in 1235, it was taken by the French in 1542, 1555, 1596, and 1657; they, after it was definitely assigned to them by the peace of the Pyrenees (1659), had it recon-

structed and re-fortified by Vauban. It was, however, captured by the Germans in 1815, in 1870, and again (after destruction of its defences by the French) in 1914.

Montmorency, a river of Quebec, a tributary of the St Lawrence, famous for its beautiful falls, 8 miles NE. of Quebec. Here the stream is 100 feet wide, and the falls have a sheer descent of 250 feet.

Montmorency, ANNE, first DUC DE, Marshal and Constable of France, born 15th March 1492, belonged to one of the oldest and greatest of the noble families of France. Brought up along with Francis I., he distinguished himself by his gallantry and military skill at Marignano (1515) and in the defence of Mézières, and was taken prisoner along with his sovereign in the battle of Pavia (1525). In consequence of his efforts to win his master freedom, and his successful warring against the emperor's armies, he was made Constable in 1538; but, being suspected by the king of siding with the Dauphin against him, he was banished from court in 1541. On the accession of Henry II. (1547) he was restored to his former position and dignities. In 1557 he commanded the French army which suffered the terrible defeat of St Quentin at the hands of the Spaniards, in which he was again taken prisoner. During the minority of Charles IX. Montmorency, with the Duke of Guise and the Marshal St André, composed the triumvirate which opposed the influence of Catharine de' Medici. In 1562 he commanded the royal army against the Huguenots at Dreux, and was taken prisoner a third time. In the following year he drove the English out of Havre. He again engaged Condé at St Denis (1567), but received a fatal wound, of which he died at Paris on the following day, 11th November 1567. See *Life* by Decrue (2 vols. Paris, 1885-89).

Montmorency, HENRI, DUC DE, grandson of the famous Constable de Montmorency, was born at Chantilly, 30th April 1595. His godfather was Henry IV., who always called him his 'son.' When he was seventeen years of age Louis XIII. made him admiral and viceroy of Canada, and in the following year governor of Languedoc. During the religious wars of 1621 and the following years Montmorency commanded the Catholics in the south against Rohan, was almost captured at the siege of Montpellier (1622), took the islands of Ré and Oléron from the defenders of Rochelle (1625), and penetrated into Piedmont (1630). But Richelieu, jealous of his popularity, provoked him into rebellion along with the king's brother, Gaston, Duke of Orleans. Marshal Schomberg was sent against him, defeated him at Castelnaudary, and took him prisoner. Montmorency, covered with wounds, was carried to Toulouse, sentenced to death by the parliament, and, notwithstanding the intercession of King Charles I. of England, the pope, the Venetian Republic, and the Duke of Savoy, was beheaded, 30th October 1632. Montmorency was distinguished for his amiability and the courtesy of his manners, as well as for his valour.

Montoro, a town of Spain, on the Guadalquivir, 26 miles ENE. of Córdoba; pop. 14,000.

Montpelier, the capital of Vermont since 1805, is on the Winooski or Onion River, 206 miles by rail NNW. of Boston. It contains a handsome granite state-house, with a statue of Ethan Allen, and has some mills and tanneries. Pop. 7000.

Montpellier, the capital of the French department of Hérault, on the river Lez, 6 miles from the sea and 31 SW. of Nîmes. Pop. (1872) 54,466; (1911) 80,230; (1921) 81,548. Near the centre of Languedoc, on the great route from Italy and Pro-

vence to Spain, with its seaport at a point offering the shortest land-route not only to all parts of Languedoc, but to north France, Montpellier's position was a highly favourable one during the middle ages. Hence alike its commercial and intellectual importance, and its stormy history, during which it was sometimes independent, and sometimes under the suzerainty of Aragon or Navarre, before finally becoming a possession of the French crown in 1392. Its schools of medicine, law, and arts, developing during the 12th and 13th centuries, were formally constituted a university by a papal bull in 1289, at which time the schools of law and medicine (the latter founded by Arabian physicians) rivalled those of Paris. In the following century Petrarch was a student at the law school, and Arnaud de Villeneuve, the alchemist and physician, was teaching in the medical school. With such a geographical position Montpellier was easily stirred by the Renaissance. Rabelais and Rondelet the anatomist both graduated in medicine in 1537; Casaubon was made Greek professor in 1586. After Rondelet there is a continuity almost unique in the history of science. A pupil of his founded the famous botanic garden (the oldest in France) in 1593; other pupils, Lobel, Clusius, the brothers Bauhin, were highly distinguished amongst the earlier botanists (see BOTANY). At the end of the 17th century (during which Clarendon and Locke had been residents), Magnol again made Montpellier the centre of the science, and reckoned among his pupils Tournefort and the elder De Jussieu. De Candolle also wrote here some of his principal works, and laid out the first botanic garden upon the natural system in 1810. The medical school had also a notable history; and a new period of activity is indicated by the celebration of the sixcentenary of the university (1890), with its reorganisation upon the fullest scale of equipment. The town has also an important picture-gallery and library.

A centre of wine production, upon which its present prosperity depends, Montpellier suffered greatly by the phylloxera; but it was here that the cure of grafting French vines upon American stocks was earliest applied. The new School of Agriculture, chiefly devoted to the practical study of wine and silk culture, is very flourishing. Of the mediæval town little remains, its fortifications and most of its buildings, save the cathedral and the adjoining bishop's palace (which now houses the school of medicine), having been destroyed in the religious wars, in the Revolution, or by municipal improvements. The older streets are crooked and narrow, but afford better shelter from the sun, and from the chilling *mistral*, than do the modern ones. The chief modern buildings are the theatre and law-courts; but the principal glory of the town is its two great terraces, forming public promenades overlooking the undulating country dotted with innumerable *mazets* or country cottages, and in the distance the Mediterranean, Cevennes, Pyrenees, and Alps. See books by Duval Jcuve and Aigrefeuille.

Montpensier. See BOURBON.

Montreal, the principal city of the Dominion of Canada, is the centre of Canadian commerce, of Canadian banking, and of the extensive system of railways by which the country is covered. It is built on the south-east side of an island formed by the junction of the Ottawa River with the St Lawrence, and may be said in general terms to be situated on the northern bank of the St Lawrence. The city is about 4 miles long and 2 wide, the Central Mountain rising in the rear narrowing the city at its base for some distance. It is not the

political capital of the province of Quebec, but it exerts an immense political influence, and practically not only directs the political business of Quebec, but exerts also by means of its banks, its manufactures, and its great importing and distributing commercial houses a great influence on the public policy of the Federal Government. It is also the seat of the greatest universities, hospitals, convents, and seminaries in all Canada. Finally it is during the season of navigation—i.e. from May to November—the great maritime port of the Dominion, many transatlantic steamship companies making it one of their headquarters; while a lake and river and coast navigation of great activity increases and diversifies the business of the city. It is nearly 1000 miles from Montreal to the ocean proper, and 250 to the first salt water at Three Rivers; and Montreal is 300 miles nearer Liverpool than is New York. Pop. (1871) 107,225; (1881) 140,747; (1901) 267,730; (1911) 470,480; (1921) 618,506, with suburbs about 850,000. Over half are of French descent; of the rest, the Irish are more numerous than those of English and Scottish descent.

The growth of the commerce of Montreal has been very remarkable. The 1500 miles of the St Lawrence River contribute; and the great graving-dock (1913) is proving very useful. For the great Victoria Railway Bridge across the St Lawrence, rebuilt in 1898-99, see BRIDGE. The canal system which finds its outlet at Montreal is remarkable. By means of the canals Montreal is enabled to touch and handle the trade of Duluth and Fort William on Lake Superior, of Chicago and Milwaukee on Lake Michigan, Collingwood and Goderich on Lake Huron, Buffalo and Cleveland on Lake Erie, Hamilton, Toronto, Kingston, and Oswego on Lake Ontario. These canals afford a continuous course of water-communication extending from the Straits of Belle Isle to Port Arthur at the head of Lake Superior, a distance of 2260 miles. Montreal, therefore, looks forward with some misgiving to the project for deep-water communication with the lakes, by which need for transshipment would end. See CANAL. The Canadian National, the Canadian Pacific, and other railways open up by means of various connections the whole railway-system of the United States and Canada, and the Canadian Pacific Railway has a through line from Montreal to Vancouver City in British Columbia, a distance of 2906 miles. Thousands of hands are employed in the boot and shoe manufacture, in clothing-factories, in tobacco-factories, and in the workshops of the railways. There are also rubber-factories, sawmills, sack-factories, tool-factories, silk-factories, cotton-mills, and an endless variety of small industries which receive encouragement from the protection afforded by the tariff.

Of the Episcopal churches, Christ Church Cathedral has a tower 224 feet in height, and St George's one of 230 feet. The Catholic churches are numerous, and some of them splendid: St Peter's Church is a repetition on a smaller scale of the church at Rome; Notre Dame holds 10,000 people; St Patrick's is the church of the Irish Catholics. In the French churches the preaching is generally in the French language. Education in Montreal is conducted under the law of the province of Quebec. It is denominational in character, the vast majority of the schools being of course Roman Catholic. The Protestant schools are under the control of a special board. The taxes on Catholics go to the Catholic schools, the taxes on Protestants to Protestant schools. McGill University, which obtained its charter in 1821, has been an active establishment since 1852; the University of Montreal (Roman Catholic) has taken over and developed the Mon-

treau branch of Laval University of Quebec; the seminary of St Sulpice, founded in 1657, is a theological institution; the Presbyterian College, chartered in 1865, is well endowed; the Wesleyan Theological College was founded in 1873; and others in the long list are the Congregational College, the Anglican Diocesan College, St Mary's College, founded in 1848 by the Jesuits, the academic hall of which holds 1200 people, the Jacques Cartier Normal School, under the control of the provincial government, the Christian Brothers' Schools, the schools and convents of the congregation of Notre Dame, the schools and convents of the Sacred Heart. McGill College Library, the Advocates' Library, the Presbyterian College Library, the Mechanics' Institute, the Fraser Institute, and the Y.M.C.A. have libraries of some value. The *Quebec Gazette* (1764) was the first paper published in Canada; the *Montreal Gazette* (1778) is the next oldest, and is a leading journal still. There are musical, art, and historical associations also which maintain in Montreal a taste for art, literature, and science not common in colonial commercial cities. Among the chief philanthropic institutions are the General Hospital, the Protestant House of Industry, the Y.M.C.A. building, the Dispensary, the Gray Nuns' Hospital (1755), which is also a foundling hospital, the Hôtel Dieu (1644).

History.—Montreal was purchased from the president of the Hundred Associates of France, a trading corporation, by Abbé Olier and Dauversière, who were moved by religious enthusiasm to establish institutions there; it was actually founded by Maisonneuve, the leader and military head of the enterprise of Olier and Dauversière, who landed at Montreal (*Ville-Marie de Montréal*) on the 18th May 1642. The early history of the city was one of continuous struggles against the Iroquois Indians, by whom the whole island was more than once devastated up to the very palisades of the town's defences; and in 1660 the Indians almost exterminated the population not actually within the feeble defences. In 1722 the city was fortified with a bastioned wall and ditch. In September 1760, the year following the capture of Quebec by Wolfe, Montreal was surrendered by the French governor, De Vaudreuil, to the British, under Lord Amherst and General Murray. In 1776-77 the city was occupied by the invaders from the revolted colonies, who did their best to coerce or cajole the Canadians into joining in the rebellion. In 1777 the British forces advanced from Quebec, and Montreal was evacuated by the invaders. Since that time the history of the city has been peaceful. The war of 1812-14 did not disturb its progress. The rebellion of 1837 for a moment ruffled its political serenity; but all its modern history has been the history of constitutional development, of business progress, of educational advancement, and of growth in population.

Montreuil-sous-Bois, an eastern suburb of Paris in the department of the Seine. It is noted for its porcelain works. Pop. 51,000.

Montreux, a group of villages on the north shore of the Lake of Geneva, 15 miles by rail SE. of Lausanne. The name properly belongs to one small hamlet, but is popularly extended so as to include the adjoining villages of Clarens, Vernex, Veytaux, &c. The beautiful situation and mild climate of 'the Swiss Nice' attract many invalids to the place, which abounds with hotels and *pensions*. Near it is the castle of Chillon. Pop. 17,000.

Montrose, a seaport of Forfarshire, 76 miles NNE. of Edinburgh and 42 SSW. of Aberdeen. It stands on a level peninsula between Montrose Basin (a tidal loch, measuring 2 by 1½ miles, but

almost dry at low-water) and the mouth of the river South Esk. A fine suspension bridge (1829), 432 feet long, leads to Inchbrayock or Rossie Island, in the Esk's channel, and is continued thence by another bridge; and there is also a railway viaduct (1883). Montrose has a plain town-hall (1763-1819); a large parish church (1791-1834), with a steeple 200 feet high; an academy (1820); a lunatic asylum (1868), 2 miles NNW.; good links; and a wet dock (1840). The foreign trade—timber its staple—is chiefly with the Baltic. Flax-spinning is the principal industry; and ropes, canvas, &c., are also manufactured. Montrose was the birthplace of Robert Brown, botanist; Joseph Hume; Sir Alexander Burnes; and Paul Chalmers, R.S.A. It has memories, too, of Edward I., the two Melvilles, the Great Marquis, the Old Pretender, Dr Johnson, and Lola Montez. A royal burgh since 1352 and earlier, it unites with Arbroath, Brechin, Forfar, and Bervie to return one member to parliament. Pop. (1851) 15,238; (1921) 10,979.

Montrose, JAMES GRAHAM, MARQUIS OF, belonged to a family which can be traced back to the year 1128, and which since 1325 had been settled at Old Montrose, in Maryton parish, Forfarshire, near Montrose town. It had been ennobled with the titles of Lord Graham (1451) and Earl of Montrose (1505); and three of its members had fallen at the battles of Falkirk, Flodden, and Pinkie; whilst another, Sir William Graham, early in the 15th century married for his second wife Mary, daughter of Robert III.—a marriage from which sprung the Grahams of Claverhouse. John, third Earl of Montrose, was chancellor and, after James VI.'s accession to the English crown, viceroy of Scotland. His successor, John, married Lady Margaret Ruthven, eldest sister of the unfortunate Earl of Gowrie; and the issue of this union was five daughters and one son, James, the 'great marquis,' who was born in 1612 at Old Montrose. His mother died in 1618, his father in 1626. Next year the young earl was sent to the university of St Andrews by his guardian and brother-in-law, Archibald Lord Napier, son of the famous inventor of logarithms. He was proficient in all field-sports, and an apt if not ardent student, besides exhibiting a genuine love of literature, which his stormy after-life never destroyed. In 1629 he married Magdalene Carnegie, daughter of the first Earl of Southesk, and he lived at Kinnaird Castle, his father-in-law's seat, till in 1633, on attaining his majority, he left Scotland to travel in Italy, France, and the Low Countries.

On his way home, in 1636, he had an audience with Charles I., but, owing to the machinations of the Marquis of Hamilton, was coldly received; and he had not been long back in Scotland before by the 'canniness of Rothes' he was 'brought in' to the ranks of the king's opponents, at this time comprising the great mass of the Scottish nation. Montrose returned in the very year (1637) when the tumults broke out in Edinburgh on the attempt to introduce Laud's Prayer-book; and he was one of the four noblemen selected to compose the 'Table' of the nobility, which, along with the other Tables of the gentry, the burghs, and the ministers, drew up the famous National Covenant (q.v.). In the summer of 1638 he was despatched to Aberdeen, to coerce it into subscription; and in 1639 he made three military expeditions thither. On the first occasion (30th March) he employed conciliation; Baillie laments his 'too great' humanity. On the second (25th May) he imposed on the city a fine of 10,000 merks, but, though his soldiers committed some acts of pillage, he resisted the importunities of the Covenanting zealots to give 'Meroz' to the flames, and Baillie again

complains of 'his too great lenity in sparing the enemy's houses.' The arrival at Aberdeen by sea of the Earl of Aboyne, Charles's lieutenant of the north, with reinforcements, caused Montrose to retreat, followed by the earl and the Gordon Highlanders; but at Meagra Hill, near Stonehaven, on 15th June, he won a complete victory, and four days later, after storming the Bridge of Dee, he was once more master of Aberdeen. The citizens expected some bloody punishment for their well-known Episcopalian leanings, but again Montrose agreeably disappointed their fears, again to be upbraided by the Committee of Estates for not having burned the town.

News now arrived of the 'pacification of Berwick,' and terminated the struggle in the north. Charles invited several of the Covenanting nobles to meet him at Berwick. Among those who went was Montrose; and the Presbyterians dated what they regarded as his apostasy from that interview. His political position was certainly different after his return. In the General Assembly which met in August 1639 he showed symptoms of disaffection towards the Covenant; and one night, it is said, a paper was affixed on his chamber-door, '*Invictus armis, verbis vincitur.*' In the second Bishops' War, when, on 20th August 1640, 25,000 Scots crossed the Tweed, Montrose was the first to plunge into the stream; but that very month, with eighteen other nobles and gentlemen, he had entered into a secret engagement at Cumbernauld against the dictatorship of Argyll, to whom and the zealots Montrose was as hostile now as he ever had been to Hamilton and the 'sometime pretended prelates.' It leaked out that he had been secretly communicating with the king; and when the Scottish parliament met (November 1640) he was cited to appear before a committee. The affair of the 'Cumbernauld Bond' was brought up; but nothing came of it, though some of the fiery spirits among the clergy 'pressed,' says Guthrie, 'that his life might go for it.' Next June Montrose with three others was accused of plotting against Argyll, and confined till November in Edinburgh Castle. Clarendon's story that Montrose, about this period, offered to the king to assassinate Argyll and Hamilton may safely be set aside; but to Hamilton he owed the rejection of his two proposals in the following year to raise the royalist standard in the Highlands.

In 1644, however, he quitted his forced inaction at Oxford, where he had been residing with Charles, and, disguised as a groom, made his way into Perthshire, with the rank of lieutenant-general in Scotland and the title of Marquis of Montrose. At Blair-Athole he met 1200 Scotto-Irish auxiliaries under Alaster Maccoll Keitache Macdonell ('Col-kitto'), and placed himself at their head, the clans quickly rallying round him. Marching south, on 1st September he fell on the Covenanting army, commanded by Lord Elcho, at Tippermuir, near Perth, and gained a signal victory. He next defeated a force of Covenanters at Aberdeen (13th September), and took possession of the city, which was this time abandoned for four days to all the horrors of war. The approach of Argyll, at the head of 4000 men, compelled Montrose, whose forces were far inferior in numbers and discipline, to retreat. He plunged into the wilds of Badenoch, recrossed the Grampians, and suddenly appeared in Angus, where he wasted the estates of more than one Covenanting noble. Having obtained fresh supplies, he once more returned to Aberdeenshire, with the view of raising the Gordons; narrowly escaped defeat at Fyvie in the end of October; and again withdrew into the fastnesses of the mountains. Argyll, baffled, returned to Edinburgh, and threw up his com-

mission. Montrose, receiving large accessions from the Highland clans, planned a winter campaign, marched south-westward into the country of the Campbells, devastated it frightfully, drove Argyll himself from his castle at Inveraray, and then wheeled north intending to attack Inverness. The 'Estates' at Edinburgh were greatly alarmed, and, raising a fresh army, placed it under the command of a natural son of Sir William Baillie of Lamington. He arranged to proceed by way of Perth, and take Montrose in front, while Argyll should rally his vast array of vassals, and fall on him in the rear. The royalist leader was in the Great Glen of Albin, the basin of the Caledonian Canal, when he heard that Argyll was following him. He instantly turned on his pursuer and surprised and utterly routed him at Inverlochy, 2d February 1645. Fifteen hundred of the Campbells were slain, only four of Montrose's men. He then resumed his march northward, but did not venture to assault Inverness, his wild mountaineers being admirably fitted for rapid irregular warfare, but not for the slow work of beleaguering. So, directing his course eastward, he passed with fire and sword through Moray and Aberdeenshire. Baillie and Hurry, his lieutenant, were at Brechin, but Montrose by a dexterous movement eluded them, captured and pillaged Dundee (3d April), and escaped safely into the Grampians. On 4th May he routed Hurry at Auldearn, near Nairn, and on 2d July inflicted a still more disastrous defeat on Baillie himself at Alford in Aberdeenshire. 'Before the end of the summer,' he sent word to Charles, 'I shall be in a position to come to your Majesty's aid with a brave army;' and towards the end of the month he marched southward with upwards of 5000 men. He was followed by Baillie, who picked up reinforcements by the way, and who on 15th August again risked a battle at Kilsyth, but was defeated with frightful loss, 6000 of the Covenanters being slain. This, the last and most signal of Montrose's six splendid victories, seemed to lay Scotland at his feet, but the clansmen slipped away home to secure their booty, and Aboyne withdrew with all his cavalry. Still, with 500 horse and 1000 infantry, he had entered the Border country, when, on 13th September, he was surprised and hopelessly routed by 6000 troopers under David Leslie at Philiphaugh, near Selkirk. Escaping to Athole, he again endeavoured, but vainly, to raise the Highlands; and on 3d September 1646 he sailed for Norway, whence he proceeded to Paris, Germany, and the Low Countries.

Here it was that news reached him of Charles I.'s execution, whereat he swooned, and then reviving, 'swore before God, angels, and men to dedicate the remainder of his life to the avenging the death of the martyr.' So, on behalf of Charles II., he undertook a fresh invasion of Scotland, and from Orkney passed over to Caithness, his little army almost annihilated by shipwreck. Neither gentry nor commons would join him; but he pushed on to the borders of Ross-shire, where, at Invercharron, his dispirited remnant was cut to pieces by Strachan's cavalry, 27th April 1650. He fled into the wilds of Sutherland, and was nearly starved to death, when he fell into the hands of Macleod of Assynt, who sold him to Leslie. He was conveyed with all possible contumely to Edinburgh, where, dressed like a gallant bridegroom, he was hanged in the High Street, near the Cross, on a lofty gallows, 21st May 1650. Eleven years afterwards his mangled remains were collected from the four airts and buried in St Giles's, where a stately monument was reared to him in 1888. He left a son, James, the 'good Marquis' (c. 1631-69), whose grandson in 1707 was created Duke of Montrose.

Montrose's few poems, all burning with passionate loyalty, are little known, save the one famous stanza, commencing, 'He either fears his fate too much.' That has the right ring, one would think; and yet its ascription to Montrose is doubtful, first put forward in Watson's *Collection of Scots Poems* (1711). There are four portraits of Montrose—by Jameson (1629 and 1640), Dobson (1644), and Honthorst (1649). Of the inner man the finest estimate is Gardiner's: 'When once he had chosen his side, he was sure to bear himself as a Paladin of old romance. If he made any cause his own, it was not with the reasoned calculation of a statesman, but with the fond enthusiasm of a lover. When he transferred his affections from the Covenant to the king, it was as Romeo transferred his affections from Rosaline to Juliet. He fought for neither King nor Covenant, but for that ideal of his own which he followed as Covenanter or Royalist. He went ever straight to the mark, impatient to shake off the schemes of worldly-wise politicians and the plots of interested intriguers. Nature had marked him for a life of meteoric splendour, to confound and astonish a world, and to leave behind him an inspiration and a name which would outlast the ruins of his hopes.'

See the Latin *Memoirs* by his chaplain, Dr Wishart (Amst. 1647; trans. by Murdoch and Morland Simpson, 1893); Mark Napier's *Memoirs of Montrose* (1838; 4th ed. 1856); Lady V. Greville's *Montrose* (1886); Mrs Pryce's *Great Marquis* (1912); J. Buchan's *Montrose* (1913); and Gardiner's *History of England, Great Civil War, and History of the Commonwealth and Protectorate*.

Montserrat (Lat. *Mons Serratus*, so named from its saw-like outline), a mountain of Catalonia, in north-east Spain, 30 miles NW. of Barcelona. Its height is 4055 feet; and 'its outline,' says Ford, 'is most fantastic, consisting of cones, pyramids, buttresses, ninepins, sugar-loaves.' The pious Catalonians aver that it was thus shattered at the Crucifixion. Every rift and gorge is filled with box-trees, ivy, and other evergreens. From the topmost height the eye wanders over all Catalonia. The mountain, however, owes its celebrity to the Benedictine abbey built half-way up it, with its wonder-working image of the Virgin, and to the thirteen hermitages formerly perched like eagles' nests on almost inaccessible pinnacles. In 1811 the French, under Suchet, plundered the abbey, burned the library, shot the hermits, and hanged the monks (who had given shelter to their emigrant brethren at the Revolution). The place suffered still more in 1827, when it became the stronghold of the Carlist insurrection.

Montserrat, one of the Lesser Antilles, belonging to Britain, lies 27 miles SW. of Antigua. It is about 11 miles in length, 7 in breadth, and has an area of 32 sq. m. Pop. 12,000, of whom Plymouth, the chief town, has 1700. The surface is very mountainous (3000 feet), and heavily timbered. Sugar, limes and lime-juice, cotton, cocoa, Castillea rubber, coffee, arrow-root, and papain are the principal products. The island, governed by a commissioner and a nominated legislative council, is the healthiest in the West Indies.

Mont St Michel. See ST MICHEL.

Montucla, JEAN ÉTIENNE (1725-99), an eminent mathematician, born at Lyons, held some minor government posts, and wrote the first name-worthy *Histoire des Mathématiques*.

Montyon Prizes, rewards for signal instances of disinterested goodness discovered throughout the year, awarded by the French Academy, according to the will of Jean-Baptiste-Robert Auger, Baron de Montyon (1733-1820), who bequeathed £120,000 to public hospitals, and the remainder of

his fortune to give sums of money to poor patients on leaving Paris hospitals, and to found the prizes since connected with his name. Already in 1782 he had originated the prize of virtue, but on his return to France in 1815 he arranged the scheme in its final form. The Academy of Sciences awards annually a prize of 10,000 francs for means of making any mechanical occupation more healthy, another of equal value for improvements in medicine and surgery; while the Forty themselves award the prize of virtue, and another to the writer of the work likely to have the greatest beneficial influence on morality—both alike of 10,000 francs a year.

Monuments. The Ancient Monuments Protection Acts of 1882, 1898 (Ireland), 1900, 1910, 1913, constitute the Commissioners of Works guardians of certain monuments in Great Britain and Ireland; and provide for their being made guardians of as many more as the owners shall put under their care, and for acquisition by gift, purchase, or bequest. Owners retain all rights save as regards injuring or defacing the monuments; any person defacing or injuring them is liable to a fine not exceeding £5, or imprisonment for a month. The Commissioners, the specially appointed Inspector of Ancient Monuments, and their workmen are to have access to do what may be necessary to protect the monuments. In France famous castles and churches, as well as dolmens, &c., are among the *monuments historiques* protected by law. Many of these and other monuments at home and abroad are dealt with in special articles. See

Barrow.	Earth-houses.	Obelisk.
Brasses.	Hadrian's Wall.	Offa's Dyke.
Broch.	Kits Coty House.	Pyramid.
Cairn.	Maeshowe.	Round Towers.
Callernish.	Mausoleum.	Runes.
Castle.	Monastery.	Standing Stones.
Colossus.	Mound Builders.	Stone Circles.
Dolmen.	Nuraghe.	Stonehenge.

Monza (anc. *Modetia*), a town of Italy, on the river Lambro, 9 miles by rail NNE. of Milan. The ancient capital of the Lombard sovereigns, it owed much of its early importance, and its chief public edifices, to Theodelinda; and in the middle ages, in spite of thirty-two sieges, it was conspicuous for the wealth of its numerous citizens and nobles, and the extent of its cloth-trade. The cathedral, founded in 595 by Theodelinda, contains many interesting relics of this great queen. Humbert I. was assassinated here by Bressi, 29th July 1900. The famous Iron Crown, removed to Vienna in 1859, was restored in 1866 (see CROWN). The town has also an interesting town-hall (1293), a royal palace (1777), given to the nation in 1919, and manufactures of cottons, hats, leather, &c. Pop. 57,000.

Moody, DWIGHT LYMAN, evangelist, was born at Northfield, Massachusetts, 5th February 1837, was for a while a shopman in Boston, and in 1856 went to Chicago, where he engaged with remarkable success in missionary work. In 1870 he was joined by Ira David Sankey, who was born at Edinburgh, Pennsylvania, 28th August 1840. In 1873 and 1883 they visited Great Britain as evangelists; but the main centre of their evangelistic and educational work was Northfield, Mass., where Moody died 22d December 1899. A vigorous, striking, unconventional speaker, and a worker of extraordinary energy, he published some volumes of sermons and other works. The standard Life of him is by his son (1900).

Moody, WILLIAM VAUGHN (1869-1910), poet and dramatist, born at Spencer, Indiana, graduated from Harvard, and was instructor in English at Chicago University. His first published work, *The Masque of Judgment* (1900), was one of a trilogy of philosophic dramas in blank verse, the others being *The Death of Eve* (unfinished) and *The Fire-*

Bringer. In 1901 appeared *Poems*, including strenuous lyrics and patriotic stanzas (e.g. 'On a Soldier Fallen in the Philippines'), instinct with lofty indignation against injustice and wrong. His prose play, *The Great Divide* (1906), achieved instant success; not so his mystical prose drama, *The Faith Healer* (1909). A complete edition of the *Poems and Poetic Dramas* (2 vols.) was issued in 1912.

Mooltan. See MULTAN.

Moon, the satellite of the earth, which ranks among the larger satellites of the solar system, being an almost perfect sphere of 2158 miles diameter. The mean distance between its centre and that of the earth is 238,870 miles. As compared with the earth, its diameter is .273, its surface .074, and its volume .0203. The ratio of its mass to that of the earth is 1:81.53; thus its mean density is .60 that of the earth, or 3.5 times that of water. Gravity at the moon's surface is one-sixth of its amount on the earth. The moon makes a complete revolution round the earth in one month, but as it rotates about its axis in the same period, it always presents the same face to us. Its orbital velocity about the

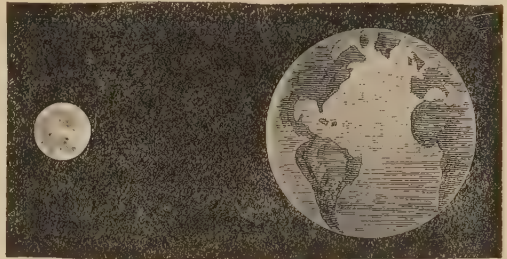


Fig. 1.—Comparative Sizes of the Earth and Moon.

earth is 2270 miles per hour, and its equatorial velocity of rotation 10 miles per hour. Presenting as large a surface to the eye as the sun, and changing both its form and position with great rapidity, the moon was studied very early in the history of civilisation, and proved the most useful of the heavenly bodies for the measurement of time. Its motions have been most carefully observed in modern times in order that its position in the sky may be calculated beforehand, and enable the traveller and navigator to determine longitude (see LATITUDE AND LONGITUDE).

Every month the moon waxes and wanes, changing from a thin crescent to a half-moon, from a half to a full, and from a full back again to a thin crescent. These changes in the moon's appearance are called its phases, and observation shows that as the phase changes the angle between the directions of the sun and moon changes also. The new moon is always seen in the west, near the setting sun; when it is half illuminated its direction is at right-angles to that of the sun; when full it is in a direction directly opposite to the sun. Further, at new moon it sometimes comes between the earth and the sun, causing an eclipse of the sun; and at full it sometimes is screened from the sunlight by the earth's shadow, and is itself eclipsed (see ECLIPSE). The explanation of the changes of phase, given by Aristotle (384-322 B.C.) and probably surmised much earlier, is: The moon is a spherical body which moves round the earth; it is not self-luminous, but is illuminated by the distant sun. When the moon is a thin crescent only a small portion of the illuminated half is turned towards the earth, while when it is full the whole of the illuminated half is presented. When the moon is crescent the rest of the disc is frequently seen at the same time,

faintly illuminated by light from the earth. This interesting phenomenon, known as 'the old moon in the arms of the new,' confirms the explanation which has been given.

If the moon be observed on consecutive nights it will be seen that its position among the stars has shifted considerably. In the course of a month it makes a complete circuit of the stars. Each day, like the sun and stars, it appears to move from east to west; but this movement, due to the rotation of the earth on its axis, may for the present be left out of consideration. Suppose the sky could be seen from the earth's centre, stars would be seen dotted all over and apparently on the surface of a distant sphere. The sun, moon, and planets would be seen all near a *great-circle* of this sphere, or circle cut from the sphere by a plane through its centre. This great-circle, called the *Ecliptic* (q.v.), passes through certain definite constellations, and may be considered as fixed among the stars. The sun moves round the ecliptic in one year. The orbit of the moon does not agree exactly with the ecliptic, but is a great-circle near to it—i.e. cutting it at a very small angle at two opposite points, and reaching its greatest distance from the ecliptic, on opposite sides, half-way between these points of intersection. The moon describes its orbit in one month. It makes a complete circuit of the stars in a *sidereal month*. The average length of the sidereal month is 27·32166 mean solar days. But as the sun is also moving along the ecliptic, a longer time elapses before the moon is again in conjunction with the sun. Thus the *synodic month*, or average time from new moon to new moon, full to full, &c., is 29·53059 days. But this is only to be regarded as a rough first approximation to the movement of the moon, which is very complicated and intricate when it is accurately observed. Its orbit is inclined at an angle of $5^{\circ} 8' 40''$ to the ecliptic; but the line of Nodes (q.v.), or intersection of the orbit with the ecliptic, is not fixed. It moves slowly in a retrograde direction, completing its revolution in 18·6 years. Again, the movement of the moon in its orbit is not uniform. On the average an arc of $13^{\circ} 10'$ is described daily, but varies from less than 11° to more than 15° . A considerable part of this want of uniformity is accounted for by the fact that the moon does not describe a circle uniformly about the earth as centre, but an ellipse of eccentricity ·055 of which the earth occupies a focus, moving, in accordance with Kepler's Laws (q.v.), more quickly when near the earth than when more distant. This movement is also detected by measures of the moon's apparent diameter, which varies from $33' 30''$ when the moon is in *perigee* or nearest the earth to $29' 20''$ when in *apogee* or farthest from the earth. This ellipse is not fixed, but its longest axis or line of apsides moves (turns slowly) in a forward direction, completing a revolution in nine years. The motion of the moon was so far analysed by the Greek astronomers, especially by Hipparchus, who discovered the eccentricity—more accurately represented by Kepler as the elliptic character—of the moon's orbit and the motion of the apsides.

The position of the moon in the sky is determined by taking as a foundation the mean motion of the moon in longitude—i.e. along the ecliptic, the mean motions of the node and apse, and adding to these various periodic terms which are now represented trigonometrically. If g denote the moon's anomaly or angular distance from *perigee*, g' the sun's anomaly, and D the angular distance from the sun in the plane of the ecliptic, the five largest inequalities in the moon's longitude are: $+6^{\circ} 17' 2'' \sin g + 1^{\circ} 16' 26'' \sin (2D - g) + 39' 57'' \sin 2D + 12' 49'' \sin 2g - 11' 9'' \sin g'$. The first term is the *elliptic inequality*, discovered

by Hipparchus; the second the *evection*, discovered by Ptolemy; the third the *variation*, discovered by Tycho Brahe; and the fifth the *annual inequality*, also discovered by Tycho; while the fourth term may be regarded as due to Kepler's substitution of the ellipse with the earth as focus for a circle with the earth placed a little out of the centre.

The problem of the moon's motion was revolutionised by the discovery of the law of gravitation. Newton showed that under the attraction of the earth alone the moon would describe an ellipse. The influence of the sun—which, though distant, is very massive—causes Perturbations (q.v.) in this ellipse. Newton showed that the motion of the nodes and apsides and the principal inequalities were attributable to this cause. The problem was then presented of determining deductively the motion of the moon with as great accuracy as could be verified by observation. Newton had used geometrical methods, but the great complication of the problem required analysis for its further development. The first great exponents of the lunar theory were Clairaut and Euler. As observations became more accurate greater demands were made on gravitational theory, and many great mathematicians have applied themselves to this difficult problem. The three most complete theories are those of Hansen, Delaunay, Hill and Brown. Delaunay gives a complete algebraic solution of the problem, but is obliged to use series of slow convergency. Hansen avoids this by using numerical values of some of the quantities involved, such as the eccentricity of the moon's and sun's orbit. His method is thus less general and less interesting from the mathematical standpoint, but in some respects solves the problem with greater numerical accuracy. The method of Hill is algebraic, excepting for one quantity—the ratio of the month to the year, for which a numerical value is taken. Thanks to some very beautiful and ingenious mathematics, this theory is comparatively simple. It has been carried through to completion by E. W. Brown. The attractions of the planets as well as of the sun are included in these works. Hansen constructed tables based on his own theory, and the predictions of the moon's place in the *Nautical Almanac* have been based on these tables since their completion in 1857. Under the direction of Radau, tables were published in 1911 for prediction of the moon's place on Delaunay's theory. These are utilised in the *Connaissance des Temps*, while the British and American nautical almanacs have used Brown's tables from 1923. These theories have almost completely succeeded in predicting the moon's place. There still remain, apparently unaccountable for by theory, two inequalities—one of semi-amplitude, $11' 5''$, with a period of about 270 years; and another of semi-amplitude, $3' 3''$, with a period of about 60 years. The possibility of these terms arising from planetary perturbations has been exhaustively examined and answered in the negative by Radau and Brown.

A point of great interest in the theory of the moon is the *secular acceleration*. In 1693, by examination of the records of ancient eclipses, Halley concluded that the moon's mean motion was increasing at the rate of $12''$ a century; i.e. in each century the moon moved $12''$ more than in the previous century. Laplace investigated the subject theoretically, and accounted for it as the result of a slow change in the eccentricity of the earth's orbit about the sun. In 1853 Adams showed that only half of the amount could be accounted for by this cause. His result was confirmed by Delaunay, and later researches by Brown give $5' 91''$ as the theoretical value of this quantity. The difference between the theoretical and observed values led

to renewed examination of the records of early eclipses by Newcomb, Cowell, and Fotheringham. The indefiniteness of these records makes them difficult to interpret. The discovery in the British Museum of the record of an eclipse at Babylon (identified by Cowell as occurring on 31st July 1063 B.C.) led Cowell to a better determination of the moon's secular acceleration, and the discovery of a small secular acceleration in the movement of the sun. Following Cowell, Fotheringham has given as (*Monthly Notices*, Royal Astronomical Society, December 1920 and April 1923) the conclusion of a very complete discussion of early solar and lunar eclipses and occultations of stars by the moon a value of $10\cdot3''$ per century for the secular acceleration of the moon, and $2\cdot1''$ for that of the sun. The excess of the observed value of the moon's secular acceleration over the calculated value and the secular acceleration of the sun may be explained by a slow lengthening of the day. This is caused by the frictional action of the tides, which acts like a brake on the rotating earth. It has been shown by Taylor and Jeffries (*Monthly Notices*, Royal Astronomical Society, 1920) that shallow seas in which the tides run strongly are most effective in bringing this about. Detailed numerical calculation shows that the Irish Sea will account for one fifty-sixth of the amount required. There seems little doubt that there are sufficient closed areas, such as the English Channel, Behring Strait, Bay of Fundy, and Mozambique Channel, to cause the whole of the hitherto unexplained part of the secular acceleration.



Fig. 2.—The Moon, photographed at Greenwich on 19th April 1899.

The moon's distance from the earth is obtained by observations of its place from two widely separated stations, such as the observatories at Greenwich and the Cape of Good Hope. If observed simultaneously from these stations the moon will not appear to both observers in the same position among the stars, the amount of difference depending on the distance of the moon from the earth at the time. From this difference is deduced the moon's *equatorial horizontal parallax*, or the change in the moon's position among the stars which would be noted by an observer on the equator

when the moon was seen on the horizon, if he shifted his place to the centre of the earth. The mean distance of the moon given above as 238,870 miles is probably less than twenty miles in error.

From the fact that the moon always presents the same face to the earth, it follows that the moon rotates about an axis perpendicular to the ecliptic in the same time as it revolves round the earth—i.e. a little more than twenty-seven days. The axis is not quite perpendicular to the ecliptic but inclined $1^{\circ}30'$ from the perpendicular. Owing to the want of uniformity in the moon's orbital motion and the changes in this orbit, there are slight variations in the face presented to us. At one time and another about $\cdot59$ of the moon's total surface is seen from the earth (see LIBRATION). The figure of the moon is very slightly ellipsoidal, bulging out a little in the direction towards the earth.

From the differences in size, density, and mass we should expect that, while presenting some features of agreement, the moon would differ widely from the earth in physical condition. To the naked eye some peculiarities are obvious. Attentively watching the full moon, we soon become familiar with its irregularly-spotted surface, which *never changes*. It cannot be like the earth, which is often obscured by clouds and mists. The telescope confirms this impression. No changes have been certainly detected by astronomers, and only one, that in the walls of the small crater Linné, has been reasonably suspected. The details of the lunar surface are hard, cold, and glaring in their delineation. The delicate colouring and shade of terrestrial scenery is entirely absent. Its surface appears to consist of bare rock, showing cracks, possibly due to the effects of heat and cold. Nothing like mist, cloud, or vapour has ever been seen, and the inference is drawn that the moon has practically no water or air. Observations of stars occulted by the moon (see OCCULTATIONS) confirm this, and the moon's atmosphere certainly cannot have more than $\frac{1}{100000}$ th of the surface density of our own.

The total amount of light received from the full moon is about $\frac{1}{100000}$ th of that received from the sun. Of the light received by it from the sun about 17 per cent. is reflected. About the same proportion of the heat received is similarly reflected, and the remaining 83 per cent. absorbed. It has been calculated by Poynting and also by Very that during the lunar day—i.e. fourteen of our days—the moon rises to a temperature very near the boiling-point of water. In the lunar night the temperature falls far below any temperature experienced on the earth. The absence of an atmosphere, and especially of water-vapour, leaves the surface of the moon exposed to these great variations of temperature, and it is to this cause that any changes, if such should be found, in the moon's surface are to be attributed; for without water or air there can neither be storms of wind nor floods to modify the surface.

The moon has been carefully mapped, and names have been given to all the more prominent features. The term *Mare* (Lat. sea) has been applied to the large dark plains, an example of which is the *Mare Crisum*, easily seen as an oval dark spot near the edge of the new moon. Another example is the *Mare Serenitatis*, the large dark oval near the right of the accompanying illustration. The terms *Palus* (marsh), *Lacus* (lake), and *Sinus* (bay) have all been fancifully used to denote smaller dark areas.

The most striking feature is furnished by the *craters*. Under this term are included more or less circular areas of diameters from 150 miles to less than a mile, surrounded by walls which may reach as much as 18,000 feet in height. Often a small peak is found in the centre. It will be seen from the

illustration how thickly the surface of the moon is covered with craters. The larger craters are named after astronomers and philosophers—e.g. Copernicus, Tycho, Plato. Besides these there are the ranges of mountains called the Alps, Apennines, Cordilleras, &c., similar to terrestrial chains. The heights of many of the lunar mountains have been measured. Galileo showed how this could be readily done by the lengths of their shadows. The highest peak, *Newton*, has an altitude of 24,000 feet. The lunar *ridges* (so named by Schröter, their discoverer in 1787) are clefts or cracks in the surface, passing often through mountains and valleys, sometimes for a distance of 300 miles, their breadth being relatively so small as to give them the appearance of true cracks. Some of the most striking of all lunar appearances are the broad white *rays* which diverge from a few central points. Those from the crater *Tycho* extend to great distances, in one case to nearly 2000 miles. Their breadth is from ten to twenty miles, and they pass over mountains and plains.

The mapping of the moon is a branch of astronomy known as *Selenography*. The first complete map was made by Hevelius. In 1836 Beer and Mädler published a very careful description of the moon with accompanying maps, the results of many years' study and micrometric measurement. Recently Franz and Saunder, from measurements of photographs, have largely increased the accuracy with which the positions of various points on the moon are known.

The first photograph of the moon was a daguerreotype taken by Draper in 1840. Since the invention of the dry-plate process it has become a comparatively easy matter to obtain fairly good photographs of the moon. Only a short exposure of at most a few seconds is needed. But as in one second of time the moon moves $\frac{1}{2}''$, it is necessary, if very sharp photographs are to be obtained, to give special movements to the telescope, so that its motion may exactly correspond with that of the moon in the sky. Owing to slight atmospheric changes, the best results are only obtained occasionally, and as the outcome of many trials. Excellent photographs have been taken at the Lick Observatory, but the most extensive series has been obtained at Paris by MM. Loewy and Puiseux, who have published beautiful enlarged photographs. Even finer photographs, though few in number, have been obtained by Mr Ritchey, using a colour-screen with the refractor of the Yerkes Observatory. Probably the finest photographs are those taken with the large 100-inch reflector of the Mount Wilson Observatory.

The etymology of the word *moon* is interesting, but not in all respects certain. The long-prevalent view that our word and its numerous cognates are derived from a root *mē-*, to measure, from its function as a measure of time, is attractive and plausible, but cannot be substantiated. More likely, according to the *New English Dictionary*, our *moon*, with the cognate words in all branches of the Indo-Germanic family, has arisen, by substitution of suffix (Brugmann's view), from the *t*-stem *mēnoth*, month. Outside the Teutonic group of names for the moon (O. E. *mōna*, Old Frisian *mōna*, Old Saxon *māno*, Old High German *māno*), compare Greek *mēnē*; and with reduced grade of the stem suffix *mens-*, Sanskrit *mās*, *māsa*, Zend *manha*, Greek *mēn* for *month*, Ionic *meis*, Latin *mensis*, Irish *mí*.

Harvest-moon.—At or about the time of harvest in the north temperate zone the sun in its annual course is approaching the celestial equator, which it crosses from north to south on September 22. On that date it sets close to the exact western point of the horizon. If it happens to be then also full moon, the moon rises that evening as the sun

sets, and is at its rising opposite the sun, or close to the exact eastern point of the horizon. Thus it begins to give light at sunset, and continues to do so until sunrise, when it sets opposite to the sun, just as the latter rises. This arrangement holds good without any great change for several days, so that there is practically no darkness, especially if the weather be fine. The full moon which thus illumines the autumn nights is called the *harvest-moon*. No other full moon in the year rises for so many days in succession so soon after sunset. If the date of full moon be not exactly September 22, still the same phenomena occur, though not with the same perfection, and the longer the interval between full moon and that date the less perfect they are. This is because the full moon, being on September 22, coincides with the time when the moon (being at full moon necessarily *opposite* the sun) is crossing the celestial equator from south to north, at which time its northward motion is most rapid. The position of any body on the celestial sphere determines the time of its rising at any place in our latitudes, and, if that position be altered, the time of rising will be altered also. If it moves *southward* the moon will tend to rise *later*, if it moves *northward* it will tend to rise *earlier*. We have seen that the moon's northward motion is most rapid when crossing the equator. Hence it has then a strong tendency to rise earlier each evening. But its motion towards the east (or *downwards*, when it is on the eastern horizon) gives it a tendency to rise later. These opposite tendencies, in the case of the September full moon, approach a balance, if the observer be in the latitude of northern Europe. Therefore the moon in that case rises only a few minutes later each evening for about a week. Farther north, about lat. $64\frac{1}{2}^{\circ}$, a balance is attained, and for two evenings the moon rises at the same time. Still farther north it rises *earlier* the second evening. But the most generally observed phenomena are of course those to be seen between latitudes 40° and 60° , which consist in the nearly full moon rising but little after sunset for several days in succession. In these latitudes of the southern hemisphere March enjoys the benefit of the harvest-moon, as September does in the north. And as celestial appearances are reversed to observers in different hemispheres, it follows that, when we have most benefit from the full moon, our neighbours at the antipodes have least.

For the lunar theory, see Airy's *Gravitation*; Herschel's *Outlines of Astronomy*; and E. W. Brown, *The Motion of the Moon* (1906). For selenography, Loewy and Puiseux, *Atlas Photographique de la Lune* (1896-1908); W. H. Pickering, *The Moon from Photographs* (1904); G. P. Serviss, *The Moon* (1908). On the formation of the craters, &c., from the point of view of a geologist, see Shaler, *Smithsonian Contributions to Knowledge*, vol. xxxiv. (1903).

Superstitions regarding the Moon.—The moon was anciently an object of worship, and even in the 17th century she was supposed by the common people of England to exercise great influence over human affairs. The times for killing animals for food, gathering herbs, cutting down wood for fuel, sowing seeds of various kinds, were all regulated by the 'age' of the moon, and these set periods were considered to be a necessary part of practical knowledge, and ignorance or neglect of them to be infallibly productive of loss. There were similarly defined periods for taking particular medicines and attempting the cure of particular diseases. Many such superstitions prevailed till a recent period in the Highlands of Scotland, favourable or unfavourable consequences from any occurrence being predicted according to the age of the moon at the time it happened. Through-

out Scotland the waning moon was considered to have an evil influence, and full or new moon to be the most auspicious season for commencing any enterprise. The same opinion was held in Scandinavia and Germany, and the history of all nations teems with similar superstitions. The special influence of the moon on persons of weak or wavering reason is preserved in our words *lunatic* and *moon-struck*, and is still an article of popular belief. Amongst mere superstitions must be ranked the old and widespread belief that the changes of the moon influence the weather on the earth, bringing about fair or rainy, settled or stormy weather; so that from the moon's periods predictions as to the weather may be made. The only known weather influence is a slight but appreciable tendency to dispersion of clouds shortly after full moon. See the article ECLIPSES.

In the Edda we read that 'Mundilföri had two children—a son, Máni ('moon'), and a daughter, Sól ('sun');' and in German the moon is masculine and the sun feminine to this day. It was the same in Anglo-Saxon, although modern English has in this matter followed the classic mythology, in which Phœbus and Sol are gods and Selene, Luna, and Diana are goddesses; Grimm (*Deutsche Mythologie*, p. 666) quotes an old invocation to the 'New Moon, gracious lord' (Neuer Mon, Holder Herr), for increase of wealth; and down to recent times the German people were fond of speaking of 'Frau Sonne' and 'Herr Mond' ('lady sun' and 'lord moon'). The same inversion (as it appears to us) of gender is found among the Lithuanians and Arabians, and even the ancient Mexican *Meztle* ('moon') was masculine. Among the Slavs, according to Grimm, the moon is masculine, a star feminine, and the sun neuter. See the Rev. T. Harley's *Moon-lore* (1886; with bibliography).

Moon, MOUNTAINS OF THE, have played a mysterious part in African geography since the days of Ptolemy, who indicated them as containing the sources of the Nile. They were generally figured on mediæval maps as a high range crossing the entire continent from Abyssinia to the Gulf of Guinea. With them have been identified the mountains of Abyssinia, the groups of Kenya and Kilima-Njaro, and also Ruwenzori.

Moon, WILLIAM. See BLIND.

Moonseed. See MENISPERMACEÆ.

Moonstone. See FELSPAR.

Moonwort (*Botrychium Lunaria*), an interesting fern, native of Britain, and widely distributed over northern Europe, penetrating to within the Arctic regions and Asia, and along with the few other species of which the family is composed appearing also in North America. The plant is of simple structure, consisting of a root-stock bearing a single erect stem from 3 to 6 inches high. A single pinnate leaf springs from the stem about midway from root to apex, the thick, pale-green segments being half-moon shaped. The fructification is developed on a branched spike from 1 to 2 inches long. *B. virginianum*, the Rattlesnake Fern, is the largest growing species.

Moor. See ECOLOGY, BOG, PEAT, WASTE LANDS; and for Grouse Moors and Moorfowl, see GROUSE.

Moore, ALBERT JOSEPH (1841-93), painter, son of William Moore, portraitist, was noted for his diaphanous draperies in figure-subjects.

Moore, GEORGE, born in 1857, the son of a Mayo landowner and M.P. associated with the Young Ireland party, was educated at Oscott, and published poems in 1878 and a tragedy on Martin Luther in 1879. For some years he studied in Paris. *A Mummer's Wife* (1884) showed Zola's influence;

Vain Fortune (1891) and *Esther Waters* (1894; reshaped 1920) are in a similar vein of 'realism.' *Evelyn Innes* (1898) had a sequel in *Sister Teresa*. As an exponent of the Celtic revival he proclaimed English literature dead or dying, and, mainly on Celtic-national grounds, renounced the Roman Catholic faith. *Confessions of a Young Man* (1905) began an autobiographical series continued in *Memoirs of my Dead Life* (1906) and *Hail and Farewell, a Trilogy* (1911-14). Later works are *The Brook Kerith* (on the story of Christ, 1916), *A Storyteller's Holiday* (1916), *Héloïse and Abelard* (historical novel, 1921), *The Coming of Gabrielle* (1921), and *In Single Strictness* (1922). See books by Maclean (1906), Mitchell (1916), and the *Life*, by his brother, of their father (1913).

Moore, JOHN (1729-1802), born at Stirling, a minister's son, studied medicine at Glasgow, and there began to practise. As medical attendant to the young Duke of Hamilton he travelled six years on the Continent, and on his return (1778) settled in London. His *View of Society and Manners in France, Switzerland, Germany, and Italy* (4 vols. 1779-81) was well received; but the novel *Zeluco* (1789), which suggested Byron's *Childe Harold*, is to-day the least forgotten of his works.

Moore, SIR JOHN, the hero of Coruña, born at Glasgow, 13th November 1761, was eldest son of the preceding. He entered the army as ensign when only fifteen, and first distinguished himself in the descent upon Corsica (1794); he served in the West Indies (1796), in Ireland during the rebellion of 1798, and in Holland in 1799. He was in Egypt in 1801 with the army under Abercromby, and obtained the Order of the Bath for his services in command of the reserve. When war again broke out in 1802 Moore served in Sicily and Sweden. In 1808 he was sent with a corps of 10,000 men to strengthen the English army in the Peninsula. He arrived in Mondego Bay, August 19, and assumed the chief command on the return to England of Sir H. Burrard. In October he received instructions to co-operate with the forces of Spain in the expulsion of the French from the Peninsula. He moved his army from Lisbon with the intention of advancing by Valladolid to unite himself with the Spanish general Romana, and threaten the communications between Madrid and France. But the apathy of the Spaniards, the successes of the French in various parts of the Peninsula, and, above all, the folly and intrigues of his own countrymen, soon placed him in a critical position. Yet he had determined to make a bold advance from Salamanca to attack Soult when the news reached him that Madrid had fallen, and that Napoleon was marching to crush him at the head of 70,000 men. Moore's forces amounted to only 25,000 men, and he was consequently forced to retreat. In December he began a disastrous march from Astorga to Coruña, a route of near 250 miles, through a desolate and mountainous country, made almost impassable by snow and rain, and harassed by the enemy. The soldiers suffered intolerable hardships, and arrived at Coruña in a very distressed state. It was impossible to embark without fighting, and Soult was in readiness to attack as soon as the troops should begin to embark. The battle was mainly one of infantry, for the cavalry after destroying their horses had gone on board, and the bulk of the artillery, for which the ground was not adapted, had also been withdrawn. On the 16th January 1809 the French came on in four strong columns. A desperate battle ensued. While animating the 42d Regiment in a brilliant charge in an early stage of the action, Moore was struck by a cannon-ball on the left shoulder and

died in the moment of victory. The French were defeated with the loss of 2000 men; and the dead leader was buried just before the embarkation of his troops—at eight in the morning apparently, and not at night, spite of Wolfe's famous poem. The British army in this expedition lost their magazines and 6000 soldiers. Soult raised a monument to Moore's memory on the field of battle, and another was erected in St Paul's Cathedral. His uncommon capacity was mated with disinterested patriotism and heroic ascendancy of character.

See the (too fraternal) *Life* by his brother (2 vols. 1834); his *Diary*, edited by General Maurice (who says Moore delivered 'the boldest, the most brilliant, and the most successful stroke of war of all time'; 1904); and Oman's edition of Napier's *Peninsular War* (1904; in which Moore's mistakes are insisted on).

MOORE, THOMAS, the 'Bard of Erin,' was born at 12 Angier Street, Dublin, on 28th May 1779, the son of a Catholic grocer. From the school where Sheridan had been educated, and where he himself became a 'determined rhymist,' he passed in 1794 to Trinity College, and thence, after taking his B.A., proceeded in 1799 to London to keep terms at the Middle Temple. He brought with him a translation of Anacreon, which came out in 1800, dedicated to the Prince of Wales, his patron then, but the butt from 1813 of his satire. It proved a great hit, and, with his musical talent, procured him admission to the best society. In 1801 followed the *Poetical Works of the late Thomas Little*, whose pretty erotics were a good deal blamed, and very widely read. In 1803, through Lord Moira's influence, he was appointed registrar of the Admiralty court at Bermuda. He went there to arrange for a deputy, and, after a tour in the States and in Canada, returned in a twelve-month to England—the democratic notions of his Dublin days toned down by his transatlantic experience. For his *Odes and Epistles* (1806) he was sharply taken to task in the *Edinburgh*. The bulletless duel with Jeffrey was the consequence, over which Byron made so merry, but which left the non-combatants fast friends for life. In 1811 he married an actress, good Bessy Dyke (1793–1865), and, after living successively in Leicestershire, in Derbyshire, and at Hornsey near London, in 1817 they settled at Sloperton Cottage, near Bowood, Lord Lansdowne's seat, in Wiltshire.

Meanwhile, among other fugitive pieces, Moore had published the earlier of the *Irish Melodies* (ten parts, 1807–34) and *The Twopenny Post-bag* (1812), whose tropes at once glittered and stung. Now he became anxious to emulate his brother-poets, who published in quartos. He fixed on an oriental subject, and in 1817 the long-expected *Lalla Rookh* appeared, dazzling as a firefly; and the whole English world applauded. After the publication he went with Rogers to Paris, and there wrote *The Fudge Family* (1818). For *Lalla Rookh* the Longmans paid him 3000 guineas; the *Irish Melodies* brought in £500 a year; but Moore had 'a generous contempt for money,' and about this time his Bermuda deputy embezzled £6000. Moore's liability was reduced by compromise to £1000, which he ultimately paid by his pen; but in 1819, to avoid arrest, he went to Italy with Lord John Russell. He spent five days at Venice with Byron (his friend since 1811), went on with Chantrey to Rome, and then with his family fixed his abode in Paris, where he wrote *The Loves of the Angels* (1823) and a prose romance, *The Epicurean* (1827). He returned in 1822 to Sloperton; and here, except for occasional 'junktetings' to London, Scotland, and elsewhere, he passed his last thirty years. To those years belong the *Memoirs of Captain Rock* (1824), the *History of Ireland* (1827), and the *Lives of Sheridan* (1825), Byron (q.v., 1830), and Lord Edward

Fitzgerald (1831). In 1835 he received a pension of £300, but his last days were clouded by sorrow and suffering—the loss of his two sons, and the decay of his mental faculties. 'I am sinking,' he writes to Rogers in 1847, 'into a mere vegetable.' He died on 25th February 1852, and was buried in Bromham Churchyard.

Moore in his lifetime was popular as only Byron; Earl Russell called him 'greatest of English lyrists,' and Kit North ranked him above Burns; but to-day he is placed amongst writers marred by artificiality and 'sensibility.' Even in his lyrics there is a tedious sameness, with their eternal 'love of one's country, of the wine of other countries, and of the women of all countries.'

See his *Memoirs, Journal, and Correspondence*, 'edited' by Lord John (afterwards Earl) Russell (8 vols. 1852–56); Vallat's French monograph (1886); Litton Falkiner's selections (with Essay, 1904); Godley's edition (1910); and Stephen Gwynn's *Moore* (in 'Men of Letters,' 1905).

MOORE, THOMAS STURGE, author, poet, art critic, and wood-engraver, was born in Sussex in 1870. His first published work was a miscellany, *The Vine-dresser and Other Poems* (1899). *Pan's Prophecy*, which appeared in 1904, is perhaps his masterpiece of imagery. Of his other works may be mentioned *The Little School* (1905; enlarged ed. 1917); *The Powers of the Air* (1920); two poems, *Danaë* and *Aforetime* of the same year; and some essays and studies on Dürer, Correggio, and others. He designed some wood-engravings for the poems of Yeats.

MOOREA. See EIMEO.

Moor-hen. See WATER-HEN.

Moor Park. See FARNHAM.

MOORS, a vague ethnographical expression applied to people whose geographical frontiers have been constantly shifting. First given (Mauri) to the inhabitants of the kingdom and subsequent Roman province of Mauretania, comprising within variable limits the whole country west of Numidia, now called Algeria and Morocco, later on it included the inhabitants of the whole of Africa north of the Sahara and Atlas from Tripoli westwards. Here for some three centuries flourished the great African church of Tertullian, Cyprian, and Augustine; in 429 the country was overrun by the Arian Vandals from Spain, but was recovered for the Byzantine emperors by Belisarius (533–36); invaded by the Arabs in 647, it was speedily subdued, and the Moors embraced Mohammedanism as quickly as they had embraced Christianity, and have clung to it ever since. From 1830 these countries have been gradually occupied and colonised by the French, with the exception of Italian and Spanish protectorates. The Arab slave-dealers and mixed Arab and Negro clans to the south are sometimes called the *Moors* of the western Sudan. Whether in Algeria or in Morocco the Moors cannot be considered as a pure race. Some authorities take them as nearly equivalent to the Berbers, even the nomad tribes; others restrict the name to an admixture of Arab blood, and call Moors only the more settled Arabic-speaking population of the town.

In European history the term is applied in a special sense to the Arab and Berber conquerors and occupants of Spain from 711 to 1492. Within twenty years from their first landing these tribes had overrun the whole of Spain except the Asturias, had got possession of the Narbonnaise (719), had raided into France, till finally repulsed by Charles Martel near Tours in 732. For a short time one khalif ruled the whole of Islam from beyond Bagdad to the Atlantic. When in 750 the Abbaside khalifs overthrew the Omniades a descendant of the latter, Abdurrahman I., escaped and founded the khalifate of the West at Córdoba in 755. His dynasty lasted

till the degradation of Hashim III. in 1031. Then after a period of anarchy the Almoravides (Berbers) succeeded from 1086 to 1147; the Almohades followed from 1130 to 1232. The greater part of Spain had now been lost, but the Beni-Nasr held Granada from 1232 to 1492. The chief steps of the Spanish re-conquest are the taking of Toledo, 1085; Saragossa, 1118; Valencia, by Jaime I. of Aragon, 1238; Seville, 1248; Murcia, 1260; Granada, 1492. The first of these invaders of Spain were mainly of Arab blood, and brought with them capacities of civilisation. From the 8th to the close of the 11th centuries the Spanish Moors in architecture, literature, science, industry, manufacture, and agriculture were far in advance of any northern European race of that date; no other people in western Europe could have then built a cathedral like the mosque of Córdoba (784-793); in philosophy and in the terms of mathematical and astronomical science they have left their impress on most of the languages of western Europe. Their toleration of the Christians, though contemptuous, contrasts favourably with that of the Christians towards the Moors after the conquest. But after the 12th and 13th centuries the conditions were reversed. The Moors had no reserve of civilisation or of increasing resources to fall back upon in northern Africa; they were degenerating, while behind Christian Spain was a Europe ever growing more civilised and richer in resources of every kind. The conquest was retarded by the division and intestine struggles of the Christian kingdoms; but these same causes told far more fatally on the Moors. There were never more than five or six separate Christian kingdoms; but the Moorish states were at times divided among over twenty little kings, and every dynasty in succession fell to pieces through intestine strife. The advance of the Turks westward after the taking of Constantinople (1453) was too late to help their co-religionists in Spain. Khair-ed-din Barbarossa (q.v.) established himself in Barbary in 1518, and was more or less successful in a plunderous warfare against Spain; but after the naval defeat of Lepanto (q.v.) in 1571, however much the Moors might harass Spain, there was no real danger of a re-conquest. Their piratical efforts only served to raise a hatred between two chivalrous races who had once respected each other and to carry it to the bitterest fanaticism.

For the expulsion of the Moors after the fall of Granada in 1492 and the treatment of those who remained in subjection, see FERDINAND, SPAIN, MORISCOS. See also KHALIFS, ALMORAVIDES, ALMOHADES, ALGERIA, ANDALUSIA, ARABIAN ARCHITECTURE, CÓRDOBA, GRANADA, MOROCCO, TUNIS; works by P. de Gayangos (1840), R. P. A. Dozy (1861-81), Stanley Lane-Poole (1887), and S. P. Scott (3 vols. 1904).

Moorshedabad. See MURSHIDABAD.

Mooruk. See CASSOWARY.

Moose. See ELK.

Moose Jaw, a city of Saskatchewan, at the confluence of Moose Jaw River and Thunder Creek, 400 miles W. of Winnipeg, on the Canadian Pacific Railway, an important junction for branch and connecting lines. It is the centre of a fine agricultural country. Pop. 19,000.

Moot, Moot-hill. See FOLKMOOT.

Moplas, a race of southern India, mainly near the Malabar coast, who as fanatical Mohammedans have caused trouble by outbreaks. Descended from the old Arab traders, they number over 1,000,000.

Moquis. See PUEBLOS.

Moraceæ, a family of dicotyledons, akin to the elms and nettles, mostly tropical and subtropical trees and shrubs, with latex, and opposite leaves which shed their stipules. The unisexual flowers,

with parts mostly in fours, aggregated in a globular or disc-shaped inflorescence, commonly give rise to a multiple fruit, of which the Bread-fruit (q.v.), Mulberry (q.v.), and Fig (q.v.) are well-known examples. The latex of *Ficus* and *Castilloa* yields India-rubber (q.v.); that of *Galactodendron* (see COW-TREE) is a milk-substitute. See also CECROPIA, CONTRAYERVA, HEMP, HOP, UPAS.

Moradabad, capital of a district of British India, on the Ramganga, 100 miles E. by N. of Delhi, is noted for its metal-work and trade in country produce; pop. 82,600.

Moraine. The masses of rock which, by atmospheric action, are separated from the mountains bounding the valleys along which glaciers flow, find a temporary resting-place on the surface of the ice, at the margin of the glacier, and are carried along with it, but so slowly that they form a continuous line along each margin. These lines of debris are called *lateral moraines*. When two glaciers unite, the two inner moraines unite also and form one large trail in the middle of the trunk glacier, and this is called a *medial moraine*. A large portion of these rocky fragments at length reach the end of the glacier, and here the melting ice leaves it as a huge mound, which is known as a *terminal moraine*. The rock-debris, sand, clay, gravel, &c., which are dragged forward underneath the ice, are called *ground-moraines*, or *moraines profondes*. See GLACIER, BOULDER-CLAY.

Moralities. See MYSTERIES.

Moral Philosophy. See ETHICS.

Morar, a district and loch in the west of Inverness-shire, south of Loch Nevis. The loch, 12 miles long, is by far the deepest in the British Isles, its maximum depth being 1017 feet.—MORAR is also the British cantonment near Gwalior.

Morat (Ger. *Murten*), a small town in the Swiss canton of Freiburg, 12 miles ESE. of Neuchâtel, lies on the Lake of Morat ($\frac{3}{4}$ by 2 miles, 1428 feet above sea-level). Here, on 22d June 1476, the Swiss gained a victory over Charles the Bold, Duke of Burgundy.

Morata, OLYMPIA, a 16th-century scholar, was born at Ferrara in 1526, the daughter of the poet Fulvio Pellegrino Morato (who died in 1547). Already in her sixteenth year she gave public lectures in her native city; but, having in 1548 married the German physician Andreas Grundler, she followed him to Germany and became a Protestant. Driven from place to place by the religious wars, and reduced to penury, she died at Heidelberg, 20th October 1555, leaving numerous Latin and Greek poems, mainly on religious subjects (edited 1558, 1870, &c.), a treatise on Cicero, dialogues, letters, &c. See the Monograph by Bonnet (4th ed. Paris, 1865).

Moratin, LEANDRO FERNÁNDEZ DE, comic poet, was born at Madrid, 10th March 1760, and was the son of a poet. In 1790 appeared his first and best comedy, *El Viejo y la Niña*; it was followed by *La Comedia nueva*, *El Barón*, *La Mogigata*, and *El St de las Niñas*. Godoy conferred several ecclesiastical benefices upon him; Joseph Bonaparte made him chief royal librarian; but after 1814 he took refuge in Paris. He died in Paris, 21st June 1828.

Morava. See MARCH (river).

Moravia (Ger. *Mähren*), till 1918 a crown-land of the Austrian empire, now the middle section of the Czechoslovak republic, is bounded NE. by Silesia, E. by Slovakia, S. by Lower Austria, and NW. by Bohemia. It is enclosed on all sides by mountains, being separated from Silesia by the Sudetes, from Bohemia by the Moravian chain, and from Slovakia by the Carpa-

thian Mountains; while branches of these various chains intersect the whole country except in the south, where there are extensive plains rising to about 800 feet. Numerous small rivers flow south-east, and fall into the March or Morava, from which the country derives its name, and which joins the Danube. The Oder rises among the mountains on the north-east, and soon leaves the country. Moravia is essentially an agricultural region. On the whole the soil is rich. The principal crops are rye and oats; then come barley, wheat, potatoes, beet-root, leguminous plants, and many fruits and vegetables. The breeding of animals is actively prosecuted. The principal mineral products are coal and iron, with some graphite. The principal branches of industry are the manufacture of woollen, linen, and cotton goods, and beet-sugar. Brünn (q.v.), or Brno, the capital, is the chief emporium for the manufactures. A university was set up at Brünn in 1919. Of 2,662,884 inhabitants (in 1921), over two millions were Czechs, over half a million Germans. For history, see CZECHOSLOVAKIA.

Moravia, a Latin name for the province of Moray (q.v.).

Moravians, otherwise known as Herrnhuters, The Church of the Brethren, or The Unity of the Brethren, are a small body of Protestants who claim to be the modern representatives of the ancient church of the Bohemian Brethren (see **BOHEMIA**), or *Unitas Fratrum*, which first took a definite shape in 1467, when the followers of Peter of Chelcizky, a pious layman and a contemporary of Huss, formed themselves into a separate ecclesiastical community on the apostolic model. They held that all Christians should lay aside distinctions of rank, abstain from military service and the use of oaths, and live in literal accordance with the teaching of Christ. These views forced them to keep aloof from both sections of the Hussites proper, and, though there may have been Waldenses amongst them, they owed very little at any period of their history to these crypto-Protestants. At the synod of 1467 three elders, a bishop, and two presbyters were chosen by lot, and received ordination probably from a Waldensian priest, though the first beginnings of the church are wrapped in a mist of confused traditions and miraculous tales. Under the influence of Lucas of Prague, a man of strong character and great literary talent, the Brethren in 1494 abandoned their levelling ideas, but maintained their stern and rigid discipline, and by the beginning of the 16th century there were between 300 and 400 churches in the Unity. They had much friendly intercourse with Luther, but stood out for the celibacy of the clergy, the doctrine of works, and congregational purism. For a time, however, the Unity was under the influence of Lutheran ideas, though the Brethren had naturally a much stronger sympathy with Calvinism. From the commencement of its history times of persecution alternated with times of repose, and many of the Brethren, especially in the early part of the 16th century, were forced to flee to Poland and Prussia. In 1570 the Polish branch united with the Reformed Church, and, though in 1600 the Bohemian and Moravian branches included two-thirds of the population and most of the nobility, the Brethren having got mixed up with the revolution which ended so disastrously in 1620, by 1627 the church was entirely broken up and destroyed. In 1722 some of the Moravian descendants of the suppressed Unity, who had been roused by the preaching of a carpenter, Christian David, a converted Roman Catholic, resolved to emigrate, and were allowed by the pious young Count Zinzendorf (1700-60) to

settle on a part of his property in Saxony, close to the Austrian frontier. The first company consisted of two brothers, their wives, four children, two relations, and David, but these were soon joined by other emigrants from Moravia and Bohemia, and by pious and fanatical people of various nationalities. Five years later the settlers at Herrnhut ('The Lord's Keeping') amounted to over three hundred. They at first attended the parish church, but soon began to quarrel among themselves and with the Lutheran pastor, and adopted wild and extravagant views. Owing to the exertions of Zinzendorf peace was restored, and the settlers formed themselves into a society in communion with the Lutheran Church, and drew up certain rules for their guidance in all matters of religion and conduct, the chief of these being that all in Herrnhut should live in love with all their brethren and with all the children of God in all religions.

Twelve elders were chosen to be the teachers and overseers of the community, and these came to be assisted afterwards by male and female 'labourers' of all sorts, including 'inspectors' of spiritual nuisances, and even of the work done and the goods sold by the Brethren. August 13th of this year (1727) is still celebrated as the spiritual birthday of the renewed church. By 1733 the Society had become a distinct church, and in 1735 the first bishop was elected and was ordained by Jablonski, court chaplain in Berlin, one of the two surviving guardians of the precious apostolical succession, which had been handed down by Amos Comenius, the last bishop of the old Unity. Although the Moravians imitated certain parts of the constitution and practice of the original church, much of what was peculiar in their views and discipline is to be traced to Zinzendorf, who was consecrated bishop in 1737, and was their 'advocate' until his death in 1760. The members of the community were divided into 'bands,' which met to exchange experiences, to study the Bible, to sing and pray, and there was a special division, still maintained, into 'choirs,' which consisted respectively of unmarried men, unmarried women, married couples, widowers, widows, boys and girls. Some of the 'choirs' had their own houses, where the members lived under the direction of a brother or sister. There were two daily services in which all joined, and hourly prayer was kept up night and day by certain members of the bands, while every morning the Brethren were supplied with a text as a 'watchword.' Love-feasts were introduced by Zinzendorf, and are still held, though the practice of feet-washing before the communion has been abandoned. All important matters, even marriage, were decided by an appeal to the 'lot,' and, as Zinzendorf taught that death was a joyous journey home, the departure of a brother or sister was announced by blowing a trumpet, each 'choir' having its own peculiar air.

Various branch settlements were established in Germany, America, and Britain, and in these the Herrnhut arrangements were strictly carried out; but, when this was not possible, congregations were set up, or societies were created, composed of members of other Protestant churches, as Brethren might belong to either of the three 'tropes'—the Lutheran, the Reformed, or the Moravian. Some of the Moravians came into contact with the Wesleys and Whitefield, and had considerable influence on their views, and they were even patronised by Anglican dignitaries, but partly owing to misrepresentation and partly owing to injudicious conduct on the part of some of the Brethren, their use of certain foolish hymns and sensuous and grotesque language in reference to the wounds of Christ, bitter opposition was roused against them both in England and the Continent.

Since the middle of the 18th century the home-history of the Unity has been uneventful.

At present the executive government of the church is vested in the Elders' Conference of the Unity, a clerical body composed partly of bishops and partly of presbyters. This conference carries out the injunctions of the synod, the supreme court of the church, which meets every ten years at Herrnhut. At the meeting in 1889 a synodal resolution was passed practically abolishing the determining of questions by lot. There are also provincial synods and conferences, and each congregation is governed by its own Elders' Conference, which consists of all the male and female 'labourers.' The bishops enjoy no special privileges in the way of rank or salary, but have the sole power of ordaining. The ordinary church service is largely liturgical, and hymn-singing has always been a prominent feature of Moravian worship. The Moravians have no formal confession, though at an early period they declared their adhesion to the Augsburg Confession, and the litany which is used on Easter Sunday and two other Sundays is really a creed. The Unity is now divided into four provinces: the British, German, and north and south American. The Moravian Church is *par excellence* the missionary church of Christendom. The mission to the West Indian slaves was started in 1732, and soon that to Greenland (q.v.)—the latter made over in 1900 to the Danish Lutheran Church.

See histories of the Brethren by Holmes (1828), Bost, Schweinitz, Gindely, Goll, Cröger, Hamilton, and Hutton (1909); on their constitution, works by Seifferth (1866); on their missions, by Thompson (1883), Hamilton (1901), and Hutton (1923); besides the Lives of Zinzendorf (q.v.).

Moravides. See ALMORAVIDES.

Moray, PROVINCE OF, an old territorial division of Scotland, comprising the modern counties of Moray (or Elgin) and Nairn, eastern Inverness, and part of Banff. The two first-named form (since 1918) the parliamentary county of Moray and Nairn. The 'laich,' or lowlands, noted for its fertility, was subject to constant raids from the neighbouring highlands.

Moray, JAMES STUART, EARL OF, by Protestants called the 'Good Regent,' was the natural son of James V. of Scotland, by Margaret, daughter of John, fourth Lord Erskine, whom James in 1536 thought seriously of marrying, even though she had already wedded Sir Robert Douglas of Lochleven. Born in the year 1531, in 1538 he was made prior in commendam of St Andrews, in 1556 joined the Reformers, and almost immediately became the head of the Protestant party in Scotland. In 1561 he was despatched to France to invite his half-sister, Queen Mary, to return to her kingdom; and on her arrival he acted as her prime-minister and chief adviser. In 1562 she created him Earl of Mar; but that earldom being claimed by Lord Erskine, the title of Earl of Moray was conferred instead on Lord James, who put down the Border banditti and defeated Huntly at Corrichie. Strongly opposed as he certainly was to the marriage of Mary to Darnley (1565), he is falsely alleged before it to have endeavoured to seize the pair near Lochleven; and after it he openly appealed to arms, but was easily put to flight by the queen, and forced to take refuge in England. He did not return to Edinburgh till 10th March 1566, the day after Rizzio's murder, to which he was certainly privy. In April 1567 he withdrew to France, but in the following August was recalled by the nobles in arms against Mary, and found her a prisoner at Lochleven, and himself appointed regent of the kingdom. In his famous interview with the queen on the 15th he 'behaved himself rather like a ghostly father unto her than like a

counsellor.' On Mary's escape he defeated her forces at Langside, near Glasgow (13th May 1568), and afterwards was one of the commissioners sent to England to conduct the negotiations against her. He then, as always, acted with extreme wariness; and after his return to Scotland by his vigour and prudence he succeeded in securing the peace of the realm, and settling the affairs of the church. But on 23d January 1570 he was shot at Linlithgow by James Hamilton of Bothwellhaugh, who was instigated thereto by Mary's adherents, and prompted also, it may be, by personal enmity. He was buried in St Giles's, Edinburgh. Of his ambition there can hardly be question; still, the most different estimates have been formed of his character, according to men's estimates of Mary. See MARY, QUEEN OF SCOTS, and works there cited.

Moray, SIR THOMAS RANDOLPH, EARL OF, nephew and, from 1308, comrade of Robert Bruce, recaptured Edinburgh Castle from the English (1314), commanded a division at Bannockburn, took Berwick (1318), won the victory of Mitton (1319), invaded England again in 1320 and 1327, and was regent from Bruce's death to his own at Musselburgh, 20th July 1332.

Moray Firth, an indentation of the German Ocean, on the north-east coast of Scotland, between Kinnaird's Head in Aberdeenshire and Duncansbay Head in Caithness.

Morayshire. See ELGINSHIRE.

Morbihan, a maritime department of France, formed out of ancient Brittany, with the Atlantic on the south and Finistère on the west. Area, 2624 sq. m.; pop. (1872) 490,352; (1921) 546,047. The coast is much indented, and has a multitude of bays, promontories, harbours, and islands. The largest island is Belle Isle (q.v.). The department forms a plateau of no great elevation, partly cultivated, partly occupied by extensive tracts of heath and marsh (see BRITANNY). Morbihan is divided into the four arrondissements of Vannes, Lorient, Ploermel, and Pontivy. The chief town is Vannes (q.v.), but the most populous is Lorient (q.v.). Many ancient customs still prevail in Morbihan; communal proprietorship survives there, and in some of the islands the *curé*, assisted by a council of notables, governs the people in a patriarchal fashion.

Mordants. See DYEING.

Mordaunt, CHARLES. See PETERBOROUGH.

Mordvins, a Finnic race, now however greatly intermingled with the Russians, who dwell along the middle course of the Volga, from the government of Nijni-Novgorod to that of Samara. They number about a million.

More, HANNAH, was the fourth daughter of the village schoolmaster of Stapleton, near Bristol, where she was born in 1745. As a child she showed great quickness of apprehension and a good memory. Her sisters were sent to a school in Bristol, and when the eldest was twenty-one they opened a boarding-school there, to which Hannah went when she was twelve years old. She wrote verses at an early age, and in 1762 she published *The Search after Happiness*, a pastoral drama. In 1774 she went on a visit to London, and was introduced to the Garricks, and by them to Dr Johnson, Burke, Sir Joshua Reynolds, and the best literary society of London. During this period of her life she wrote two tales in verse, and two tragedies, *Percy* and *The Fatal Secret*, both of which were acted. While in London she went a great deal into society, but gradually found this mode of life to be unsatisfactory, and was led by her religious views to withdraw from it. After the publication of her *Sacred*

Dramas she retired to Cowslip Green, a cottage near Bristol, where she did much to improve the condition of the poor in her neighbourhood by establishing schools for their instruction. She still continued her literary work, and helped by her writings to raise the tone of English society. Her essays on *The Manners of the Great* and *The Religion of the Fashionable World*, a pamphlet on *Village Politics*, her novel *Cælebs in Search of a Wife*, and a tract called *The Shepherd of Salisbury Plain*, are some of the most popular of her works. In 1828 she moved from Barley Wood, a house she had built for herself near Cowslip Green, to Clifton, where she died, 7th September 1833. See books by Roberts (1834), Thompson (1838), Miss Yonge (1888), Miss Harland (1901), and Miss Meakin (1911); and her *Letters*, ed. Brimley Johnson (1925).

More, HENRY, one of the Cambridge Platonists, was born at Grantham in Lincolnshire in 1614. He was educated at Eton and Christ's College, Cambridge, revolted early against the Calvinism of his parents, and gave himself entirely to philosophy, especially to Plato and more particularly the Neoplatonist writers. He took his Bachelor's degree in 1635, his Master's in 1639, when he was elected fellow of his college. Here he remained all his life, nor could he be prevailed upon to accept church preferment. He lived in an atmosphere of unusual spiritual elevation, and exercised a great influence on the young men that gathered round him. Among his pupils was a young lady of family who became Viscountess Conway, and at whose seat of Ragley in Warwickshire More often stayed. This lady's sympathies with the mystic and the occult extended also to Van Helmont and Valentine Greatrakes, and the views of her circle told strongly on More, whose earlier rationality gradually gave place to fantastic mysticism and theosophy, so that his successive works decline in value. He died 1st September 1687, and was buried in the chapel of his college.

His *Divine Dialogues* (1668) are still of peculiar interest. His *Opera Theologica* were collected in 1675, his *Opera Philosophica* in 1678, his *Poems* in 1878. See the *Life* by Grosart Ward (1710; new ed. 1911), Tulloch's *Rational Theology*, and E. G. George's *Seventeenth Century Men of Latitude* (1908).

More, SIR THOMAS, was born in Milk Street, London, in 1478. His father, who subsequently became Sir John More, Justice of the King's Bench, was a man of character and talent, with a high sense of parental responsibility. More received his first instruction in Latin, then the basis of all education, in one of the most famous English schools of the time—that of St Anthony, Threadneedle Street, London. In after-life More wrote Latin with all the facility, though not with the classical purity, of the best Italian scholars of the Revival of Learning. When he attained his fifteenth year his father, after the fashion of the time, placed him as page in the household of Archbishop Morton, to whose virtues More afterwards paid the highest tribute in his *Utopia*. Morton, on his side, formed the highest expectations of More, and was in the habit of saying to the nobles who dined with him: 'This child here waiting at the table, whosoever shall live to see it, will prove a marvellous man.'

By Morton More was sent to Oxford, where the Renaissance was now represented by such men as Colet and Linacre, both of whom had travelled and studied in Italy. From Linacre he appears to have learned Greek, and from Colet he received a spiritual impulse which gave a direction to his entire life and opinions. From Colet More also learned those novel methods of biblical interpreta-

tion which Colet himself may have learned from Savonarola in Florence. By his acquaintance with the classics therefore, and by his enlightened views regarding the theology and the traditions of the church, More was emphatically a man of the new order. When, some time after leaving Oxford (probably about 1498), he first met Erasmus, both at once felt that they were in entire sympathy on all the deepest questions of the time.

It was his father's wish that he should follow the same profession as himself. Having completed his legal studies, first at New Inn and afterwards at Lincoln's Inn, he acted for three years as reader in Furnival's Inn. It marks the religious basis of More's character that he spent the next four years in the Charterhouse of London in 'devotion and prayer.' By his marriage with the eldest daughter of Mr Colte, a gentleman of Essex, he definitively made choice of a secular career. During the last years of Henry VII. he became under-sheriff of London and member of parliament, in which latter capacity he gave serious offence to the king by protesting against the excessive dowry demanded by Henry from parliament on the occasion of his daughter's marriage with James IV. of Scotland.

On the accession of Henry VIII. (1509) a brilliant prospect was opened up to More. It was Henry's ambition to surround himself with men of genius and accomplishments; and More had by this time attained a European reputation in the world of learning. As ambassador on two occasions to the Low Countries he had also given proofs of his tact and capacity for business. More, however, had little inclination for public life, and it was only after much hesitation that he took service under Henry. Introduced to the king through Wolsey, he rose rapidly in dignity and in the royal favour. He became Master of Requests (1514), Treasurer of the Exchequer (1521), and Chancellor of the Duchy of Lancaster (1525). For a time the king showed him every mark of personal attention—paying him unexpected visits at his house in Chelsea 'to be merry with him.' Congratulated on these marks of favour by his son-in-law Roper, More, who had divined Henry's real character from the first, replied: 'If my head would win him a castle in France it should not fail to go.' As speaker of the House of Commons (1523), More, on the occasion of Wolsey's demand for a subsidy of which the House disapproved, received the great cardinal in a manner that made him exclaim: 'Would to God you had been at Rome, Mr More, when I made you speaker.' More, however, still continued to enjoy Henry's favour; and on two occasions was sent on missions of importance to Francis I. and the Emperor Charles V.

On the fall of Wolsey in 1529, More, against his own strongest wish, was appointed to the office of Lord Chancellor. Seeing from the first where the king's divorce from Catharine of Aragon must eventually lead, he knew that only one fate could be in store for himself. In the discharge of his office he displayed a primitive virtue and simplicity, being 'ready to hear every man's cause, poor and rich, and keep no doors shut from them.' The one stain on his character as judge is the harshness of his sentences for religious opinions. In passing such sentences More acted only in the spirit of the time; but in his *Utopia* he had shown the clearest conception of the sacredness of the individual conscience. 'The Utopians,' he says, 'put the unbelievers to no punishment, because that they be persuaded that it is in no man's power to believe what he list.' More sympathised with Colet and Erasmus in their desire for a more rational theology and for radical reform in the manners of the clergy, but like them also he had no promptings to break with the historic church. He could look only with

displeasure, therefore, on the successive steps which led Henry to the final schism from Rome. In 1532 he resigned the chancellorship, and retired into private life. The disapproval of his policy by such a man as More could not be disregarded by Henry, and various attempts were made to win him over. Nothing, however, could shake the constancy of More, and his death became a mere matter of time and policy. The opportunity came in 1534. In that year Henry was declared head of the English Church; and More's steadfast refusal to recognise any other head of the church than the pope led to his sentence for high-treason after a harsh imprisonment of more than a year. The manner in which he met his death, while it is one of the commonplaces of English history, strangely illustrates an inveterate habit of his nature—the disposition to jest with the most serious questions and on the most momentous occasions. As, on 7th July 1535, he mounted the scaffold he exclaimed to a stander-by: 'Friend, help me up; when I come down again I can shift for myself; and raising his head after it had been laid on the block, he bade the executioner stay till he had put aside his beard, 'for,' said he, 'it never committed treason.'

More was twice married; but only by his first wife had he any family. In no life of More should his daughter Margaret, the wife of his biographer Roper, pass unmentioned. By her high character and accomplishments, but above all by her pious devotion to her father, she holds a place among the illustrious women of English history.

One of the distinguished characters in the political history of England, More also ranks high in the history of its literature. By his Latin *Utopia* (1516; Eng. trans. 1556) he takes his place with the most eminent humanists of the Renaissance, and he was the one literary Englishman of the 16th century well-known and admired on the Continent. In his *History of King Richard III.* (1513) he produced what may be regarded as the first book in classical English prose. In his personal character More was the most attractive and lovable of men; and his tragic end gave the crown to the moral beauty of his life. From Erasmus's sketch of him we realise all his virtues and all his attractions; but realise also that he was a winning rather than an imposing figure. He had ingenuity rather than insight; not infrequently his wit passed into levity and even into flippancy; and there was in his character a strain of morbidness and superstition which precluded him from the largest and humanest views of men and things. In 1886 he was beatified.

See Roper, *Life of Sir Thomas More* (first printed 1626); Lord Campbell, *Lives of the Chancellors*; Mackintosh, *Lardner's Cabinet Encyclopædia*; Seeborn, *Oxford Reformers*; D. Nisard, *Renaissance et Réforme*; editions of the *Utopia* by Lupton (1895), R. Steele (1923), and H. Girtein (1925); *Lives of More* by Father Bridgett (1891) and W. H. Hutton (1895); also works cited at HENRY VIII., WOLSEY, ERASMUS, and FISHER.

Morea, the mediæval and modern name for the Peloponnesus (q.v.). After being overrun by the Goths and Vandals, it became a prey, in the second half of the 8th century, to Slav invaders, who were gradually subdued and civilised by the Byzantine emperors. In 1205 the peninsula was conquered by the Normans, who formed its western portion into a feudal principality subject to the crown of Sicily. Michael VIII. Palæologus reconquered the country after 1261; but the principality of Achaia remained in the family of Villehardouin till 1346, when the male line became extinct. Various claimants now arose, and much strife and confusion ensued. At length, in 1461, the greater portion of the Morea fell into the hands of the Turks, the remainder being held by Venice, who abandoned it in 1540.

Venice reconquered the Morea in 1684, but again lost it to the Turks in 1714. For its later history, see GREECE.

Moreau, JEAN VICTOR, the greatest general of the French Republic, except Bonaparte, was born, 11th August 1761, at Morlaix, in Brittany, the son of an advocate, and was sent to study law at Rennes. On the outbreak of the Revolution he was chosen to command the volunteers from Rennes, served under Dumouriez in 1793, and displayed such military talent that in 1794 he was made a general of division; he took an active part in reducing Belgium and Holland under Pichegru in that and the following year. When Pichegru fell under suspicion, the Directory appointed Moreau, in the spring of 1796, to the chief command on the Rhine and Moselle. He crossed the Rhine at Kehl, defeated Latour at Rastatt and the Archduke Charles at Ettlingen, and drove the Austrians back to the Danube. But, owing to the defeat and retreat of Jourdan, he was obliged to make a desperate effort to regain the Rhine, which he accomplished, notwithstanding great difficulties, in a retreat that established his reputation for generalship more than all his previous victories. A suspicion of participation in the plots of Pichegru led to his being deprived of his command after the *coup d'état* of 18th Fructidor. In the following year (1798) he succeeded Schérer in the command of the army in Italy, which was hard pressed by the Russians and Austrians. By a retreat conducted with consummate skill, he saved the French army from destruction. The Directory, nevertheless, deprived him of the chief command, and gave it to Joubert. But Moreau remained with the army at Joubert's request to be present at the battle of Novi. Early in the engagement Joubert was killed and Moreau again assumed the command, and conducted the defeated troops to France. The noble disinterestedness of Moreau's character, his military talent, and his political moderation induced the party of Sieyès, which overthrew the Directory, to offer him the dictatorship of France; he declined it, but lent his assistance to Bonaparte on 18th Brumaire. Receiving the command of the army of the Rhine, Moreau gained victory after victory over the Austrians in the campaign of 1800, drove them back behind the Inn, and at last won the great and decisive battle of Hohenlinden (q.v.). A strong feeling of jealousy against Moreau now took firm root in Napoleon's mind. He accused his rival of participation in the plot of Cadoudal (q.v.) and Pichegru against his life, had him arrested, brought to trial, and found guilty on insufficient evidence, 9th June 1804. A sentence of two years' imprisonment was pronounced; Napoleon commuted it into banishment, and Moreau went to America, and settled in New Jersey. There he remained until 1813, when he accompanied the emperor of Russia and the king of Prussia in the march against Dresden. Fortunately for his fame he did not live to invade his country, for here, as he stood talking to the Emperor Alexander on 27th August, a French cannon-ball broke both his legs. Amputation was performed, but he died at Laun in Bohemia, 2d September 1813. He was buried in St Petersburg. See the studies by C. Jochmus (Berl. 1814) and A. de Beauchamp (trans. Lond. 1814).

Morecambe Bay, an inlet of the Irish Sea, separates the main portion of Lancashire from Furness. It is about 10 miles in average breadth and 18 miles in length, and receives the Leven, the Kent, and the Lune.—The watering-place of Morecambe, $3\frac{1}{2}$ miles WNW. of Lancaster, was incorporated as a borough in 1902; pop. 19,000 in holiday season.

Moreen. See MOIRE.

Morel (*Morchella*) is a genus of Discomycete fungi, of which some species are eaten fresh and preserved in central and southern Europe.

Morelia, capital of the Mexican state of Michoacan, in a valley 6400 feet above sea-level, 130 miles WNW. of Mexico city, so named in honour of the patriot Morelos; pop. 40,000.

Morelli, GIOVANNI (1816-91), a notable art-critic, was born at Verona, and studied medicine in Germany. His works on the German and Italian painters applied new methods (the painting of hands, ears, &c. being specially regarded) to proving originals copies and copies originals.

Morepork. See PODARGUS.

Moreri, LOUIS (1643-80), was born in Provence, took orders, and was for five years a noted preacher at Lyons, where in 1674 he published *Le Grand Dictionnaire Historique, ou le Mélange Curieux de l'Histoire sacrée et profane* (in 1 vol. folio). In 1675 he went to Paris, and laboured at the expansion and improvement of this important work till his death.

Moresnet, a small Belgian territory 5 miles SW. of Aachen, was till 1919 partly Belgian, partly Prussian, partly neutral.

Moreton Bay, on the east coast of Queensland, Australia, is formed inside the islands of Moreton and Stradbroke, the former 20 miles and the latter 33 miles in length, and both about 5 miles in greatest breadth. The bay is 40 miles long by 17 broad; its southern half is dotted with islands and sandbanks. It receives the six considerable streams, Nerang, Pimpama, Logan, Brisbane, Pine, and Caboolture. The entrance at the north end is practicable at all times for vessels of the largest size; and the tortuous channel leading to the mouth of the Brisbane River has been improved (see BRISBANE). The southern entrances to the bay are practicable only for small sailing-boats.

Moreton-Bay Chestnut, a papilionaceous genus of which *Castanospermum australe* is the only species known. A native of Queensland, it belongs to the sub-order Papilionaceæ of the natural order Leguminosæ. The tree grows to the height of from 70 to 100 feet, with spreading branches clothed with pinnate leaves about a foot long. The flowers—bright yellow, and red—are succeeded by cylindrical pendulous pods of a bright brown colour, 6 to 8 inches long generally, containing about four seeds each, which are roundish but somewhat flattened on one side. Though likened to the sweet chestnut, they are much inferior in delicacy of flavour, being very astringent; but they are somewhat improved when roasted.

Morgagni, GIOVANNI BATTISTA (1682-1771), founder of pathological anatomy and professor at Padua. See ANATOMY.

Morgan, MOUNT. See MOUNT MORGAN.

Morgan, AUGUSTUS DE. See DE MORGAN.

Morgan, CONWY LLOYD, was born in London, 6th February 1852, and educated at Guildford and at the Royal College of Science, London. In 1878-83 he was lecturer in English and Physical Science at Rondebosch, near Capetown; in 1884 was appointed professor of Zoology and Geology in University College, Bristol; in 1887 became principal; and in 1909 for three months was first vice-chancellor of the university of Bristol. Among his works are *Animal Biology* (1887), *Animal Life and Intelligence* (1890), *Introduction to Comparative Psychology* (1895), *Habit and Instinct* (1896), *Animal Behaviour* (1900), *Instinct and Experience* (1912), *Emergent Evolution* (1923).

Morgan, SIR HENRY. See BUCCANEERS; also J. C. Hutcheson, *Sir Henry Morgan* (1890), and Haring, *The Buccaneers in the West Indies* (1910).

Morgan, LADY, novelist, was born (Sydney Owenson) in Dublin on the Christmas-day of 1780 or thereby—'cold, false, erroneous, chronological dates' she protests against. Her father, a theatrical manager, fell into difficulties; and the clever, bold, lively young woman resolved to support the fortunes of the family, first as governess, afterwards as author. She had had 'somewhat mysterious relations' with at least one admirer, Sir Charles Ormsby, when in 1812 she was married off-hand to Thomas Charles Morgan, M.D. (1783-1843), whom the Lord-lieutenant knighted for the occasion. For the next quarter of a century, excepting two long visits to the Continent, the pair made Dublin their home; but in 1837 Lord Melbourne gave her a pension of £300, and next year they removed to London. Here she died on 16th April 1859, having continued busy with her pen and her tongue to the last. Her twenty-two works—rattling novels, verse, travels, &c.—include *St Clair* (1804), *The Wild Irish Girl* (1806), *O'Donnel* (1814), *France* (1817), and *Italy* (1821). Her silly but not unamusing *Memoirs* were edited by Hepworth Dixon (2 vols. 1862).

Morgan, LEWIS HENRY, an American archaeologist, was born at Aurora, New York, 21st November 1818, graduated at Union College in 1840, and became a lawyer at Rochester. He served in the state assembly (1861) and senate (1868), and died 17th December 1881. Morgan's earliest work, *The League of the Iroquois* (1851), was the first account of the organisation and government of an Indian tribe; but even more valuable are his *Systems of Consanguinity and Affinity of the Human Family* (1869), and his treatise on *Ancient Society* (1877). He also published *Houses and House-life of the American Aborigines* (1881), and an account of the beaver.

Morgana, FATA. See FATA MORGANA.

Morganatic Marriage (perhaps from Goth. *morgan*, 'to limit'; perhaps Ger. *morgengabe*, a gift given by the husband to the wife after marriage; Littré suggests *morgen*, 'morning'—a wedding celebrated privately in the morning), sometimes called *Left-handed marriage*, a lower sort of matrimonial union, which as a civil engagement is completely binding, but fails to confer on the wife the title or fortune of her husband, or on the children the full status of legitimacy or right of succession. In Germany it came in very early times to be accepted as a principle that *Ebenbürtigkeit*, or equality of birth between husband and wife, was essential to a proper marriage. The lower nobility were of course not *ebenbürtig* with the higher nobility, nor the best born commoners with the lower nobility. Later, the rule came to concern only reigning houses and the higher nobility. But members of German princely houses entering into marriages of this kind with their inferiors in rank (as frequently happened) contracted merely morganatic unions. The marriage, for instance, in 1851 of Prince Alexander of Hesse to the Countess Julie von Hauke, from which sprang the Battenberg family, was a morganatic one.

Morgan Library, a collection of early printed books and manuscripts, mostly literary in character, made in a measure secretly in the last years of his life by John Pierpont Morgan (1837-1913), the United States banker and financier, and housed by him in a fine marble building designed by Charles F. McKim, and situated near Madison Avenue, New York. In 1924, as a memorial to his father, the library was handed over by Morgan's son to trustees for the public, together with an

endowment of about £300,000. The collection is said to number some 20,000 volumes, and in its kind is among the most noteworthy in the world; at the time of its bequest it was valued at about £1,000,000. Here in printed books is work by Caxton and all the early English printers (sixty Caxtons out of a possible hundred, nearly all the early English Bibles, and other works), by Fust and Schöffer, by Fust and Gutenberg, the Elzevirs, and the Aldine Press; some twenty Shakespeare quartos in addition to folios. The manuscripts include the illuminated Ashburnham *Evangelarium* (9th cent.), 15th century manuscripts of Richard de Bury, Chaucer, and Gower; the only known manuscript fragment of *Paradise Lost*, which, though not in the author's hand, is the 'copy' from which the poem was set up.

Morgarten, a mountain slope on the east margin of Lake Egeri, in the canton of Zug, Switzerland, is the place where 1400 men of the Swiss Forest Cantons—Schwyz, Uri, and Unterwalden—won a great victory over 15,000 Austrians, 15th November 1315.

Morghen, RAPHAEL SANZIO, a famous engraver, was born at Naples, 19th June 1758, of German family. After some instruction from his father, a mediocre engraver, he studied at Rome under Volpato, then considered the best engraver in Italy, whose daughter he married in 1781. Even his first works obtained great success. Raphael's celebrated figures in the Vatican of 'Poetry' and 'Theology' were engraved by him in 1781; and he afterwards produced a succession of engravings of a very high class from many of the masterpieces of art: amongst these may be mentioned Raphael's 'Madonna della Seggiola' and the 'Transfiguration'; the 'Madonna del Sacco,' by Andrea del Sarto; the 'Duke of Moncado,' by Van Dyck; and Da Vinci's 'Last Supper.' The grand-duke gave him a pension at Florence, where he died 8th April 1833. His *Life*, with a catalogue of 254 works, was published by his pupil, Niccolò Palmerini. He will always hold a very prominent place in the history of Engraving (q.v.).

Morgue, a mortuary in Paris (q.v.), now demolished.

Moriche, a tropical American palm (*Mauritia flexuosa*). See PALM.

Morier, JAMES (1780?-1849), novelist, born at Smyrna, served from 1809 to 1816 at the court of Persia, first as secretary of legation, subsequently as envoy. In 1812 he published his *Persia, Armenia, and Asia Minor to Constantinople*, and in 1818 *A second Journey through Persia, Armenia, and Asia Minor*. The minute and familiar acquaintance he had acquired with the manners and customs of the Persians was seen in his highly-interesting series of Eastern romances: *The Adventures of Hajji Baba of Ispahan* (1824), *Hajji Baba in England, Zohrab, Ayesha, and The Mirza* (1841).—SIR ROBERT MORIER, G.C.B. (1826-93), British diplomat in Germany, Spain, and Russia, was his nephew. See *Life* by his daughter (1911).

Mörke, EDUARD (1804-75), regarded by some German critics as one of their greatest lyrists, was born at Ludwigsburg, and became a pastor at Tübingen and a professor of German Literature at Stuttgart. By a succession of volumes of poetry he made good his claim to rank as one of the foremost of the Swabian school.

Morin, JEAN (or MORINUS; 1591-1659), head of a college at Angers, wrote on ecclesiastical antiquities and the Samaritan Pentateuch.

Moringa. See BEN (OIL OF).

Morion. See ARMOUR.

Moriori. See CHATHAM ISLANDS.

Moriscos is the name given to the Moors who remained in Spain after 1492; Mozárabes or Muzárabes, to the Christian Spaniards who lived in the parts of Spain under Moorish rule; Mudéjares, to the Moors who submitted to the Christians in the earlier periods of the re-conquest.

To take first the *Mozárabes*. Christianity was freely, if contemptuously, tolerated under the Moorish rule. Occasional outbursts of fanaticism used to take place. These were often provoked by Christians defiantly seeking martyrdom, as in Córdoba in the 9th century; this persecution lasted intermittently till 953, when it well-nigh ceased. The Mozárabes kept their ancient liturgy, though many of them had ceased to understand Latin, and spoke and wrote Arabic only, writing even Latin and Spanish with Arabic characters. They occasionally held councils, but indifference prevailed, and the Spanish conquerors were more astonished at the laxity of the Mozárabes than at their constancy in retaining their old faith. For Mozarabic liturgy, see LITURGY.

Mudéjares.—Moorish names appear first in the 9th century as inhabitants of the country, and witnesses to documents, under Spanish rule. One of the earliest capitulations or fueros granted to them is that of Huesca (1081); by this and subsequent fueros (Tudela, 1115, &c.) the widest toleration was extended to them; they were allowed full exercise of their religion, laws, language, dress, and customs. The fuero of Játiva granted by Jaime I. of Aragon (1251) even provides that if any Saracen should become a Christian he should lose his landed property; that of Siliebar, near Seville (1255), allows them to build a castle for their defence. These capitulations seem to have been fairly observed till the 14th century, when a change of tone becomes apparent. In 1301 the Moors of Aragon were compelled to wear a distinctive dress, and in the next century their privileges were greatly curtailed; recantation was forced upon them. The Mudéjares of Aragon, Valencia, and Castile had hitherto been faithful, had served loyally in war even against Moors, had taken the royal side in all popular movements; even as late as 1528 they appealed to their well-proved loyalty to the crown.

But their situation was greatly impaired by the incorporation among them of the *Moriscos*, after the fall of Granada (1492). The terms of the capitulation of Granada were to the full as liberal as those under which the Mudéjares had lived loyally in Aragon, Valencia, and Castile for three or four centuries. Under Talavera, the first Archbishop of Granada, some attempt was made to observe these conditions, and with happy results. But the bigotry of Cardinal Ximenes, violating the capitulation, led to a rising in the Alpujarras (1500-2) and to the expulsion of the Moriscos of Castile and León; though in 1503 and in 1510 Ferdinand forbade the expulsion of those of Aragon and Valencia. At the close of the rising in the Alpujarras the alternative of exile or of baptism had been offered to the Moriscos. Those who chose exile went to swell the number of the Corsairs of Algeria and the Barbary States, who were henceforth a standing danger and annoyance to Spain. The newly-converted Moriscos (New Christians as they were called) became the objects of the severities of the Inquisition; as doubtful Christians they were regarded with greater jealousy and suspicion than as professed Mohammedans. Under danger of relapse their children were taken from them, and their young men sent to the galleys. In the war of the Germanias in Valencia (1520) they were ruthlessly massacred by the populace, but were still faithful to the king and to the nobles who respected their privileges. The ever-increasing

persecution provoked a still more serious rising under Philip II. in Granada. It was put down after two years of warfare by Don John of Austria (1568-70); many of the Moriscos, and especially the women, were given to the soldiers as slaves, and the rest, who did not emigrate, were removed to Castile, Valencia, and Murcia. The action of the Corsairs, avenging on Spain the wrongs of their fellow-countrymen, ruining the commerce, carrying off Christian captives, ravaging the coasts so that for leagues along the south-east it remained uncultivated, increased the bitterness against the Moriscos, who were suspected of being in league with the Corsairs, and directing their forays. Many returned openly to their ancestral faith; spasmodic attempts at genuine conversion proved fruitless; in 1599 the Archbishop of Valencia reported the conversion of one Morisco woman only as the result of a year's labour. Harsher measures were tried and failed; persecution only made them cling more firmly to their faith; partial expulsion only augmented the number of the Corsairs; and at last they were forbidden to leave the country by sea. The hatred, however, of Philip II. against the Protestants was stronger than his dislike of the Moriscos, and his reign is marked by constant vacillations in his policy towards them; and their lot cannot have been absolutely intolerable, for one charge against them was that their numbers increased continually while that of the old Christians diminished. The fear and suspicion aroused on both sides made it difficult for Spaniards and Moriscos, new and old Christians, to live together. After so many breaches of faith the Moriscos could trust no promise made to them by king or church. To the Spaniards it seemed intolerable to have an intestine foe, while the kingdom was so sorely pressed from without; and churchmen taught the king that anything, short of the extermination which he might commit with a safe conscience, was a mercy. In 1582 the total expulsion was first mooted; it was decided on in principle in 1599. In 1609-10 the whole of the Moriscos were expelled the kingdom, either by sea from Valencia, or through the Pyrenees from Aragon and Castile. All their goods were confiscated, except what they could turn into money, or carry with them on their persons; robbery, murder, assault, excesses of every kind against them marked their track; all their children under four years of age were taken from them to be brought up as Christians; over 500,000 Moriscos, chiefly agricultural labourers or farmers, left the country in which their people had dwelt for so many centuries. The results to Spain were like those which subsequently followed the emigration of the Huguenots from France. Even this does not end the story; the descendants of the children forcibly kept behind, or of those really converted to Christianity, were regarded with horror, and were constantly denounced to the Inquisition. For nearly a century afterwards we find decrees of particular provinces expelling families for being descendants of the Moriscos. A taint of Moorish blood was sufficient to prevent the holding of any public office, even in the smallest municipality.

See *Guerra de Granada*, by Diego de Mendoza; *Rebelión y Castigo de los Moriscos del Reino de Granada*, by L. del Mármol y Carvajal (both in vol. xxi. of Rivadeneira's *Biblioteca de Autores Españoles*); *Estado Social y Político de los Mudéjares de Castilla*, by F. Fernández y González (1866); books on them by Florencio Janer (1857) and Danvila y Collado (1889); and *The Moriscos of Spain, their Conversion and Expulsion*, by Henry D. Lea (1901).

Morison, JAMES COTTER, author and Positivist, was born in 1832, son of the inventor of 'Morison's pills,' and educated at Highgate gram-

mar-school and Lincoln College, Oxford. His first work was his masterpiece, *The Life and Times of St Bernard* (1863). His latest, *The Service of Man, an Essay towards the Religion of the Future* (1887), attracted much attention, but it was commenced when sickness had already seized him, and it does not adequately represent his views. He was one of the founders and first proprietors of the *Fortnightly Review*. His intellectual gifts were associated with a most genial and kindly nature; he was reputed one of the best talkers of his time in French as well as English, and had long projected a work on the history of Louis XIV.'s reign, but owing to ill-health it was never fairly begun. He died 26th February 1888.

Morison, ROBERT, botanist, was a native of Aberdeen, born in 1620. Having borne arms as a royalist in the civil wars, he retired to France when his sovereign's cause collapsed, and took the degree of doctor at Angers (1648). Two years later he became superintendent of the garden formed at Blois by Gaston, Duke of Orleans. After the Restoration he was appointed by Charles II. one of his physicians, 'botanist royal,' and 'professor' of Botany at Oxford. He was knocked down by a coach in London, and died the following day, 10th November 1683. His chief work is *Plantarum Historia Universalis Oxoniensis* (1680).

Morisonianism. See EVANGELICAL UNION.

Morlaix, a picturesque and flourishing port of France, in the Breton department of Finistère, on the tidal Dossen, 6½ miles from the sea and 38 ENE. of Brest. It has many quaint timbered houses, a huge railway viaduct 207 feet high, and manufactures tobacco, paper, &c. Moreau was a native. Pop. 15,000. See BERNARD OF MORLAIX.

Morland, GEORGE, painter, was born in London, 26th June 1763, the eldest son of Henry Morland, crayonist (1712-97), to whom at fourteen he was articulated for seven years, and who brought him up with extreme rigour. No sooner, then, had he become his own master than he went hopelessly and utterly to the bad. His marriage in 1786 had no power to check him; and his whole after-life was a downward course of debt and dissipation. He was regular only in this, that 'every day he got thoroughly intoxicated, and then generally would lie all night long on the floor.' Yet he worked hard and rapidly, in the last eight years of his life turning out nearly nine hundred paintings and more than a thousand drawings. His strength lay in country subjects (pigs, Gypsies, and stable interiors); his sea-pieces are not so good. He died of brain-fever in a sponging-house, 27th October 1804. See Lives by Dawe (1807), Richardson (1895), and Williamson (1904).

Morley, a municipal borough, since 1918 part of Batley and Morley parliamentary borough, in the West Riding of Yorkshire, 5 miles SW. of Leeds, with woollen manufactures, glass-works, tanneries, coal-mines, and stone quarries. Mentioned in Domesday, it became a borough only in 1885. The Earl of Oxford (Mr Asquith) was born in Morley. Pop. (1851) 4821; (1921) 23,934.

Morley, HENRY (1822-94), was born in London, and educated at King's College there, practised medicine at Madely, Shropshire, in 1844-48, taught a school in 1848-50 at Liscard, and was joint-editor or editor of the *Examiner* from 1856 till 1864. For eight years English lecturer at King's College, he was in 1865-89 professor of English Literature at University College, London. In 1889 he contributed the article on English Literature to this work. His writings include lives of Palissy (1852),

Cardan (1854), and Cornelius Agrippa (1856); *Memoirs of Bartholomew Fair* (1857); *English Writers to Dunbar* (part of a projected history of English literature in 20 volumes); *Clément Marot and other Studies* (1871); a very popular *First Sketch of English Literature* (1873; 14th ed. extended by Edmunds, 1912); *Library of English Literature* (5 vols. 1876-82); and *English Literature in the Reign of Victoria* (1881). He edited several popular libraries of reprints (Morley's Universal Library, 63 shilling vols.; Cassell's National Library, 214 vols. at threepence; and the Carisbrooke Library). See Life by H. S. Solly (1898).

Morley of Blackburn, JOHN, VISCOUNT, born the son of a surgeon at Blackburn, 24th December 1838, graduated from Lincoln College, Oxford, in 1859, where the Tractarian movement had been followed by a movement in the direction of Liberalism, and young Morley came under the influence of J. S. Mill. Embarking on a literary career, he was, after a few preliminary ventures, appointed editor of the *Fortnightly Review*; and from 1880 he edited the *Pall Mall Gazette*, the leading organ of advanced Liberalism, and the *Pall Mall* till, in 1883, he was sent to parliament by Newcastle. His articles and speeches in favour of Home Rule did much to prepare the way for Gladstone's new policy. In 1886, and again in 1892, he was Secretary for Ireland in Gladstone's Home Rule administrations. In 1895 he lost his seat through his opposition to the compulsory eight hours' day for miners, then regarded as Socialistic; but in 1896 he re-entered parliament as member for the Montrose Burghs. In 1905 he was made Secretary of State for India, entering the House of Lords as Viscount Morley of Blackburn in 1908; in 1910 he took the less fatiguing post of Lord President of the Council. As Indian Secretary he had the ungrateful task of firmly suppressing sedition (not without protest from extreme Radicals), but was able to make a welcome concession to the desire of the natives of India to have a larger share in the government of their own country. Not seldom in public life he took the unpopular side; but by the force of his personality and his steadfast adherence to his principles he retained the respect of those who differed most widely from him. He was Lord President of the Council from 1910 till 1914, but he retired from the government and from public life on the outbreak of war. He died 23d September 1923. To the study of modern problems he carried the spirit and methods of Philosophical Liberalism. Alike in his writings and his public life, he accepts in the main the leading conceptions of the Philosophic Liberals—a belief in individual and social progress along the lines of freedom and knowledge, progress being accelerated by the growth of justice and sympathy; and his intense interest in the progress of humanity explains his antipathy to 'Imperialism'—he opposed both the Sudan expeditions and the South African War policy. Evolution, not revolution, is the keynote of his thinking; and by his deep historic sense, his fondness for the concrete, his vital interest in humanity, apart from philosophic shibboleths, he became an exponent of evolutionary Liberalism.

His philosophy of life must be gathered from a study of his writings, of which that *On Compromise* (1874) is one of the most characteristic. In his *Voltaire* (1872) we have his attitude towards religion. In his *Diderot and the Encyclopædists* (1873) he insisted on the paramount importance of knowledge and freedom as the two vital factors in progress, a generous tribute being paid to the advanced thinkers of the Revolution period. In *Rousseau* (1873), along with appreciation of Rousseau's influence, he protested against the dangers

of importing into political life sentimentalism and intuitionism. His *Burke* (1879) sketches the ideal politician, in whom the desire for progress is held in check by a profound regard for the principles of order and continuity. In his *Life of Cobden* (1881) he elucidates those great politico-economic principles which tend to internationalise commerce and industry. Four series of *Miscellanies* (1871-1908), a volume of *Studies in Literature* (1891), his *Machiavelli* (1897), and his *Recollections* (1917) are part of his literary legacy; and the *Oliver Cromwell* (1900) showed how fairly he could deal with a man and a movement dominated by religious conceptions he does not share. In his *Life of Gladstone* (3 vols. 1903), a literary as well as a political masterpiece, the history of the time is depicted with superb and attractive lucidity, while Gladstone all through remains the central figure.

See *Viscount John Morley: An Appreciation*, by J. H. Morgan (1924); Ali Khan, *Life of Lord Morley* (1923); and a criticism of Morley as a writer and thinker by P. Braybrooke (1924).

Morley, SAMUEL (1809-86), born in Homerton, became head of his father's hosiery business in 1854. He was returned to parliament for Nottingham as a Liberal in 1865; represented Bristol in 1868-85, and declined a peerage. Identified with many religious and philanthropic movements, he gave largely towards the erection of Congregational chapels and institutions.

Morley, THOMAS, English composer, was born in 1558. He was a pupil of Byrd, and in 1588, when he seems to have been organist at St Giles', Cripplegate, graduated in music at Oxford. Shortly thereafter he would appear to have been organist at St Paul's, and there is evidence that for a time he served in Flanders as some sort of anti-Catholic secret political agent. In 1592 he entered the Chapel Royal, and was successively epistler and gospeller, but resigned in 1602, almost certainly on account of ill-health, and died probably in 1603. In 1598 he had obtained a twenty-one year's monopoly of song-book production. Morley's outstanding work was done in vocal secular music, and, if he was not the founder of the English madrigal school, he was certainly its leading personality, and in a sense its father. Between 1593 and 1597 he produced three volumes of canzonets (1593, 1595, 1597), one volume of madrigals (1594; here the word 'madrigal' is for the first time used in English on a title-page), and one volume of ballets (1595), a form of musical composition Morley was the first to introduce into England. Thereafter he edited a collection of canzonets from Italian composers (1597), and two collections of madrigals, the first (1598) from Italian composers, the second (1601) the well-known *Triumphs of Oriana*; except in the volume of 1598, various pieces of his own were included in these works. Morley's vocal compositions, some 200 in all, many based on original treatment of borrowed Italian matter, and all fresh and distinguished in harmony, in phrasing, in melody, and in general workmanship, reflect the light-hearted spirit of the composer; and in this vein, to which almost exclusively he confined himself, Morley was unrivalled among the English madrigalists. Notable among his vocal pieces are 'April is my mistress' face,' 'Now is the month of maying,' 'My bonny lass, she smileth,' 'Fire! fire!' 'I follow, lo, the footing,' 'Stay heart, run not so fast,' and 'Miraculous Love's wounding,' which last forecasts what came to be known as ternary form. In other fields of composition Morley also did work of note: virginal music by him is in the *Fitzwilliam Virginal Book* and elsewhere; his lute-song set of the year 1600 contains 'It was

a lover and his lass,' rare as an undoubtedly authentic original setting of a Shakespeare song; while in sacred music he wrote various services, anthems, and motets; and edited, with four pieces by himself, *The whole Booke of Psalmes* (no date). In addition to musical composition Morley wrote his celebrated *Plaine and Easie Introduction to Practicall Musicke* (1597), a text-book in dialogue form, containing much sound instruction, as well as some musical examples of his own composition; for many generations it had no rival as a work on modal music, and it may still be studied with advantage; it pleasantly reflects, too, the personality of its author, and is valuable also for the sidelights thrown on contemporary musical life. Among his contemporaries Morley enjoyed high popularity and repute, and he is unquestionably to be ranked among the greatest of the Elizabethan composers. See Fellowes, *The English Madrigal Composers* (1921), and for Morley's madrigal and kindred compositions four volumes (1913) in *The English Madrigal School* (ed. Fellowes).

Mormaer, the better spelling of the Gaelic *mormhaor*, often spelt *maormor*. See EARL.

Mormons, or, as they call themselves, the Church of Jesus Christ of Latter-day Saints, an organisation founded by Joseph Smith, born, the son of a farmer, at Sharon, Vermont, on 23d December 1805, who at ten removed with his parents to Palmyra, New York, and four years later to Manchester. There he claimed to have received in 1820 a divine call as a prophet of the Most High; and on the evening of 21st September 1823 a glorious messenger from the presence of God appeared at his bedside and called him by name. 'He said there was a book deposited, written upon golden plates, giving an account of the former inhabitants of this continent, and the source from whence they sprung. He also said that the fullness of the everlasting gospel was contained in it, as delivered by the Saviour to the ancient inhabitants. Also, that there were two stones in silver bows deposited with the plates, and the possession and use of these stones was what constituted seers in ancient or former times, and that God had prepared them for the purpose of translating the book. . . . While he was conversing with me about the plates, the vision was opened to my mind that I could see the place where the plates were deposited, and that so clearly and distinctly that I knew the place again when I visited it.' This visitation was supplemented by others, the same angel appearing to him thrice that night, and afterwards paying him several visits and instructing him at length in relation to his prophetic mission. The spot where the records lay concealed was described as being 'on the west side of a hill, not far from the top, about 4 miles from Palmyra, in the county of Ontario, and near the mail-road which leads thence to the little town of Manchester.' Thither the youth repaired the next day, and was shown the plates as he had been promised, but was not permitted to take them. Four years later, however, after due disciplinary probation, on the night of September 22, 1827, the angel of the Lord delivered the sacred records into his hands. They were engraved on plates nearly 8 inches long by 7 wide, a little thinner than ordinary tin, and bound together by three rings running through the whole. The volume was altogether about 6 inches in thickness, a part of which was sealed. The characters, letters, or hieroglyphics upon the unsealed part were small and beautifully engraved. They represented an unknown language, which Mormons have called the 'Reformed Egyptian.' Along

with them were found the Urim and Thummim, described by the angel; by means of this instrument, which is said to have borne some resemblance to a pair of spectacles, the Lord enabled the young man to translate the ancient records into English. He read off by the aid of the Urim and Thummim to his associate and scribe, Oliver Cowdery, or other clerks, who wrote down the words exactly as he gave them. The first edition of the *Book of Mormon* (5000 copies) was published at Palmyra, New York, in 1830. It contained a prefatory testimonial, signed by Oliver Cowdery, David Whitmer, and Martin Harris, to the effect that an angel of God came down from heaven and showed them the plates from which Joseph Smith translated the *Book of Mormon*; and this was followed by the testimony of eight other witnesses, among them Joseph's father and two brothers, who affirmed that 'Joseph Smith, junior,' had shown them the golden plates containing the engravings. These were the only persons who were permitted to see them. They were returned to the angel after the work of translation was done. Only the unsealed portion of the plates was translated, the sealed remainder being reserved, with a promise of translation at a future time.

These records contain the primitive history of America from its settlement by a colony that came from the Tower of Babel, at the time of the confusion of tongues, to the beginning of the 5th century of the Christian era. These primitive colonists of North America were called Jaredites. They were a race highly favoured of heaven, but degenerated and became wicked and corrupt, the sun of their civilisation finally setting in a sea of blood and civil strife, in which millions of souls were slaughtered. But a new race came directly from Jerusalem about 600 B.C., and in time peopled both North and South America. The founders of the new colony were Lehi and his wife, his four sons Laman, Lemuel, Sam, and Nephi, with their wives; Zoram, a servant, and his wife; in all sixteen persons. They landed on what is now the coast of Chili, in South America. After Lehi's death quarrels broke out among the brothers. The Lord had appointed Nephi to be the ruler of the new race of colonists, but his jealous elder brothers rebelled, and were cursed by the Almighty for their iniquities, and condemned to have dark skins, this punishment to continue in their posterity. They became 'an idle people, full of mischief and subtlety, which did seek in the wilderness for beasts of prey.' They were known as Lamanites, and, according to the *Book of Mormon*, were the ancestors of the American Indians. The Nephites became highly civilised and prosperous, were fair and beautiful to look upon, and were greatly blessed of the Lord, though often ungrateful for his goodness. Both Nephites and Lamanites increased and multiplied, but were almost continually at war with each other. About the time of the Crucifixion, awful earthquakes, darkness, and destruction announced that event. Shortly afterwards Christ himself appeared out of heaven to the more righteous Nephites. He showed them his wounded side and the print of the nails in his hands and feet, instructed them in the truths of his gospel, healed the sick, blessed children, administered the sacrament, chose twelve apostles, and gave them power to found his church with the same orders of priesthood, the same ordinances, gifts, powers, and blessings as in the Old World. After a prolonged season of peace, the result of the spread of the work of Christ, which at one time was received by both Nephites and Lamanites, hostilities between the two races were resumed, gradually the purity of their faith

declined, and finally, about the year 385 A.D., a decisive conflict, similar to that which had destroyed the Jaredites in the same locality, took place near the hill Cumorah, where the Nephites were almost totally annihilated. The Lamanites remained a dark and benighted race, to people the waste of ruin, and faintly perpetuate in their customs and traditions the story of the illustrious past. Shortly before the battle of Cumorah, a Nephite prophet named Mormon had been commissioned of God to write an abridgment of the history of his people, from the records kept by their various prophets and rulers, to be hidden in the earth till God should see fit to bring it forth and 'unite it with the Bible for the accomplishment of his purposes in the last days.' This abridgment, written upon golden plates, was concealed in the hill by Moroni, a son of Mormon, and one of the survivors of the battle of Cumorah. He it was who appeared as an angel to Joseph Smith and told him where the plates were deposited. Such is the famous *Book of Mormon*, believed by the Latter-day Saints (hence called Mormons and Mormonites) to be of equal authority with the Jewish and Christian scriptures, and to form an indispensable supplement to them, containing God's revelations to the New, as the others to the Old World.

The work being published, attention was speedily drawn to it. The opponents of the Saints alleged that it was made up from a romance written by a quondam clergyman named Solomon Spaulding (1761-1816). This the Mormons emphatically deny, and the discovery of the original MS. of that romance by President Fairchild of Oberlin College, 1884, corroborates their denial. Undeterred by ridicule and hostility, the Mormon prophet and his associates declared that the millennium was nigh at hand, that the Indians would soon be converted, and that the new Jerusalem, the Zion of the last days, where the Saints would finally gather to prepare for the coming of the Lord in his glory, was to be built in the heart of the American continent. America, they claimed, was the land of Joseph, bestowed upon him and his posterity for ever by the blessing of the patriarch Jacob, as recorded in Genesis and Deuteronomy. The prophet's house was frequently beset by mobs and 'evil-designing persons'; several times he was shot at and very narrowly escaped; but his courage and zeal continued to bring him disciples, and on April 6, 1830, the Church of Jesus Christ of Latter-day Saints was legally organised, with six members, at the house of Peter Whitmer, in Fayette, Seneca county, New York. Several months prior to this the Aaronic priesthood, restored by an angel who said that he was John the Baptist, was conferred upon Joseph Smith and Oliver Cowdery, and later they were ordained to the Melchizedek priesthood by the apostles Peter, James, and John. The new religion spread rapidly and gained many converts. Branches of the church were established in New York, Pennsylvania, Ohio, the British provinces, and the New England states. The prophet was fiercely attacked by the leaders and preachers of the other religious denominations, but held his ground firmly. Though but poorly educated, he was a formidable opponent in the polemical field. In January 1831, in compliance with revelation, the church removed westward and established its headquarters at Kirtland, Ohio, where it began to thrive amazingly. In the summer of 1831 a colony from Kirtland migrated to Missouri, where they purchased lands in Jackson county, which had been revealed to the Mormon prophet as the chosen site for the city of Zion. At a place called Independence his colonists concentrated them-

selves, established a printing-press, started a monthly periodical, the *Evening and Morning Star*, and continued to preach zealously and make proselytes to their faith. Their success and rapid increase here, as elsewhere, raised up enemies. Secret societies were formed to expel them from Missouri, their houses were attacked by mobs, their periodicals were stopped, their printing-press confiscated, their bishop tarred and feathered, and numberless other outrages committed against them. Finally, in the autumn of 1833, the entire community, numbering about 1500 souls, were driven from their homes, whipped, plundered, many of them killed, and the survivors expelled from Jackson and scattered through the adjoining counties. The main body of the refugees found a resting-place and kindly welcome in Clay county.

Meanwhile the Saints in Ohio had suffered some persecution. On the night of March 5, 1832, at Hiram, Portage county, a mob broke into a house where the prophet was sleeping, tore him from the arms of his wife, hurried him to an adjoining meadow, tarred and feathered him, and forced aqua fortis into his mouth. Sidney Rigdon, his associate, was similarly handled and rendered temporarily insane. Later on Smith was assailed by divers vexatious prosecutions, but each time came off victorious. He set up a mill, a store, and a bank in Kirtland, and continued his propagandist labours with great success. In June 1833 the building of a temple in Kirtland was commenced. Shortly afterwards a printing-press was established in the city, and Oliver Cowdery recommenced the publication of the *Evening and Morning Star*. In July 1834 the Mormon prophet visited for the third time his people in Missouri. He was accompanied by 204 persons, mostly young men. This was the 'Zion's Camp' expedition, the object of which was to relieve the wants of their afflicted brethren who had been driven from their homes in Jackson county, and, if possible, effect a reconciliation between them and their former neighbours. They purchased lands in Caldwell county, Missouri, where they settled and founded the city of Far West. At Kirtland on February 14, 1835, the Twelve Apostles of the church were chosen, and soon after the council of the Seventies, their co-labourers in the ministry, was called into existence, and sent forth with the apostles to begin the work of 'pruning the Lord's vineyard for the last time.'

In June 1837 Heber C. Kimball, Orson Hyde, Willard Richards, Joseph Fielding, and others left Kirtland for England, and landed at Liverpool, July 20. Three days later they began preaching in Preston, and met with such remarkable success that within the next eight months, at the expiration of which time Kimball and Hyde returned to America, they had converted and baptised about 2000 people. The British mission was the first foreign mission of the Mormon Church.

On account of apostasy and persecution Kirtland was now pretty much abandoned by the Saints, the main body of them with the prophet and other leading elders migrating to the new 'Stake of Zion' in Missouri. They settled in Caldwell, Daviess, Clinton, Carroll, and Ray counties, where they bought land and improved it. At Far West, Caldwell county, the corner-stone of a temple was laid, a printing-office was established, and a monthly paper, called *The Elder's Journal*, published. But an election riot in August 1838, in Gallatin, Daviess county, where attempts were made to prevent the Mormons from voting, and some of them were obliged to defend themselves against assailants, was made the pretext for further acts of violence and rapine, from which the Saints in the outlying settlements were sufferers. The mob even burned the

houses and laid waste the property of some of their own sympathisers in order to make it appear the work of the Mormons, who were falsely accused of deeds similar to those of which they were the victims. The result was a general uprising. The militia of the state was called out to suppress the riots, but took side with the mob against the unpopular Mormons. Governor Boggs issued an order for them to be 'exterminated or driven from the state,' and commanded Major-general Clark with several thousand troops to proceed at once to Far West and execute the decree. To this overwhelming force the inhabitants of the city peaceably surrendered, though compelled to look on and see their city sacked and pillaged, their wives and daughters outraged and insulted, and a number of their brethren killed by the mob and the soldiery. The Mormon leader and about seventy others were retained as prisoners, and the body of their followers, on penalty of death, ordered to leave the state forthwith. From twelve to fifteen thousand people in the autumn and winter of 1838 crossed the Mississippi, and were kindly received in the neighbouring state of Illinois. Joseph Smith and the other prisoners were tried by court-martial (November 1) and condemned to be shot, but escaped execution.

The Mormon prophet next rallied his people on the banks of the Mississippi, principally at or near Commerce, Hancock county, Illinois, where they again purchased homes and founded the city of Nauvoo (q.v.). This region though naturally fertile was then a mere wilderness, but Mormon thrift and industry soon made it 'blossom as the rose.' The legislature of Illinois granted a liberal charter to Nauvoo, and a body of Mormon militia was formed under the name of the 'Nauvoo Legion,' with the prophet himself as its commander. Meantime the Twelve Apostles, with Brigham Young at their head, had preached a wonderfully successful mission in the British Isles, whence they sent many hundreds of converts across the Atlantic. Within five years the Mormons numbered in Illinois about 20,000 souls.

After a few years of comparative peace and prosperity the tempest of persecution again burst upon the Mormon community. Governor Ford ordered into service several hundred men, had Joseph Smith arrested with his brother Hyrum, and immured in Carthage gaol, Willard Richards and John Taylor accompanying them. In the afternoon of June 27, 1844, a mob of about 150 men with blackened faces broke into the gaol and shot the two brothers Smith dead, also severely wounding John Taylor. The assassins were never brought to justice. Mormonism was now thought to be doomed, but under the leadership of Brigham Young it survived the shock of its prophet's martyrdom: 'the blood of the martyrs' proved, as ever, to be 'the seed of the church.' But the anti-Mormons were determined on the removal of the entire community of Latter-day Saints from the state, and the Mormon leaders, seeing no alternative but to comply with this demand or experience a repetition of the murderous scenes of Missouri, finally resolved once more to abandon their homes, and seek a haven of peace and safety in or beyond the Rocky Mountains. Accordingly, on 1st February 1846 a thousand families left Nauvoo, crossing the Mississippi on the ice. At Council Bluffs, on the Missouri River, in the month of July 1846, Captain J. L. Allen of the United States army called on the Mormons to raise a battalion for service in the Mexican war. The exiles speedily raised the five hundred troops required, though it took nearly all their able-bodied men. The families left at Council Bluffs, unable in the absence of the battalion to proceed farther that season, crossed the Missouri and established 'Winter Quarters,' now Florence, Nebraska. Mean-

while the residue of the community left behind in Nauvoo, after a gallant defence of their city against the mob, which in violation of treaty came upon them in overwhelming numbers, were expelled from their homes and thrown shelterless upon the western shore of the Mississippi.

In the spring of 1847 Brigham Young at the head of a picked band of pioneers, 143 men, 3 women, and 2 children, started from Winter Quarters for the Rocky Mountains. They arrived in the valley of the Great Salt Lake, the site of their present beautiful city, on July 24, and began to plough the ground and put in crops the same day. Seven hundred more wagons arrived that autumn, and 1000 wagons in the autumn of 1848. In December 1847 Brigham Young was chosen president of the church—an office left vacant since the death of Joseph Smith—with Heber C. Kimball and Willard Richards as his counsellors in the First Presidency. In 1849 the provisional government of the state of Deseret was organised at Great Salt Lake City, a state constitution adopted, and a delegate sent to congress to ask for admission into the Union. The petition was refused, but in September 1850 congress created Utah a territory, and President Fillmore appointed Brigham Young governor, which office he held from 3d February 1851 until 11th April 1858, when he was succeeded in that office by Alfred Cumming. In 1857 the Mormons were falsely charged with being in a state of rebellion against the government, and President Buchanan sent a considerable military force to Utah. Young and his people fearing military excesses, and remembering the fate of Far West and Nauvoo, kept the army east of the Wasatch Mountains until the next spring, when arrangements were made for the peaceable entry of the troops, the Mormons having abandoned their city and surrounding parts and removed south, with the avowed determination of burning every building and reducing Utah to its former condition of barrenness if vindictively pursued. They were not, however, molested. The troops passed quietly through the city and encamped in Cedar Valley, about 40 miles south-west, and the people returned to their homes. Since then their cities and settlements have extended from Idaho through Utah into Wyoming, Colorado, Nevada, Arizona, New and Old Mexico. The Mormons also have a settlement in British America.

The Mormons have sent many missionaries to the British Isles and nearly every other European country, also to Australasia, Africa, Palestine, the East and West Indies, China, Burma, Siam, South America, and the Society, Sandwich, and Samoan Islands, and from most of these places have gathered numerous converts. In 1849 the Perpetual Emigration Fund was established, to assist poor Saints in distant lands to emigrate to Utah. Annual and semi-annual general conferences of the whole church are held, generally at Salt Lake City, and quarterly conferences in the various 'stakes,' and usually in the various missionary fields.

Organisation.—The ecclesiastical authorities of the Church of Jesus Christ of Latter-day Saints comprise two priesthoods—the Melchizedek or High Priesthood, and the Aaronic or Levitical, which is the lesser priesthood. The latter ministers in temporal things, the former in spiritual things, though having general authority and supervision over the whole. Apostles, seventies, high-priests, patriarchs, and elders belong to the Melchizedek priesthood, bishops, priests, teachers, and deacons to the Aaronic. The highest authority in the church is the First Presidency, consisting of the president of the whole church and two counsellors. The presidents have been Joseph Smith, Brigham Young (q.v.), John Taylor (1808–87), Wilford

Woodruff (1807-98), Lorenzo Snow (1818-1901), Joseph F. Smith (1838-1918), Heber J. Grant. The death of the president dissolves the First Presidency, the authority then devolving upon the Twelve Apostles, who nominate his successor, always selecting for the office, since the death of Joseph Smith, the president of the Apostles. The third body is the Seventies, of whom there are one hundred councils (commonly termed quorums), each of seventy members, each council having seven presidents, included in the seventy. The seven presidents of the first council of seventies preside over all the councils of seventies. The duties of the above three bodies are general rather than local. The cities and settlements of the Saints are organised into stakes, each usually covering one county. Each stake has a president, assisted by two counsellors, also a high council of twelve members (who are high-priests), presided over by the president of the stake and his two counsellors. Each stake is divided into several wards, presided over by a bishop and his two counsellors. The high-priests of any stake form a council indefinite in number. A council of elders consists of 96 members; of priests, 48; of teachers, 24; of deacons, 12. An apostle is a special witness to all the world. The Twelve Apostles are a travelling presiding high council, to build up the church and regulate the affairs of the same in all nations, as well as at home, under the direction of the First Presidency, when there is a First Presidency. A seventy's duty is to travel and minister under the direction of the apostles. The special office of a patriarch is to administer patriarchal blessings. Apostles, patriarchs, high-priests, seventies, bishops (if high-priests), and elders can preach, baptise (invariably by immersion), lay on hands for the gift of the Holy Ghost, and minister in various other ordinances of the church. Neither priests, teachers, nor deacons can lay on hands for the gift of the Holy Ghost, but a priest may preach and baptise. Neither a teacher nor a deacon can baptise or administer the sacrament, which all the other officers named may do. The special duty of a teacher is to visit and teach the members in order to promote morality and faithfulness. The special duty of a deacon is to attend to minor temporalities, and to assist the teacher in his duties.

Doctrine.—The articles of faith of the Church of Jesus Christ of Latter-day Saints: 'We believe in God, the Eternal Father, and in his Son, Jesus Christ, and in the Holy Ghost. We believe that men will be punished for their own sins, and not for Adam's transgression. We believe that through the atonement of Christ all mankind may be saved, by obedience to the laws and ordinances of the gospel. We believe that these ordinances are (1) faith in the Lord Jesus Christ; (2) repentance; (3) baptism by immersion for remission of sins; (4) laying on of hands for the gift of the Holy Ghost. We believe that a man must be called of God by "prophecy and by the laying on of hands," by those who are in authority, to preach the gospel and administer in the ordinances thereof. We believe in the same organisation that existed in the primitive church—viz. apostles, prophets, pastors, teachers, evangelists, &c. We believe in the gifts of tongues, prophecy, revelation, visions, healings, interpretation of tongues, &c. We believe the Bible to be the word of God, as far as it is translated correctly; we also believe the *Book of Mormon* to be the word of God. We believe all that God has revealed, all that he does now reveal, and we believe that he will yet reveal many great and important things pertaining to the kingdom of God. We believe in the literal gathering of Israel and in the restoration of the ten tribes; that Zion will be built upon this [American] continent; that Christ

will reign personally upon the earth, and that the earth will be renewed and will reach its paradisaic glory. We claim the privilege of worshipping Almighty God according to the dictates of our own conscience, and allow all men the same privilege, let them worship how, where, or what they may. We believe in being subject to kings, presidents, rulers, and magistrates, in obeying, honouring, and sustaining the law. We believe in being honest, true, chaste, benevolent, virtuous, and in doing good to all men; indeed, we follow the admonition of Paul—"We believe all things, we hope all things," we have endured many things, and hope to be able to endure all things. If there is anything virtuous, lovely, or of good report or praiseworthy, we seek after these things' (Joseph Smith).

They also believed in the patriarchal order of marriage, as practised by Abraham, Jacob, and other ancient worthies; they held that it is right and proper, under certain restrictions, for a man to have more than one wife, providing he is chaste and upright in his conduct and otherwise worthy of the privilege. Their marriages are 'for time and all eternity,' as they believe in the perpetuation of the family relationships hereafter. Joseph Smith received the 'revelation on the eternity of the marriage covenant, including plurality of wives,' July 12, 1843, but it was not published to the world until August 29, 1852. A woman, among the Mormons, who does not marry and bear children is regarded as not having fulfilled all the law of her own being. A defence of the system has been set up on moral grounds, as well as on the ground of revelation. They declare that prior to the advent of the Pacific railroads (which, by the way, the Mormons helped to construct), and the consequent influx of 'Gentile' civilisation, their community was free from the horrible vices and degrading social evils that prevail elsewhere; fornication and adultery were unknown; there were no prostitutes, no vile seducers, no illegitimate children. Their wives are asserted to be happy, virtuous, and healthy, and their social and domestic purity and felicity challenge the highest commendation.

Congress has legislated repeatedly against the polygamic feature of their faith. An anti-polygamy law, passed in 1862, remained practically a dead letter, only one conviction being secured in twenty years, and that in a test case, upon evidence furnished by the defendant. For years after the passing of the act referred to congress permitted a Mormon delegate, who had several wives, to hold his seat in the House of Representatives; but in 1882 he was denied that right, and a monogamic Mormon was sent in his stead to congress. In March 1882 an act supplementing the law of 1862 was passed, making it an offence punishable by fine and imprisonment for a man to marry more than one wife or to cohabit with more than one woman. This act, popularly known as the Edmunds Law, was applied specially against the Mormons, and was rigorously enforced. In July 1887 a constitutional convention, composed entirely of monogamic Mormons, who were vastly in the majority in the church, met at Salt Lake City, and, adopting a constitution for the 'state of Utah,' containing a clause prohibiting and punishing polygamy and unlawful cohabitation, applied once more—the fifth time in the history of the territory—for admission to the Union as a state. Like all the previous applications, however, this was refused. Finally, in September 1890 President Woodruff issued a proclamation declaring that the church no longer teaches the doctrine of polygamy or plural marriages, and accepts the United States law prohibiting such marriages; and this declaration was afterwards confirmed in conference. Fol-

lowing the manifesto by President Woodruff, the Mormons began to divide on political party lines, and to fall into one or other of the two great national parties of the republic. The elections which ensued clearly demonstrated that the Mormon people were about equally divided in their political views and preferences. At the session of the United States Congress for 1893-94 the question of statehood for Utah was early sprung, and an Enabling Act for its admission was passed with but little opposition. In accordance with this act a constitutional convention was held in Salt Lake City, the capital of Utah, in March-May 1895, and a constitution framed for submission to the legal voters of the territory. The chief provisions of the Enabling Act were that perfect toleration of religious sentiment should be secured, that polygamous or plural marriages should be forever prohibited, that provision should be made for the establishment and maintenance of a system of public schools which should be open to all the children of said state and free from sectarian control, and that these provisions should be rendered by ordinance irrevocable without the consent of the United States and the people of the state. The constitution as framed was ratified by a large majority. See UTAH. [The foregoing article was written from the Mormon point of view by the historiographer of the church.]

The Reorganised Church of Jesus Christ of Latter-day Saints was formed by those members of the Mormon body who refused to endorse the claims of Brigham Young and other aspirants to the office of president after the death of Smith. They met in conference in 1852 and avowed their allegiance to the original tenets and practices, and repudiated Young and other secessionist bodies. They hold that the *Book of Mormon* is emphatically opposed to the practice of polygamy and condemns it as 'a gross crime,' and that all Joseph Smith's writings and public utterances were strictly opposed to such immorality and in advocacy of monogamy. They deny that Smith was responsible for the 'revelation' on polygamy, and hold that Brigham Young was the sole author of it. There are many other points on which they claim that the Mormon body have departed from the law of the church as contained in the *Book of Doctrine and Covenants*. The Reorganised Church has always been strictly monogamic in faith and practice as in the days of its inception by Joseph Smith. From 1860 Joseph Smith (1832-1914), son of the founder, was their president; and his son Frederick M. Smith (b. 1874) succeeded him. Their headquarters are in Lamoni, Iowa, and Independence, Mo.

The *Book of Mormon* has been translated into several foreign languages, as also the *Doctrine and Covenants*, the *Hymn-book*, and the *Voice of Warning*. Other Mormon publications are *Life of Joseph Smith*, *Life of Brigham Young*, *Key to Theology*, *Spencer's Letters*, *Doctrines of the Gospel*, *Life of Heber C. Kimball*, *Autobiography of Parley P. Pratt*, *Story of the Book of Mormon*, *Snow's Poems*, *Harp of Zion*, and *Correspondence of Palestine Tourists*. Besides the official Mormon literature, see Bancroft's *History of Utah* (1889); Joseph Smith (third) and Heman C. Smith, *History of the Church of Jesus Christ of Latter-day Saints* (from the standpoint of the Reorganised Church; Lamoni, Iowa, 1901); the *Utah Commission* in U.S. Government Reports; books by J. W. Riley (1902), R. and R. W. Kauffman (1912), Cannon and Knapp (1913), Martin (1920), Erickson (1923), and Linn (1924).

Morning Glory. See CONVULVULUS.

Mornington, a hamlet 3 miles E. of Drogheda in County Meath, gave a baron's title to Richard Colley (1690-1758), who, on inheriting a cousin's estate, assumed the name of Wesley or Wellesley, and was created Baron Mornington in 1747. His

son, Garrett Wesley or Wellesley (1735-81), became successively Viscount Wellesley and (1760) Earl of Mornington, and was known as a composer of glees. His son, the second earl (1760-1842), is better known (after 1799) as the famous Marquis of Wellesley.

Morny, CHARLES AUGUSTE LOUIS JOSEPH, DUC DE (1811-65), was by his contemporaries believed to have been the illegitimate son of Queen Hortense and of the Comte de Flahault, and consequently half-brother of Louis Napoleon. He was born in Paris, 23d October 1811, and adopted by the Comte de Morny. He served in the army in Algeria, but in 1838 made his début as a manufacturer of beetroot sugar and plunged into commercial and financial speculation. Chosen a deputy in 1842, he after the revolution of 1848 became the leader of the policy of the Élysée, took a prominent part in the *coup d'état*, and became Minister of the Interior. As president of the Corps Législatif he succeeded in reducing it to subservience, and in 1856-57 was ambassador to Russia, where he married the Princess Trubetzkoi. Created a duke, he maintained a gay and extravagant life till his death. See Imbert de Saint Armand, *The Court of Napoleon III.* (trans. 1890); Loliée, *Frère d'empereur* (1909).

Morocco, or MAROCCO, known to the natives as *Maghreb-el-Aksa*, 'the farthest west,' is an empire or sultanate which, though at one time comprising a portion of Algeria in one direction, and exercising in the other a modified jurisdiction as far as Timbuktú, is now confined to that part of north-west Africa bounded on the E. by the Wad Gir, which separates it from Algeria, and on the S. by Cape Nun and the Wad Draa, which separates it from Río de Oro (Spanish) and French Sahara. As the most powerful of the Sharifs or descendants of Mohammed, the sultan is Prince of the True Believers. Very little of the country has been even roughly surveyed; but, according to the vague knowledge possessed, it contains about 230,000 sq. m., of which the 'Tell' or fertile region west of the Atlas contains 78,000, the Steppes or flat sterile upland pastures 27,000, and the Desert or Sahara the remainder. Politically, Morocco comprises at present the old kingdoms of Fez and Morocco and the territories of Taflet (Tafilalet) and Sus. Since 1912 it has been divided into three zones—Tangier in the north (neutral; 140 sq. m.), a small Spanish protectorate along the Mediterranean coast, and a large French protectorate. Spain also holds a number of settlements on the north coast, and Ifni in the west. There are many provinces or 'amalat,' each presided over by a Kaid, who again has under him various minor officials directing the affairs of the smaller districts, until the head-man of the village is reached. Many of the Arab and most of the mountain tribes are practically independent, never being troubled by the Sharifian officers, and paying taxes when compelled. Over the whole, living in a few moderate-sized towns, and numerous little stationary villages of stone or clay (*dshars*) or in the tent hamlets (*douars*) of wandering tribes, is scattered a population estimated at six millions (5,400,000 in French Morocco). But there is no complete census, and the country-people, in order to avoid extortion and the 'mouna,' or gift of provisions to favoured travellers, prefer to live in retired spots at a distance from the ordinary routes through the country. Morocco is, as a rule, mountainous, the Atlas (q.v.) traversing it in several chains from south-west to north-east, and by various spurs both to the coast country and to the desert. There are, however, numerous level plains, some of which are of great extent, and very

rich, the soil being in many places a deep, black loam, evidently the bed of an ancient lake or of a primeval forest. There are also numerous more or less level plateaus similar to those of Algeria. But with the exception of parts of the Atlas, the forest of Mamora, the date and argan groves of the south, and a few straggling copses around the burial-places of saints, Morocco has, in the course of the last thousand years, been almost denuded of timber, the palmetto (*Chamerops humilis*) scrub being about the most common representative of woodland. Consequently the country looks bald, rolling hills and monotonous plains, green in spring, brown during summer and autumn, being the most characteristic features of the north, though some of the glens and mountain-regions are extremely picturesque. Farther south, and on the other side of the Atlas, where long droughts, followed by famines, are common calamities, and the rainfall is at the best of times scanty and uncertain, sandy wastes are the prevailing characteristic; but in western Morocco, though the soil is sometimes thin and out of the river-valleys stony, actual desert is rare, and, except where the sand has been drifted inland by the winds, not unfitted for pasturage.

The central range of the Atlas forms the watershed separating the streams which flow into the Atlantic and Mediterranean from those which run southward toward the desert, where they are often lost in marshy 'sinks' or *sebkhas*. And of the streams falling into the Atlantic and Mediterranean, many are in the hot season or after long droughts little better than a succession of pools connected by threads of water, though rolling in brown floods from bank to bank during the wet season, when they are dangerous to cross. None of them are navigable for any distance from their mouths, which are always impeded by bars and shoals. Yet before the 14th century vessels of considerable tonnage went 40 miles up the Sus to Tarudant, and stern-wheel steamers could even yet easily navigate the Sebu to within a few hours of Fez. But there are not even barges on them.

The climate of Morocco varies much, though the western slope, being tempered by the sea-breezes and protected from the hot desert-winds by the Atlas, is temperate, the thermometer seldom falling below 40° or rising above 90°. But in summer the interior valleys are very hot, and in winter snow often falls in Fez and Mequinez, where ice an inch thick is by no means uncommon. In Tangier there has been a slight snow-shower about twice in forty years, and in Mazagan even less frequently. Farther south extremes of heat and drought are more common, though as a rule the climate is equable, and, unless in swampy places during summer, extremely healthy. In the Sus country and the region of Tafilet rain is scarce and in places almost unknown. But farther north, and on the Atlantic and Mediterranean slopes, it falls with tolerable regularity every year between October and April, the amount being at times so great that the low lands are flooded, the rivers impassable, and the mountain-sides, unprotected by wood, furrowed by torrents, sweeping the soil and debris before them into the valleys below. On the upper reaches of the Atlas there is all summer a June-like atmosphere; but in winter they are capped deep with snow.

Morocco is thus fitted for growing any crops of the temperate and tropical zones, and, as roads and railways grow, promises to become, as Barbary was in Roman times, the granary of Europe. Barley, wheat, maize, chick-peas, and beans are grown largely, and could be produced in immense quantities. Various gums, oranges, figs, almonds, lemons, and dates are among the other vegetable

products. Cotton and hemp are grown for home consumption. Tobacco cultivation is prohibited and its use forbidden by the sultan, though both it and 'keef' (Indian hemp) are used, as are also alcoholic beverages. Most European fruits grow well, and among other products sugar has been raised. The exports are grain, eggs, linseed, wool, hides, chick-peas, olive-oil, almonds, dates, fowls, bones, esparto, and cattle. The interior of the country is so little known, and the Atlas so entirely unexplored, except hastily in isolated places, that little can be said with certainty regarding its mineral wealth. But enough has been ascertained to enable us to assert that gold (placer and in quartz), copper, tin, argentiferous galena, nickel, antimony, iron, sulphur, and manganese abound. Coal and petroleum have been indicated. Rich silver lodes exist at Gondofi near the head-waters of the Sus, and rock-salt is mined near Fez. But these mineral deposits are scarcely touched. Phosphates, however, are worked inland from Casablanca.

The flora of Morocco is essentially European, so far as the western side of the Atlas is concerned, that of the Atlas generally being a southern extension of the temperate flora of the adjoining continent, with little or no admixture of southern types.

The fauna partakes of a similar character, the Barbary fallow-deer, wild boar, Barbary monkey (found also in Gibraltar), a species of porcupine, and wild cat being the most characteristic mammals; but the lion, once common, is now very rare in the inhabited parts of the country. The birds and fishes are those of southern Europe; the reptiles and amphibia agree better with Spain than the Ethiopian region—facts all pointing to a time when the Strait of Gibraltar did not divide Europe from Africa. Ostriches are seen only in the extreme south. Locusts often devastate the country. The Barbary horses have sadly deteriorated; while in agriculture, oxen, donkeys, camels, and even women yoked with them, are commonly employed to drag the rude one-stilted plough and the harrow, which consists of a bunch of thorns.

The inhabitants consist of six principal groups. The (1) Berbers (*Braber*) or Kabyles, of whom the Amazigh, Shelluh, and Tuareg are only branches, are the aborigines. They inhabit for the most part the mountain regions, and are still only half-subdued. (2) The Arabs are descendants of the 7th-century invaders and later comers. (3) The Jews were very early settlers, semi-independent colonies still subsisting in the Atlas and the Sus country, though most of them in the towns are refugees driven out of Spain and Portugal. (4) Europeans, chiefly French and Spanish, mainly in the coast towns. (5) The 'Moors,' a term vaguely applied to all the Mohammedan inhabitants, are really Arabs with a large admixture of Berber and of Spanish and other European blood. The name is sometimes restricted to the inhabitants of the cities. (6) The Negroes, of whom there are large numbers, were brought from the Sudan as slaves. Most of the latter are still in this condition, though the descendants of some of them now occupy high places in the army and the government. The Jews, though sorely oppressed in the past, prosper amazingly.

The sultan was absolute head of state and church. Since 1912, however, he and his grand vizier have been under the control, in the French zone, of a French resident-general and French ministers; while in the Spanish zone a Spanish high commissioner controls the khalifa, who is chosen by the sultan from two candidates nominated by Spain. It was agreed that Tangier should be an international zone—an arrangement given effect to in 1923-24.

There is a railway from Ujda on the Algerian border to Fez, Mequinez, Rabat, Casablanca, and Marrakesh, with which Tangier is to be connected. Another line runs from Tetuan to Ceuta. Much road-making has been done by the French. The chief industry besides the rude agriculture of the Berbers and Arabs, and the breeding of horses and mules, is the making of 'morocco' leather, harness, slippers, red 'Fez' caps, cloth for native apparel, the chiselling of brass trays, the making of rough pottery and of inlaid flint-lock muskets, and the weaving of carpets (principally in Rabat). The best mechanics and the jewellers are Jews.

Morocco has four capitals or imperial residences, at which the sultan resides at uncertain intervals and for indeterminate periods. These are Fez; Miknas (q.v.) or Mequinez; Marrakesh, better known as the City of Morocco; and Rabat (with Salli, on the opposite side of the mouth of the Bu-Kegreg River). Beside these the principal coast towns are Tangier; Tetuan, capital of Spanish Morocco, a little way up the Martil River; Larache or El-Arish, Casablanca or Dar-al-Baida, Mazagan, Saffi, and Mogador (see separate articles). But all of them are decaying, most of them in partial ruins, and without any exception filthy, undrained, and insanitary to the last degree. When not mere collections of flat-roofed or thatched huts, of sun-dried bricks, around a *kasbah* or walled fortress, they are congeries of narrow intricate lanes, often covered over with vines or reeds to keep out the sun. These lanes are lined with shops which look like large packing-boxes, with the lids raised as a penthouse and padlocked at night, or else with whitewashed windowless walls, over which here and there rise the square towers of a mosque. But within these is often a pleasant courtyard shaded by oranges and palms and cooled by a fountain, into which open gaily Arabesque-painted rooms, furnished with the rich carpets that constitute the principal furniture of a strictly Moorish house. The sole accommodation for travellers is caravanserais, with a yard for beasts and unfurnished rooms for their owners.

After being for more than four centuries a part of the Roman empire, and in the latter period of its sway venerated with a corrupt Christianity, 'Mauritania Tingitana' fell (429 A.D.) into the hands of the Vandals, who held it until 533, when Belisarius having defeated them it became subject once more to the Eastern Empire. But in the year 680 the Arab invasion began, and with little intermission the Arabs have ever since been possessors of the country, and the entire population are now the most fanatical adherents of Mohammedanism. At first, with Spain, part of the khalifate of Bagdad, it became divided into several independent monarchies, and during this period the country enjoyed a prosperity to which it has ever since been a stranger. After seeing the successive dynasties of the Edrisi (789 A.D.), Mahdhiti, Zeiridi, Almoravidi, Almohadi, Beni Marini, Utási, Hosaini, and Filali, and almost unbroken civil and foreign wars and revolutions, the country was united under Muley (Muláí = 'my Lord') Ismail (1692-1727). Morocco, though now more contracted than formerly, has at present, with the exception of the Spanish 'presidios,' no foreign strongholds on its coast, as there were up to the year 1769, when the Portuguese evacuated Mazagan; and from 1859 to 1860, when there was an unsuccessful war with Spain, the country was not disturbed by foreign hostilities till the first of the Spanish-Rif campaigns in 1894. But it is still very backward. A passive resistance was offered to every improvement, though Christian slavery and piracy by government vessels were abolished since 1817-22, and foreign traders have nominally

had access to all parts of the empire. The sultan's disposition to coquet with motor-cars and other European innovations provoked in 1902-3 a serious and widespread rebellion of the orthodox. France proposed a scheme 'for peaceful penetration,' which Britain and Spain agreed to (1904); Germany made difficulty on the ground that it had not been duly consulted; but a European conference at Algieras (1906) arranged a *modus vivendi*: Spain to co-operate with France in organising and drilling a police force for the coast towns and in controlling the Customs. After an anti-European riot in 1907 a French force occupied Casablanca, and in 1909 Spain was again at war in the Rif. In 1909 Germany and France signed an agreement to respect the independence of Morocco. Meanwhile the sultan had been deposed (1907), and his brother, Mulai Hafid, proclaimed sultan. The French interposed again in 1911; and when Germany sent a cruiser to Agadir the relations of Germany with France and Britain were strained, but ultimately Germany agreed to a French protectorate in Morocco. By two treaties of 1912 the French protectorate was accepted by the sultan, and the Spanish protectorate and the neutral zone of Tangier were marked off. Neither of the protecting powers could establish its sway without fighting. Upon Spain especially the burden was very heavy, and the reaction upon home politics was powerful. At Annual in 1921 a great disaster befell Spanish arms, and though Raisuli (or Raisuni) came over definitely to the Spanish side and the dictator Primo de Rivera himself took command (1924), the Rifis under Abd-el-Krim swept the Spaniards down to the coast and turned upon the French. Raisuli was taken prisoner, and died (1925). French and Spaniards meanwhile continued the fight. The French have made roads and railways, built schools, set up new law-courts, reorganised the post-office. The capitulation system has been abandoned. The various towns of Morocco have communication by telephone and telegraph with one another, and by telegraph (wire and wireless) with Europe and Algeria. A Convention in 1923 attempted to provide for the government of the Tangier zone; but settlement lagged and Tangier languished.

See Chénier, *Recherches historiques sur les Maures* (1787); Godard, *Description et Histoire du Maroc* (1860); Renou, *Description géographique de l'Empire de Maroc* (1846); Tissot, *Rech. sur la Géog. comparée de la Mauritanie Tingitane* (1877); Castellanos, *Descr. hist. de Marruecos* (1878); Hooker and Ball, *Tour in Morocco* (1878); Thomson, *Travels in the Atlas and Southern Morocco* (1889); De Foucauld, *Reconnaissance au Maroc* (1888); Stutfield, *El Maghreb* (1886); Harris, *The Land of an African Sultan* (1889), *Tafilet* (1895), *Morocco That Was* (1921), and (with W. Cosens-Hardy) *Modern Morocco* (1919); Cunningham Graham, *Moghreb-el-Aksa* (1898; new ed. 1921); Bernard, *Le Maroc* (3d ed. 1915); works by Bensal (1893), Montbard (1894), Playfair and Brown (1893), Meakin (1899-1905), Aubin (1904), Bensusan (1904), Edith Wharton (1920), Conway (1923), O'Connor (1923), and Andrews (1923). See also MOORS, BERBERS, BARBARY.

Morocco, the city. See MARRAKESH.

Morón, a town of Spain, on the Guadaira, 32 miles by rail SE. of Seville; pop. 19,000.

Moroni, GIOVANNI BATTISTA (1525-78), portrait-painter, was born near Bergamo; best known by his 'Tailor' in the National Gallery.

Morpeth, a market-town of Northumberland, on the winding Wansbeck, 16 miles N. of Newcastle. The parish church dates from the 14th century; the free grammar-school, founded by Edward VI. in 1552, was rebuilt in 1859, after a chancery suit lasting 150 years. The town-hall (restored in 1870) was erected in 1714 by Sir John Vanbrugh; the county-hall in 1818. Morpeth

has flannel-factories, breweries, tanneries, iron-foundries, &c., with collieries and quarries in the neighbourhood. From 1553 till 1832 it returned two members to parliament, but now only one; the parliamentary borough now includes Ashington, Bedlington, Blyth. Pop. (1851) 10,011; (1921) 97,117, of whom only 7580 were in the municipal borough.

Morpheus (Gr., 'moulder'), in classic mythology, the son of sleep and the god of dreams. He is so named because he shapes or moulds the dreams that visit the sleeper. He is first mentioned by Ovid, and is represented as an old man with wings, pouring somniferous vapour out of a horn.

Morphine, or MORPHIA, $C_{17}H_{19}NO_3$, was the first alkaloid isolated in a pure state (by Sertürner, an apothecary, in Hanover in 1816). It is the most important of the alkaloids existing in opium, of which it usually constitutes from $\frac{1}{10}$ th to $\frac{1}{6}$ th by weight, and in which it is combined with meconic, sulphuric, and probably other acids. It is obtained as white, silky, translucent crystals, with a bitter taste and alkaline reaction. Morphine is soluble in about 1000 parts of cold and in 400 of boiling water; boiling alcohol dissolves it freely; but it is insoluble in pure ether and chloroform. Morphine is not so easily detected in cases of poisoning by opium as meconic acid (see MECONICUM). The following are some of the ordinary tests for it: concentrated nitric acid added to morphine or any of its salts gives an orange colour; when it is mixed with iodic acid iodine is liberated; in solution it gives a blue colour with persalts of iron.

Morphine is the only opium alkaloid which is soluble in lime-water, and this property affords one of the best means of extracting it. A watery infusion of opium is boiled with milk of lime, filtered, mixed with powdered sal-ammoniac, and again boiled. By this means the lime is converted into the chloride of calcium, the ammonia is volatilised by the heat, while the morphine is precipitated in an impure form, which admits of easy purification.

Morphine combines with acids to form crystallisable salts, which are readily soluble in water and in alcohol. Of these, the hydrochloride, the acetate, the bimeconate, and other salts are much used in medicine. Apomorphine, a white crystalline powder which rapidly causes vomiting, is obtained by heating morphine with an excess of hydrochloric acid.

The therapeutic uses of morphine and its salts are very similar to those of Opium (q.v.), but morphine is employed largely in cases where Hypodermic Injection (q.v.) is desired. The ordinary dose of morphine, or its salts, when given to an adult to allay pain or induce sleep, ranges from an eighth of a grain to half a grain. Many persons are addicted to the habitual use of morphine. The medicinal effects are very much the same as those of opium, and it is taken for the same reasons; but morphine is more rapid in action and more efficacious, and is not accompanied by some inconveniences which attend the use of opium. The habitual abuse has its origin usually in the legitimate use as a medicinal agent. But when the habit is established, the evil consequences soon set in, though some constitutions suffer much more than others. As a rule, *habitués* become pale, sallow, emaciated, appetite is diminished, digestion disordered, sleeplessness sets in, and defies extra doses of the drug. If, as is usual, the morphine is subcutaneously injected, all parts of the body within reach of the syringe may become one mass of sores, so that it is hard to find a place for a new injection. The will is enfeebled: the man or woman may become a mere morphinomaniac.

Morphology (Gr. *morphē*, 'form'), the study of organic form and structure, the counterpart of physiology, which is concerned with habit and function. The term was introduced by Goethe in 1817 in a famous essay. Morphology includes anatomy (descriptive and comparative) and histology (the study of minute structure), and a great part of palæontology and embryology. It discloses fundamental similarities of structure or 'homologies' (see HOMOLOGY), on which taxonomy or classification is based. It reveals the styles of organic architecture or lines of structural evolution. It seeks to show how one form may be derived from another, and its application to shape and proportions, symmetry and axes, and the like, was called by Haeckel 'promorphology.' Primarily it takes form and structure as given, and describes it, but it is bound to pass into embryology in its inquiry into morphogenesis or differentiation. Primarily it is not concerned with activity, but it cannot be withheld from inquiring into the adaptations of structure to use, or into the deep question of the relation between form and function.

See Haeckel, *Generelle Morphologie* (1866); Spencer, *Principles of Biology* (1864-66); histories of Botany by Sachs and others, of Zoology by Carus and others; His, 'On the Principles of Animal Morphology,' *Proc. Roy. Soc. Edin.* xv. (1888); D'Arcy W. Thompson, *On Growth and Form* (1917); J. Arthur Thomson, *The Science of Life* (1899).

Morphy, PAUL. See CHESSE.

Morris, GOUVERNEUR, born in Morrisania, New York, 31st January 1752, was admitted to the bar in 1771. In 1780 he lost a leg by an accident. Assistant in the finance department 1781-84, in 1787 he took his seat in the convention that framed the United States constitution, and in 1788 sailed for Paris. The greater part of 1791 he spent in England as Washington's agent, and then till 1794 was United States minister to France. Returning to America in 1798, he sat in the senate 1800-3, and died 6th November 1816. See *Memoirs* by Jared Sparks (1832), monograph by Roosevelt (1888), and Morris's *Diary and Letters* (1889).

Morris, SIR LEWIS (1833-1907), was born at Penbryn in Carmarthen, and educated at Sherborne and Jesus College, Oxford. He was called to the bar, practised as a conveyancer from 1861 to 1881, and subsequently devoted himself to local work in Wales in education and politics, but failed (as a Liberal) to gain a Welsh seat in parliament. *Songs of two Worlds* (3 vols. 1872-75) showed taste, grace, craftsmanship, and the influence of Tennyson; *The Epic of Hades* (1876) retold in a sufficiently modern spirit the myths and legends of ancient Greece. These pretty idylls were welcomed with joy by a great public. His critics were willing here, as in his later work, to recognise attractive narrative, metrical skill, clear and sometimes forcible thought, unmistakable talent, but refused to acknowledge evidence of true poetic genius. He afterwards published many other books of verse, besides *The New Rambler* (in prose), articles, and addresses.

Morris, RICHARD, LL.D. (1833-94), Early English and Pali philologist, was born at Bermondsey, in 1871 took Anglican orders, and was head-master of the Masonic School at Wood Green 1875-91.

Morris, THOMAS (1821-1908), 'the Nestor of golf,' was born in St Andrews, and served an apprenticeship as golf-club maker with the celebrated Allan Robertson. He went to Prestwick as green-keeper in 1850, where he several times won the championship belt, and returned to St Andrews as green-keeper in 1864. His son 'Tommy,' who died young in 1875, was the best player of his

time, and carried off the belt by winning it three times in succession.

Morris, WILLIAM, poet, artist, manufacturer, and Socialist, was born on 24th March 1834 at Walthamstow, where his father, a prosperous bill-broker in the City of London, then lived. His early years were spent there and at Woodford, both places on the outskirts of Epping Forest. He was at school at Marlborough from 1848 till 1852, and after a year of private tuition at home entered Exeter College, Oxford, at the beginning of 1853, his intention then being to become a clergyman of the Church of England. At Oxford he formed a close intimacy with a small group of undergraduates, and principally among these with Edward Burne-Jones, his closest friend throughout their joint life. This group, which has become historically famous under the title of the Oxford Brotherhood, was united by ardent enthusiasm and lofty ideals, Morris had gone to Oxford as a zealous Anglo-Catholic, but while there his outlook became rapidly enlarged and secularised. Visits to northern France in 1854 and 1855 deepened his inborn love of the Middle Ages; Carlyle and Ruskin became his masters in thought; and he resolved to pursue (in his own words at the time) 'things I have thought of for the bettering of the world in so far as lies in me' by devoting his life to the service and practice of art. As soon as he took his degree he articulated himself to the architect Street, the leading master of revived English Gothic, and went with him to London a few months later. He had already begun to write poetry, and to practise painting and designing. In London, under the powerful influence of D. G. Rossetti, he gave up the professional study of architecture and devoted himself for a time to poetry and painting. His first volume of poems, *The Defence of Guenevere*, was published in March 1858. A year later he married Miss Jane Burden, and began then to plan a house for himself at Upton, in Kent. The problems raised by this house were what turned him into a manufacturer and decorator. The decorative arts in England were then at their lowest level; and he devoted himself systematically to their reinstatement, which in many cases also meant their rediscovery. Together with several of his Oxford friends and some others, including Madox Brown and Rossetti, he founded in 1861 the firm of Morris, Marshall, Faulkner, and Co. (afterwards Morris and Co.), manufacturers and decorators; its object being to reinstate decoration in all its details as one of the fine arts. This business was at first carried on in Red Lion Square, Bloomsbury, then in larger premises in Queen Square, and afterwards in Oxford Street, with workshops at Merton Abbey in Surrey, where it is still continued under the same name. Its chief products were painted windows, furniture, metal and glass work, painted tiles, cloth and paper wall-hangings, jewellery, embroideries, woven and knotted carpets, printed cottons, silk damasks, and tapestries.

In 1865 Morris returned to London in order to be closer to his work, and soon after resumed his writing of poetry. *The Life and Death of Jason* (1867) and *The Earthly Paradise* (1868-70) placed him among English poets of the first rank. They were followed by the dramatic poem *Love is Enough* (1872) and the great epic of *Sigurd the Volsung and the Fall of the Niblungs* (1876). This was his last complete long poem. A number of his shorter poems, lyrics, ballads, &c. were collected in the volume of *Poems by the Way* (1891). He also made verse renderings of Virgil's *Æneid* (1875) and Homer's *Odyssey* (1887).

During his own lifetime Morris became recognised by common consent as one of the greatest among the great English poets of the Victorian age; and his

poetry still fully retains its freshness, power, and charm. In the volume of 1858, which had to wait long for recognition, he sounded a new note of romance, and though his touch was still uncertain, showed himself a master of haunting melody, of delicate psychological insight, and of power to handle and make beautiful tragic and piteous things. The stories of the *Earthly Paradise* reinstated the long narrative poem in literature, and gave it a fresh flexibility and range. One of these, *The Lovers of Gudrun*, stands apart from the rest in subject and treatment, and is the central, if not the culminating, point of his poetry. Finally, in *Sigurd* he re-embodied, with added beauty and unimpaired grandeur, the great ancient epic of the North. His achievement was thus threefold: to continue the movement imparted to English poetry by Keats; to resume the art of story-telling where it had been perfected and left by Chaucer; and to re-create the epic on a Homeric scale and with the nearest approach made in modern times to the Homeric spirit. Poetry, according to Morris, was not a matter of inspiration (whatever that may mean), but of sound workmanship. His own workmanship is uniformly beautiful, his melodiousness and his mastery of construction are equally marked; and while few great poets lend themselves less to detached quotation, fewer still, if any, excel him in continuous beauty of structure and pattern.

Morris was also in his later years a voluminous prose author. At Oxford he had written several remarkable prose romances which appeared in the *Oxford and Cambridge Magazine* (1856), conducted by him and his friends. This form of literature he resumed after a long interval in *The House of the Wolfings* (in mixed prose and verse, 1889), and continued from 1889 to 1896 in *The Roots of the Mountains*, *The Story of the Glittering Plain*, *The Wood Beyond the World*, *The Well at the World's End*, *The Water of the Wondrous Isles*, and *The Sundering Flood*. About 1879 he began to lecture publicly on the arts and their relation to civilisation and the social fabric; some of these addresses are collected in *Hopes and Fears for Art* (1892), *Signs of Change* (1888), and *Architecture, Industry, and Wealth* (1902), and many others have been published separately. Mention must be made also of his translation from the Icelandic Sagas (in collaboration with Eiríkr Magnússon) and from the Old French.

Morris in earlier life had been a Liberal; but his first active interest in politics was in connection with the Eastern Question Association of 1876. In the years that followed, his political outlook rapidly changed. The process through which his mind passed may be briefly summed up thus: Art being a function of life, real and living art was impossible except where life was organised under sound conditions; the tendency of civilisation, ever since the great industrial revolution, had been to dehumanise life; and the only hope for the future was to reconstitute society on a new basis, and thus open the way for art 'by the people and for the people, a joy to the maker and the user.' He applied his instinct for design to the social fabric, and from an artist and designer he became an active and convinced Socialist. The formal step was taken when he joined the Democratic Federation (afterwards renamed the Social Democratic Federation) in 1883; on the same day he had received the highest honour which his old Oxford college had to bestow by being elected an Honorary Fellow. In it, in the Socialist League which broke off from it in 1885, and afterwards on more or less independent lines, he spent the full energies of his later years. In *A Dream of John Ball* (1888) and *News from Nowhere* (1891), two works which have had an enormous influence, he gave fascinating

pictures of his interpretation of history and his visions of the future. Both originally appeared in the Socialist journal *The Commonwealth*, which he edited for several years; as did also portions of a long narrative poem of unequal but great beauty, *The Pilgrims of Hope*, which he never completed.

Throughout this period, as before, his activity as a craftsman was incessant. There were few among the decorative arts which he did not touch; there were none that he touched into which he did not put new life. He concentrated more particularly, in successive periods, on the arts of weaving, dyeing, and printing; in the last, the Kelmscott Press, started by him in 1890, revolutionised printing as a fine art. It was so called after the country home which he had possessed since 1871, a small and very beautiful 17th-century manor-house at Kelmscott on the upper Thames. He also practised the arts of writing and illumination, and produced manuscripts of a beauty such as had not been known since the Middle Ages. His sense of design and colour was faultless, his industry prodigious, and his swiftness of execution almost incredible. He was endowed by nature with great physical strength and amazing vitality; and he turned from one art to another rapidly and easily, because for him the arts were all threaded on one centre, and were all particular embodiments of Art as a single thing; and that thing was production with imagination and with pleasure, and was the beauty and the joy of life. In the prefatory verses to *The Earthly Paradise* he had called himself 'the idle singer of an empty day,' and the words were often quoted against him. But no singer was ever less idle, no day less empty. He held up before mankind not only the example of a simple and noble life, but the hope and vision of a world which might become an Earthly Paradise, a Kingdom of God realised on earth.

Since his death (3d October 1896) the fame of Morris has become fully established, and his influence is greater now than it ever was in his lifetime. The range of his activity and the versatility of his genius perplexed his contemporaries. The sneers at the 'poet-upholsterer,' and the obloquy which he had to face as a revolutionary Socialist, have given place to a juster estimate of his unique genius, and a recognition of his importance as one of the greatest creative and formative forces of his age, in letters, in art, and in the interpretation and organisation of life.

See *The Life of William Morris*, by J. W. Mackail (1899); *The Books of William Morris*, by H. Buxton Forman (1897); *William Morris, his Art, Writings, and Public Life*, by Aymer Vallance (1897); *William Morris, Socialist-Craftsman*, by Holbrook Jackson (1908); *William Morris, a Critical Study*, by J. Drinkwater (1912); *William Morris: a Study on Personality*, by A. Compton-Rickett (1913). There is a collected uniform edition of Morris's writings, including some previously unpublished, with biographical notes by his daughter.

Morris-dance, a rustic dance, formerly an accompaniment to the May-day games and Whitsun-ales, probably of Moorish origin. Douce conjectures it was introduced into England by John of Gaunt on his return from Spain; but Strutt maintained that the Morisco or Moor dance differed from the morris-dance in England, having been accompanied with castanets or rattles at the end of the fingers, and not with bells attached to various parts of the dress. The principal performers of the morris-dance were Robin Hood, Maid Marian, the hobby-horse, and the Bavarian fool. For its connection with pre-Christian rites, Roman or other, see Frazer, *The Golden Bough*; C. J. Sharp, *Sword Dances of Northern England* (1911); and Sharp, MacIlwaine, and Butterworth,

The Morris Book. See also their *Morris Dance Tunes*.

Morrison, CHARLES, a Renfrew surgeon, born at Greenock, and said to have died in Virginia, in 1753 suggested the electric telegraph.

Morrison, RICHARD JAMES. See ZADKIEL.

Morrison, ROBERT, founder of Protestant missions in China, was born, of Scottish parentage, at Morpeth, 5th January 1782, and in 1807 was sent to Canton by the London Missionary Society. In 1809-14 he translated and printed the New Testament. By 1819, with some help, he had done the same with the Old Testament; and in 1823 he completed his great *Chinese Dictionary*. In 1818 he established an Anglo-Chinese College at Malacca. After a visit to Europe (1824-26) he returned to China. In 1834 he was interpreter to Lord Napier, and he died at Canton, 1st August. He was also author of *Horæ Sinicæ* (1812), *Chinese Grammar* (1815), and *Chinese Miscellany* (1825). See Lives by his widow (1839) and Townsend (1888).

Morris Tubes, invented by Lieutenant Morris, are small-bore tubes constructed to be temporarily fixed inside a rifle barrel and fired with a small bullet and a light charge of powder, so as to be used for firing practice in inside ranges. They are sighted as for long ranges. They are also used with cannon, but are fixed outside the weapon and parallel to the bore.

Morritt, JOHN BACON SAWREY (1772-1843), of Rokeby Park, Yorkshire, traveller, writer on the topography of Troy, and Conservative M.P., is best remembered as Sir Walter Scott's friend. See his *Letters* (1914).

Morse. See WALRUS.

Morse, SAMUEL FINLEY BRESEE, inventor, the eldest son of Rev. Dr Jedidiah Morse, geographer, was born at Charlestown, Mass., 27th April 1791. He graduated at Yale in 1810, went to England to study painting, and in 1813 received a gold medal for his statue, the 'Dying Hercules.' In 1826-42 he was the first president of the National Academy of Design at New York. He studied chemistry and electricity, and on a voyage from Havre to New York in 1832 conceived the idea of a magnetic telegraph, which he exhibited to congress in 1837, and vainly attempted to patent in England. His claims to priority over Wheatstone (q.v.) were the subject of controversy. He struggled on heroically against scanty means until 1843, when congress appropriated 30,000 dollars for an experimental telegraph line between Washington and Baltimore. Morse lived to see his system widely adopted, and honours and rewards were heaped upon him. He died in New York, 1872. See Life by Prime (1875), and his *Letters and Journals*, edited by his son (1915).

Morshansk, a town of Russia, 58 miles N. of Tamboff and 150 W. by N. of Penza, with trade in wheat, hemp-seed, and tallow; pop. 30,000.

Mortality. The subject of general tables of mortality is discussed at INSURANCE. Weekly 'Bills of Mortality,' weekly reports as to christenings and burials, were first prepared by the parish clerks of London about 1592-93, in consequence of the frequent recurrence of the plague, and continued by the company of parish clerks till shortly after the Registration Acts of 1840, being superseded by the Registrar-general's returns. The material for the returns was obtained by persons called 'searchers,' and the system was one of disgraceful inaccuracy and systematic imposition. The area 'within the old bills of mortality' was gradually increased, till in 1726 it extended to 21,587 acres. In 1801 the 'New Tables of Mor-

tality' gave the registration district an area of 30,000 acres. See LONDON.

Mortar, a short and very thick piece of artillery of large calibre, firing a heavy shell at a fixed angle of 45° or thereabouts, so that, especially at sieges, the projectile might strike the object aimed at in a direction more or less vertical. They were superseded by breech-loading rifled mortars or howitzers. See CANNON.

Mortar. See CEMENTS.

Mortgage, in English law, is an actual or executory conveyance of real or personal property, as a security for a payment of a debt or the discharge of some other obligation for which it is given, the security being redeemable on the payment or discharge of such debt or obligation. No particular words or form of conveyance are necessary to constitute a mortgage. Property of every description, which is capable of absolute sale, may, generally speaking, be the subject of a mortgage, either legal or equitable. There are two elements in a mortgage. There is the implied obligation to pay; and there is the security for payment. Incident to every mortgage is the right of the debtor to redeem, a right which is called his 'equity of redemption,' and which continues notwithstanding that the mortgagor fails to pay the debt in accordance with the proviso for redemption. This right arises from the transaction being considered as a mere loan of money secured by a pledge of the estate. The right continues unless and until by judgment for foreclosure—i.e. by a decree which deprives the mortgagor of his right to redeem and transfers the property absolutely to the mortgagee, or by the operation of the limitation of actions (see LIMITATION), the character of creditor is changed for that of owner, or the interest of the mortgagor is destroyed by sale either under the process of the court or of a power in the mortgage incident to the security. But there is no right of foreclosure unless the contract contains a condition upon the breach of which a forfeiture is created. A mortgagee may, as a general rule, enter into possession of the land and draw the rents and profits; or he may sue the mortgagor for payment of the sum due. Further rights may be given him by agreement, and it was formerly usual to stipulate for large powers over the property. The Conveyancing Act of 1881 now regulates the powers exercised by mortgagor and mortgagee respectively, unless in so far as its provisions are excluded by express agreement. An equitable mortgage is effected when an owner of property binds himself by memorandum or otherwise to execute a formal mortgage. A person who deposits the title-deeds of his land with a banker, as security for money advanced, is an equitable mortgagor. Mortgage deeds do not, with certain exceptions, require Registration (q.v.). An owner who has mortgaged obtains not unfrequently further advances on security of a second or third mortgage of the same property; a third mortgagee who buys up the first and gets possession of the title-deeds is permitted to tack the first and third mortgages together; both will have to be paid off before the second. There are also cases in which a mortgagee is permitted to consolidate claims against different properties of the same debtor, requiring him to pay off all or none. Formerly the court did not sanction mortgage investments of trust moneys. But, in later times, this rule was to some extent relaxed, and mortgage investments of trust moneys are, under certain conditions, now authorised by statutory enactment. See on this point the Trustee Act, 1893.

A mortgage of goods is made by means of the deed known as a bill of sale (see BILL). Shares, policies of insurance, and even debts, may be mortgaged

by using the appropriate forms of transfer. In all cases, whatever the nature of the property, the Conveyancing Act enables the mortgagee to obtain a sale of the property if the mortgagor is unable to pay principal and interest. See Coote's *Law of Mortgage* (8th ed., 2 vols. 1912).

In Scotland mortgages are effected by means of a bond and disposition in security (see BOND). Mortgages are a higher and better form of security than in England because of the system of registration of deeds affecting land (see SASINE); and trustees have power to invest in mortgage securities, which are considered as safe as government stock, and less liable to fluctuations of interest. In Scotland it is not the practice to mortgage lands by mere deposit of title-deeds.

In the United States the forms and incidents of a mortgage are regulated by the laws of each state. Except in Louisiana, the English law seems to have been accepted on the basis of American legislation. The Homestead Laws enacted by several states have an important influence on the law of mortgage. See L. A. Jones's treatises on the Law of Mortgages (new ed. 1894-1900).

Mortier, ÉDOUARD ADOLPHE CASIMIR JOSEPH, Duke of Treviso (1768-1835), was born at Cateau-Cambrésis. Entering the army in 1791 he was in 1799 promoted general, and, after the first occupation of Hanover, he was in 1804 included by Napoleon in his first list of marshals of France. He distinguished himself at Ulm and Dürrenstein, and in 1807 he served in the Friedland campaign. He was created Duke of Treviso in 1808, and in 1812-13 commanded the Young Guard. He sided with Napoleon during the Hundred Days, and in consequence was for a time in disgrace, but in 1819 he was readmitted to the Chamber of Peers, and from 1830 to the time of his death at the hands of an anarchist was successively ambassador to St Petersburg and Minister of War.

Mortification, in Scots law, is a term used to denote lands given for charitable or public uses.

Mortification, in Medicine. See GANGRENE, INFLAMMATION.

Mortimer. See EDWARD II. and III.; and for Mortimer's Cross, see HEREFORDSHIRE.

Mortlake, part of Barnes urban district in Surrey, on the south bank of the Thames, 2 miles ENE. of Richmond. From 1619 to 1703 it was famous for its tapestry works; now malting and brewing are the leading industries. The Oxford and Cambridge boat race is rowed from Putney to Mortlake.

Mortmain (Fr. *morte main*) signifies in law the dead hand of a corporation. At an early period (1279) the English parliament took note of the mischief which resulted from the transfer of land to religious corporations; statutes were passed restricting the right of corporations generally to hold land. At the present day a corporation, whether it be a college or a railway company, cannot acquire and dispose of land, except in so far as its charter or act of parliament authorises it to do so. The statutes of mortmain were directed against corporations generally; the so-called Mortmain Act of 1736 was apparently intended to guard against improvident gifts of land by will for charitable purposes. The Mortmain and Charitable Uses Act, 1891, allows land to be left by will; but it must be sold within a year or other period fixed by the High Court or Charity Commissioners. Money given to purchase land, and moneys charged upon land, are within the provisions. Land situated in Scotland, in the colonies, or in foreign countries is not within the policy of the English statutes. In Scotland the common law put a somewhat similar check on deathbed aliena-

tions of land; but this check has been abolished by statute. In the United States the laws of several states limit the amount of real estate which may be held by religious bodies and charitable societies; and the laws of the United States impose a limit in the Territories.

Mortola, LA, a small village between Ventimiglia and Mentone, celebrated for the magnificent botanic garden established by Sir Thomas Hanbury. See *Hortus Mortolensis* (1912), and Voigt, *Naturführer* (1914).

Morton, JAMES DOUGLAS, EARL OF, regent of Scotland, was born in the first quarter of the 16th century, the younger son of Sir George Douglas of Pittendriech, near Edinburgh. In 1553, in right of his wife Elizabeth, daughter of the third Earl of Morton, he succeeded to the title and estates of that earldom. He joined the Reformers in 1557; in 1561 was sworn a privy-councillor; and in 1563 was made Lord High Chancellor. Having borne a foremost part in Rizzio's assassination (1566), he fled with his associates to England, but, through Bothwell's interest, in eight months obtained his pardon from the queen. He was privy to the design for Darnley's murder, but was purposely absent from Edinburgh on the night of the tragedy (1567); and, on Bothwell's abduction of Mary, he joined the confederacy of the nobles against them. He figured prominently at Carberry Hill; discovered the 'Casket Letters'; led the van at Langside (1568); and, after the brief regencies of Moray, Lennox, and Mar, in November 1572 was himself elected regent. His whole policy was directed in favour of Elizabeth, from whom in 1571 he was receiving bribes; and his high-handed treatment alike of the nobles and of the Presbyterian clergy, his attempts to restore episcopacy, and the avarice and rapacity imputed to him, daily swelled the number of his enemies, who already included all Mary's adherents. He seemed to have retrieved his temporary downfall by the seizure two months later of Stirling Castle (May 1578); but Esme Stuart in 1580 completely supplanted him in young King James's favour; and on 2d June 1581, as 'art and part' in Darnley's murder, he was beheaded with his own 'Maiden' in the Edinburgh Grassmarket. 'He died proudly, said his enemies, and Roman-like, as he had lived; constantly, humbly, and Christian-like, said the pastors who were beholders.'

See DOUGLAS, MARY QUEEN OF SCOTS, and JAMES VI., with works there cited; also T. F. Henderson's article in vol. xv. of the *Dict. of Nat. Biog.* (1888).

Morton, JOHN, Cardinal, and Archbishop of Canterbury, was born at Milborne St Andrew, in Dorsetshire, about 1420, studied at Cerne Abbey and Balliol College, and practised as advocate in the Court of Arches. Holder of various ecclesiastical preferments and a member of Privy-council, he adhered with great fidelity to Henry VI., yet by Edward IV. was made Master of the Rolls and Bishop of Ely. Richard III. imprisoned him, but he escaped, and joining Henry VII. was by him made Archbishop of Canterbury and chancellor (1486). In 1493 he became a cardinal; and he died 15th September 1500. Sir Thomas More was a page in his house. See Hook's *Lives of the Archbishops*, and *Life of Morton* by Woodhouse (1895).

Morton, LEVI PARSONS (1824-1920), was born at Shoreham, Vermont, was first a country store-keeper's assistant, then partner in a Boston firm of merchants, and in 1863 founded banking-houses in New York and London. In 1878 and 1880 he was returned to congress as a Republican; in 1881-85 he was minister to France; and in 1888-93 he was vice-president of the United States, in 1895-96 governor of New York State.

Morton, SAMUEL GEORGE, an American physician, born in Philadelphia, 26th January 1799, studied medicine there and at Edinburgh, and in 1839 was appointed professor of Anatomy in the Pennsylvania Medical College. He died 15th May 1851. His great works are *Crania Americana* (1839) and *Crania Egyptica* (4 vols. 1844); and his collection, preserved at Philadelphia, contains some 1500 skulls—900 of them human.

Morton, THOMAS, dramatist, was born in 1764 in the county of Durham, but, left an orphan, was brought up by an uncle in London. He entered Lincoln's Inn, but soon quitted law for play-writing, and produced *Speed the Plough* (1798, with its invisible 'Mrs Grundy'), *The Blind Girl* (1801). *Town and Country* (1807), *School for Grown Children* (1826), &c. For thirty-five years he lived at Pangbourne, near Reading, till in 1828 he removed to London, where he died, 28th March 1838.—His son, JOHN MADISON MORTON, was born in Pangbourne, 3d January 1811. From 1832 to 1840 he held a clerkship in Chelsea Hospital, and between 1835 and 1885 wrote a hundred farces, of which *Box and Cox* (1847) alone is said to have brought him £7000. But the rise of burlesque was his ruin, and in 1881 he became a 'poor brother' of the Charterhouse. He died 19th December 1891.

Morvan, LE, a barren district of France (q.v.), a north-easterly extension of the central plateau, is mainly in the department of Nièvre (q.v.).

Morven, or MORVERN, a thinly-peopled mountainous peninsula of north-west Argyllshire, between Lochs Sunart and Linnhe and the Sound of Mull.

Morwenstow, or MOORWINSTOW, a parish in the extreme north of the Cornish coast, 7 miles N. of Bude. Its church, dedicated to St Morwenna, is mainly of Norman date; R. S. Hawker (q.v.) was its vicar.

Mosaics. Mosaic work (Lat. *opus musivum*) consists of small cubes of diversely coloured marble, glass, or other substances set together so as to produce a geometrical or artistic design. It is principally used for ornamental floors and pavements, and for the permanent artistic decoration of the walls of churches and other public buildings. Among the Romans it was very common, for scarcely have the remains of any ancient Roman villa been discovered without finding in it a mosaic pavement. The pieces vary from a quarter to half an inch in size, and they are carefully bedded in a cement surface set over a prepared concrete foundation. Under the Byzantine empire mosaic became a distinctively Christian art, employed for decorating the walls of churches with figures of the Saviour, apostles, saints; and the remains of such Byzantine art form a link of great importance between the classical and mediæval periods. The Cathedral of St Mark, Venice, is a brilliant example of this form of art. St Sofia in Constantinople has a dome which is a mass of jewel-like mosaic. The art was revived in Italy about the beginning of the 13th century, when it was employed with great effect for the decoration of churches; and since that time it has remained, with many fluctuations, a distinctively Italian pursuit. The cubes of opaque glass for mosaic pictures, technically called *smalts* (Ital. *smalto*), are of all possible varieties of colour, as many as 25,000 shades being prepared. At Mixteco in Mexico a mask and shield (12½ inches, containing 14,000 tesserae) of turquoise mosaic were discovered in 1923. Russia contains many very fine examples of mosaic work. A variety of mosaic is extensively produced in India, having been there introduced by the Frenchman Austin de Bordeaux in the decoration of the famous Taj Mahal at Agra, whence it is distin-

guished as Agra work. The Diwan-i-khas at Delhi is an example of this type of work, and is reckoned the most beautiful room on earth. Mosaic pavements are extensively made of small cubes or tesserae of coloured marbles, and baked clay or terra-cotta similar to the ancient Roman tessellated pavements. A modern example of mosaic work of high excellence may be seen in Westminster Cathedral, London.

See Thomas Morgan, *Romano-British Mosaic Pavements* (1886); Gerspach, *La Mosaïque* (1883); W. J. Furnival, *Leadless Decorations, Tiles, Faience, and Mosaic* (1904); J. P. Vogel, *Tile Mosaics of Lahore* (1923).

Mosailima, **MUSEILIMA**, or **MOSAYLIMA** ('Little Muslim'), one of the most important rivals of Mohammed, belonged to the clan Dûl, a division of the tribe of the Beni Hanifah, of Yemāma, in Nejd. The traditions about his life and age are extremely contradictory and legendary. He claimed a prophetic power equal with Mohammed's, and deceived the people of Yemāma by the supposed miracles he performed. Mohammed hearing of this demanded his submission to Islam. Mosailima's answer was a request that Mohammed should share his power with him. 'From Mosailima, the Apostle of God,' he is said to have written, 'to Mohammed, the Apostle of God. Now let the earth be half mine, and half thine: as for Koreish, they are a people without respect for justice.' Mohammed replied: 'From Mohammed, the Apostle of God, to Mosailima, the liar. The earth is God's: He giveth the same for inheritance unto such of his servants as he pleases: Peace be to him that followeth the true Direction.'

After Mohammed's death, in the 11th year of the Hegira (633 A.D.), it at last came to an open breach between the two rival powers. The Beni Hanifah were in rebellion under their prophet to the number of about 40,000. Abū-Bakr, the khalif, sent Khālid, 'the Sword of God,' with a number of choice troops, to compel Mosailima to submission. Mosailima awaited the enemy upon the sandy plains of 'Akrahā. In the battle, which lasted from morning until the evening, Khālid contrived, with fearful losses of his own forces (1200 killed, beside the wounded, including thirty-nine chief companions of the prophet), to gain the victory. Mosailima fell in the 'Garden of Death,' and his heresy was stamped out. It is extremely difficult to come to any clear notion of Mosailima's real doctrines, as all the accounts that have survived of them come from victorious adversaries. See Sir W. Muir, *Annals of the Early Caliphate* (1883) and *The Caliphate, its Rise, Decline and Fall* (ed. Weir, 1924); Prince Caetani, *Annali dell' Islam* (1905-12).

Mosasaurus, a huge fossil reptile, belonging to the remarkable group of Pythonomorphs or 'sea-serpents,' which suggest both lizards and snakes. The remains of three species have been disinterred from Cretaceous strata. They were aquatic animals, furnished with paddles, and are estimated to have attained a length of as much as 75 feet (see **REPTILES**).

Mosch'eles, **IGNAZ**, pianist and musical composer, born at Prague, 30th May 1794, of Jewish parents, was between 1808 and 1816 the favourite musician and music-master of Vienna. Settling in London in 1825, he taught at the Academy of Music and directed at the Philharmonic Concerts. From 1844 he laboured at the conservatory in Leipzig until his death, 10th March 1870. A brilliant performer on the piano and an able composer, Moscheles ranks high amongst modern writers for the pianoforte. He also edited, in English, Schindler's *Life of Beethoven* (1841). See the *Life* by his wife (Eng. trans. 1873), and his Correspondence with Mendelssohn (Eng. trans. 1888).

Moschus, Greek bucolic poet, usually designated of Syracuse in Sicily; he flourished *circa* 150 B.C., and wrote in a style of almost painfully finished elegance a couple of short epics and minor poems. The lament for Bion is believed not to be his. Moschus's works are generally printed along with those of Theocritus and Bion; and there is a fine prose translation of the three, with an introduction, by Andrew Lang (1889); also an edition with verse translation by A. S. Way (1913).

Moscow, formerly, and again since 1918, the capital of Russia, and always venerated as such by the Russian peasantry, stands on the little river Moskva, a sub-tributary of the Volga, 403 miles by rail S.E. of St Petersburg, 768 E.N.E. of Warsaw, and 967 N.N.E. of Odessa. Its centre is the enclosure called the Kreml or Kremlin ('Citadel'), which is surrounded by walls, crowned by eighteen towers and pierced by five gates. This enclosure is the most sacred spot in all Russia. The stranger equally with the native pilgrim, on entering its Saviour gate (1491), doffs his cap to the holy icon of the Saviour that surmounts it. The most notable of the religious buildings inside the Kremlin are the cathedral of the Assumption, built originally in 1326 and rebuilt in 1475-79; its interior is encrusted with mosaics and jewelled ornaments, adorned with venerated pictures, and sanctified by numerous relics of saints; within its walls the early tsars and all the Russian metropolitans and patriarchs have been consecrated, and the metropolitans buried. The cathedral of the Archangel was originally built in 1333, but restored in 1505; here were buried the Russian tsars down to Ivan Alexievich, brother of Peter the Great. The cathedral of the Annunciation, where the tsars were christened and married, shelters some remarkable paintings by Rublev (1405). There are numerous churches of minor rank, and several monasteries; in the Voznesenski monastery (1393) the tsaritsas and female relatives of the tsars were buried. In 1600 Boris Godunov built in the Kremlin the Ivan Veliki tower, 270 feet high, the summit of which commands a magnificent view of Moscow, with her gilded cupolas and fantastic towers, her half Asiatic, half European architecture. Close by, at its foot, stands the gigantic bell, Tsar Kolokol ('king of bells'; see **BELL**). The more important secular buildings within this sanctuary of Moscow are the former imperial palace (1849); containing a museum of great importance; the palace built in the reign of Ivan III.; the Orushenaya palace, which serves as a museum of the most valuable Russian antiquities; the palace of the patriarchs, with archæological treasures and modern Russian and Greek MSS.; the arsenal (1701-36), before which is the trophy of 1812, a pile of 800 or 900 French cannon; and the Hall of the Synod, with a valuable library and ecclesiastical collections. Outside the Kreml the chief objects of interest are the colossal 'Temple of the Saviour' (1838-81), a building commemorative of 1812; the cathedral of St Basil (1554), a 'nightmare in stone,' with fantastic and highly coloured domes and towers, stands at one end of the great Red Square; at the opposite side is the historical museum; while the wall of the Kremlin, under which are the tombs of Lenin and other leaders of the revolution, occupies the third; the library of the synod and its typographical museum; the university (1755), with scientific collections and a library; the public museum (1861) containing a great library; a first-rate ethnological museum, a gallery of pictures, and scientific collections; the Goltzyn Museum (1865), with a library and a collection of paintings; an observatory; a large foundling hospital (1764); and numerous monasteries and special educational institutions. Many of the former palaces became

museums under Soviet rule. A 'popular university' was founded in 1908. Moscow is celebrated for its excellent scientific societies. The suburbs of the city are thickly sprinkled with palaces, parks, and monasteries, some of the first and last being of great historic significance.

Moscow is normally a busy industrial city, manufacturing cotton and woollen goods, silks, iron, leather, tobacco, candles, metallic articles, machinery, paper, chemicals, bricks, carriages, pottery, and watches, all on an extensive scale. There are also a number of large aniline dye-works and platinum-refining factories. But the city occupies an even higher position as a commercial mart. Situated nearly in the centre of European Russia, midway between the Baltic, the Black Sea, and the Caspian, it is one of the



Cathedral of St Basil, Moscow.

principal meeting-places of the streams of Asiatic and European commerce. In the 14th, and more especially the 15th century, it was of even greater importance than it is to-day as a commercial mart. An enormous trade is done in grain, collected from the provinces and exported through the Baltic ports; in timber, from the northern governments; in furs, hides, tallow, and cattle; in the mineral products of the Ural region; in tea, sugar, and other groceries; in cotton, silk, and woollen goods, and in all the various manufactured wares of Russia. Pop. (1864) 365,000; (1897) 988,614; (1915) 1,817,100; (1919) about 1,121,000; (1925) about 1,772,000. The temperature ranges from a winter mean of 14° F. to a summer mean of 66°, the annual mean being 40°.

Previous to its settlement by Great Russians in the 12th century the site had been occupied by Finnish races. The young state was greatly imperilled in its first years by the Mongols, who sacked the town in 1237 and 1293. But by the beginning of the 14th century its princes had secured their position, and began to make conquests and annexations on all sides. In 1325 the metropolitan of central Russia moved his seat to Moscow; a few years later the principality of Vladimir was united to that of Moscow; the Kremlin, built in 1300, was in 1367 encircled with stone walls. Moscow continued to grow in area

and in political influence, and Ivan III. (1462-1505) assumed the title Tsar of all Russia. Its prosperity received serious checks in the next century: it was nearly wholly burned to the ground in 1547, was taken and burned by the Khan of the Crimea in 1571, was hard pressed by the Mongols in 1591, and was the scene of riots arising out of the behaviour of the large Polish retinue who accompanied the bride of the Tsar Demetrius early in the 17th century. During the whole of that century the people frequently rose against the tsars and their unworthy favourites. In 1713 Peter the Great founded St Petersburg (Petrograd, Leningrad) and made it his capital; but the old merchant families, the old conservative nobles, and the common peasantry still continued to look upon 'Moscow the Holy' as the real capital of the empire. The city again suffered greatly from fires in 1739, 1748, and 1753, and the cup of misfortune was filled to the brim when it was set on fire and burned in 1812, according to the traditional belief the patriotic act of its own inhabitants to save it from Napoleon and the French (see NAPOLEON). In the revolutions, though the Kremlin was bombarded, Moscow's art treasures were apparently unhurt, the Treasury of the Patriarchs being almost the only building pillaged. The Soviet Government left St Petersburg for Moscow in March 1918. St Petersburg, depending upon adventitious circumstances, thereafter decayed, while Moscow grew rapidly in population. Great building schemes were taken in hand. Ancient monuments were cleared of later accretions and impertinences, and works of art were put in careful and competent hands. See books by Wirt Gerrare (1900), De Haenen and Grove (1912), Sir Martin Conway, *Art Treasures in Soviet Russia* (1925). The government of Moscow has an area of 12,555 sq. m., and a pop. of 4,000,000.

Moseley, HENRY GWYN JEFFREYS, born in 1887, son of an Oxford professor, was educated at Eton and Trinity College, Oxford. After lecturing for a time at Manchester, he devoted himself to research, showing by the use of X-ray spectra the number and order of the elements ('atomic numbers'). He was killed in 1915 on military service in Gallipoli. See MATTER, PHYSICAL CHEMISTRY.

Moselle (Ger. *Mosel*), a left-hand affluent of the Rhine, rises at the south-west extremity of the Vosges Mountains in France, at an elevation of about 2412 feet. Its course is north-westerly as far as Toul, passing Épinal on the way; thence it proceeds in a north-easterly direction (latterly, with many zigzag picturesque windings) bordering Luxembourg and crossing Rheinland, and joins the Rhine at Coblenz, flowing on its way through Metz, Thionville, and Trier. Its entire length is 315 miles, and it is navigable up to Frouard, 214 miles from Coblenz. Its principal tributaries are the Meurthe, Seille, and Saar on the right, and the Orne, Sure, and Kyll on the left. The wines grown in the basin of the Moselle are noted for their lightness and their delicate aromatic flavour.

Moselle was formerly a frontier department in the north-east of France, but the greater part of it was taken by Germany after the war of 1870-1871, and became as of old part of Lorraine. The small portion left to France was joined to the department of Meurthe. See MEURTHE-ET-MOSELLE. Lorraine, annexed to France in 1919, was made the department of Moselle (2036 sq. m.; pop. 503,810).

Moses (Heb. *Môsheh*; LXX. and Vulgate, *Môyses*), the great lawgiver and judge, under whose leadership Israel first began to be a nation. The whole subsequent course of Hebrew history and literature bears witness to the greatness of his fame

and influence; but the details of his life preserved in that literature, though sometimes very minute, are not, as a whole, very full or satisfying. This was felt to be the case even when it was believed that the so-called 'Books of Moses' were written by him, and, therefore, so far autobiographical; and now that the Pentateuch (q.v.), or rather Hexateuch, is held not to have taken its present form till at least 800 years after his death, and the historical traditions which it embodies are seen to be of various dates and to represent various phases of growth, the outline of his life and character has become dimmer than ever. He still remains, nevertheless, a great historical figure. If we adopt the now very generally accepted belief that Menepthah or Merenptah was the Pharaoh of the Exodus (see EGYPT), Moses was born in the first half of the 14th century B.C. At the time of his birth the 'children of Israel' (*B'ne Israel*) were a pastoral people who had long dwelt on the eastern fringe of the Nile delta, where it begins to merge into the Arabian desert. His name—for which a Hebrew interpretation ('drawn'; the verb is the same as in Psalms, lviii. 16 [17]) is offered in Exodus, ii. 10—is now generally agreed to be really of Egyptian origin (*mosi*, 'born [of]'; cf. *Thutmosi*, Thotmes, &c.). His life divides itself into three periods of forty years each (a definite for an indefinite number), during two of which he had long and intimate experience, first of the civilised life of Egypt, and afterwards of the simple nomadic life of the desert. Ultimately he became the acknowledged leader of Israel in the movement for civil and religious freedom which led to the Exodus. Thenceforward the scenes of his activity were principally Sinai, 'the Olympus of the Hebrew peoples,' En-Mishpat or Kadesh (Gen. xiv. 7), a locality of which the site is not certainly known, and the plains of Moab to the east of Jordan. The greater part of the time was apparently passed at Kadesh, which seems to have long been the national headquarters. Here his energy and force of character, combined with a conciliatory meekness (Numb. xii. 3) which has become proverbial, enabled him to establish the beginnings of the national organisation on an enduring basis. At the foundation of the commonwealth as outlined by him lay the theocratic idea, and the faith which had for its formula 'Jehovah is the God of Israel, and Israel is the people of Jehovah.' Although there is evidence that the name Jehovah was not unknown in pre-Mosaic times, it was not until now that it became a national watchword. Among the religious institutions possessed by Israel may have been some brought by their ancestors in their early migrations from Chaldea, and others that had been more recently acquired in Egypt. To the former class would belong the fundamental institutions of sacrifice, and also, possibly, that of the Sabbath; on the other hand it seems probable that the ideas connected with an ark and a separate priesthood had the later origin. The practices resting on these Moses as a 'prophet' presumably regulated and reformed. It was as a member of the priestly caste (he belonged to the tribe of Levi) that at the sanctuary and oracle of Jehovah at the 'Well of Judgment' (En-Mishpat) he exercised the functions of law-maker and judge, and so laid the foundations of that 'Torah'—i.e. 'instruction' or 'law'—which, after obscure vicissitudes, enriched by ever-broadening precedents, ultimately passed into writing in more than one form as the 'Mosaic legislation.' Irrespective of the question whether writing was much used in these days, practically all critics are agreed that the historical portions, as well as almost all the legislative documents, of the Pentateuch belong to a much later time. The poetical compositions

which are attributed to Moses—the so-called 'Song of Moses' (Deut. xxxii.) and Psalm xc.—also give internal evidence of more recent authorship. See PENTATEUCH.

After the close of the Old Testament canon Jewish tradition still busied itself about the story of Moses; some of its later additions have been preserved in the writings of Philo and Josephus (cf. Acts, vii. 22), and many more in the Palestinian Targum on Exodus. Compare also the references in the Index of Charles's *Apocrypha and Pseudepigrapha*, vol. ii. p. 859 seq. See further the histories of Israel by Ewald, Stanley, Wellhausen, H. P. Smith, &c., and the works dealing with the Pentateuch and with Israelite religion and Jewish theology. For much miscellaneous illustrative material see Gressmann, *Mose und seine Zeit* (1913), and Sir J. G. Frazer, *Folk-lore in the Old Testament* (1918).

Mosheim, JOHANN LORENZ VON (1694–1755), a distinguished church historian of Germany, was born at Lübeck, studied at Kiel, became in 1723 professor of Theology at Helmstedt, in 1747 at Göttingen, as well as Chancellor of the University. His theological works are numerous, but his most important work belonged to the department of church history, his *Institutiones Historiæ Ecclesiasticæ* (1726; improved ed. 1755) being familiar to every student as a work of great learning and accuracy in very elegant Latin. Its author is, in Gibbon's phrase, 'full, rational, correct, and moderate.' Murdock's translation (3 vols. N. Y., 1832) was brought down to his own time by Stubbs (1863).

Moskwa, rises in a marsh in the east of Smolensk, flows east to the city of Moscow, and thence 112 miles south-east to the Oka. Its total course is 305 miles. It is navigable from its mouth to Moscow, except between November and April, when it is generally frozen, and is connected directly with the Volga by the Moskwa Canal. See BORODINO.

Mosque, a Mohammedan house of prayer. The word is derived, through the Italian *moschea*, from the Arabic *mesjid*, 'a place of prayer.' The form of the oldest mosques is evidently from that of the Christian basilica (see ARABIAN ARCHITECTURE). The original forms became, however, entirely obliterated, and the mosques, with their arcaded courts, gateways, domes, and minarets, became the most characteristic edifices of Saracenic art. Wherever the Mohammedan faith prevailed, from Spain to India, beautiful examples of these buildings exist. They vary considerably in style in different countries, the Saracens generally borrowing much from the architecture of the various nations who adopted their faith. In India the mosques have many features in common with the temples of the Jains, while in Turkey they resemble the Byzantine architecture of Constantinople. Everywhere the dome is one of the leading and most beautiful features of the mosques, which commonly consist of porticoes surrounding an open square, in the centre of which is a tank or fountain for ablution. Arabesques and sentences of the Koran inscribed upon the walls, which are generally whitewashed, and never bear any device representing a living thing, are the only ornaments of the interior. The floor is generally covered with mats or carpets; there are no seats. In the south-east is a kind of pulpit (*mimbar*) for the imám; and in the direction in which Mecca lies (the Kibleh) there is a niche (*mihrab*) towards which the faithful are required to look when they pray. Opposite the pulpit there is generally a platform (*dikka*), surrounded by a parapet, with a desk bearing the Koran, from which portions are read to the congregation. The five daily prayers, which are generally said at home on week-days, are said in the mosque by the whole congregation on Fridays and certain other days, together with some additional prayers, and at times a sermon is super-

added to the service. It is not customary for women to visit the mosques, and if they do, they are separated from the male worshippers. On entering the mosque, the Moslem takes off his shoes, performs the necessary ablutions, and finishes by putting his shoes and any arms he may have with him upon the matting before him. The chief officer of a mosque is the nazir, under whom are two imâms, a kind of religious official, who is in no way to be compared with what we understand by a clergyman, but performs a certain number of religious rites, and, being very badly remunerated, generally has to find some other occupation besides. There are further many persons attached to a mosque in a lower capacity, as Muezzins (q.v.), door-keepers, &c., all of whom are paid from the funds of the mosque itself—generally derived from lands. With many of the larger mosques there are schools, academies (medressehs), and hospitals connected, and public kitchens, in which food is prepared for the poor.

Mosquitia. See MOSQUITO COAST. There is also a department of Honduras so named.

Mosquito. See GNAT, MALARIA, YELLOW FEVER.

Mosquito Coast, or MOSQUITIA, now the department of Bluefields, formerly an independent state under the protectorate of Britain, lies on the east side of Nicaragua (q.v.), to which it has belonged since 1860, in absolute sovereignty since 1906. The coast-lands are low and swampy, but the interior rises into mountains, and is healthy. The characteristic products of the West Indies are grown. The inhabitants are a mixed race, of Indian and African blood. The chief town is Bluefields, a banana port. The Mosquito Coast was discovered in 1502 by Columbus, and, though never conquered, was claimed by Spain. During the 17th century it was the rendezvous of the Buccaneers (q.v.), and was subjected to Britain in 1655, who only abandoned it in 1850.

Mossamedes, a seaport on Little Fish Bay, in Angola, with fishing and fish industries; pop. 3500.

Mossel Bay. See ALIWAL.

Mosses (Musci). The mosses are a class of small flowerless plants, important in the economy of nature, and of great interest in their life-history. They are found in all climates, but are most abundant in temperate regions and in damp places. They are included with the Liverworts in the division Bryophyta, which is sharply separated from the higher division of Vascular Cryptogams (Ferns, &c.) by the absence of wood vessels; while the lower members of the group, e.g. certain Liverworts, consist of a mere flat thallus, and show affinity to the Thallophytes. This, with other characters, indicates that the Bryophyta form a branch of the tree of evolution of an intermediate type, the mosses being a terminal class.

The uses of mosses in medicine and the arts are few and unimportant, but in mountain-regions the thick felts of moss and deep beds of peat soak up the rain, and so prevent floods from sudden storms, and in dry weather supply the streams through weeks of drought. With favourable surroundings the life of a moss-plant seems to be endless; the mosses (Sphagnum) we see growing to-day in a bog are the tips of plants which began life perhaps thousands of years ago, and which have formed a great bed of peat, which may be 20 feet thick. This social habit of mosses is a peculiarity. In some species cushions of great regularity are formed; this enables individual plants to stand erect, and is important in fertilisation, besides affording mutual protection. The capsules of

many mosses must be familiar to every one as small sacs at the end of their hair-like stalks, which rise in great numbers from a moss-cushion. These contain the spores, from each of which when sown there grows in a few days a tiny thread-like plant, the protonema. Buds of young moss-plants soon appear on this, and then, as a rule, the thread-plant dies. A moss-plant consists of a stem with leaves and roots. The roots will grow out from any part of the plant that is kept dark and damp; they are very like the protonema, indeed buds of



Diagram of the Life-history of a Moss :

a, spore; b, spore producing the thread-like or alga-like protonema; c, bud from protonema which will rise into moss-plant; d, a leaf-bearing portion of moss-plant; e, apex of moss-plant with club-shaped male organs (antheridia) producing male cells, one of which lies between e and f; f, apex of moss-plant with bottle-shaped female organs (archegonia) within which is the female cell; g, g', spore-producing generation which grows from division of fertilised egg-cell and upon female plant.

new plants may arise on them. Even from a detached leaf roots and new plants will grow; this is a sign of the simple nature of the tissues. By their branching habit, and by the death of the older parts, which leave the branches as separate plants, and in many species by special buds or gemmæ which are easily separated from the parent, mosses are rapidly propagated, indeed in many species the production of spores is rare. The sexual mode of reproduction is as follows. At the apex of a plant in the autumn may often be seen what are popularly known as moss flowers. These consist of a rosette of numerous leaves, smaller than ordinary, a sort of bud in fact. In the centre are male and female organs (antheridia and archegonia), but in some species the sex organs are on different plants; within the 'flowers' are also jointed, often club-shaped, hyaline hairs known as paraphyses. The antheridia are club-shaped bodies; when ripe, if wetted, they burst and the contained cells are squeezed out as a gelatinous mass. Within each cell is a small motile spermatozoid, which is able to swim away if the moss is thoroughly wet. The archegonia are flask-shaped; within each lies, in the bottom of the flask, the large egg-cell. The neck is lined with the canal cells, which, when the egg-cell is ready, swell up and form mucilage. If an antherozoid is near, it enters the mucilage, and working down to the egg-cell fertilises it. The ovum now grows within the archegonium, and the developing embryo forces an absorbing organ into the parent plant for nourishment. The archegonium at first swells with the growing embryo, but ultimately splits transversely, its upper part becoming the calyptra of the capsule, and its lower part the vagina of the stalk. The ripe capsule has usually a complex structure; below its calyptra is the operculum, which falling off by movement of the annulus leaves the peristome exposed. The latter is often a complicated organ consisting either of a membrane with a central aperture, or, more frequently, a single or double circle of teeth of

very varied form and size. The peristome teeth being hygroscopic, open or close upon the enlarged top of the central columnella, liberating or retaining the ripe spores according to the atmospheric humidity. Of these spores we have already spoken, and thus the life-cycle of the moss is completed. This cycle consists of two generations, the moss-plant which produces an egg; from the egg grows a plant which produces spores, but itself remains attached to the parent plant. This is called an alternation of generations. The fern has a similar story, but in this case the two generations have a separate existence and the spore-bearing generation is the conspicuous plant. Fossil remains have been found in rocks of Palæozoic age.

Classification.—There are over 3000 species divided into four orders. (1) Bryaceæ, which include the vast majority of genera. The sporangium always has a calyptra, which falls off when ripe; beneath is the operculum which splits off from the capsule exposing the peristome teeth. The capsule has a long stalk or seta. Common forms are Hypnum, Funaria, Polytrichum, &c. (2) Phascaceæ, a small order now usually united with the Bryaceæ; the spores are set free by the rotting of the sporangium; the protonema persists until the maturity of the sporangium. (3) Andreaeaceæ, a single genus; no operculum; the sporangium opens by 4-8 longitudinal slits. (4) Sphagnaceæ, bog mosses; some of the cells of the leaves grow larger than the rest, lose their contents while their walls become spirally thickened; these cells open one into the other; the smaller cells are filled with chlorophyll, and form a network round the large water-cells. The tissue of the stem has in the centre a sort of pith; outside this a layer of long cells with thick walls; outside this an epidermal layer of large water-cells. The male and female organs are either on separate branches or separate plants.

See articles LIVERWORTS, FERNS, GENERATIONS (ALTERNATION OF); also Campbell, *Mosses and Ferns*; Hofmeister, *On the Higher Cryptogamia*; Müller, *Musci* (over 1100 pp., very important) in Engler and Prantl, *Pflanzenfamilien*; Limpricht, *Die Laubmoose Deutschlands* (2400 pp.); Goebel, *Outlines of Classification and special Morphology*; Bennet and Murray, *Handbook of Cryptogamic Botany*; and works on British mosses by Wilson, Hooker and Taylor, Berkeley, Dixon, Braithwaite, Stark, Holmes and Gray, Bagnall, and Hobkirk.—The so-called Irish moss (see CARRAGEEN) is a seaweed. Corsican moss and Ceylon moss are names of algæ (of the genus *Plocaria*) used for producing an edible mucilage. Iceland Moss (q.v.) is a lichen.

Most. See BRÜX.

Mostaganem, a town of Algeria, on the coast, 45 miles N.E. of Oran, manufactures pottery, and has corn-mills and tanneries. Pop. 27,000, more than one-third being Europeans. It was a place of 40,000 inhabitants in the 16th century; and has again grown up from its decayed state since the French took possession in 1833.

Mostar, the chief town of Herzegovina, on the Narenta, about 35 miles from the Adriatic, connected by railway with the port of Metković, and *via* Sarajevo with Belgrade, Budapest, and the rest of Europe. It takes its name ('old bridge') from a 16th-century bridge of one arch, 95 feet in span, has numerous mosques, and is the seat of a Roman Catholic and a Greek bishop. Wine is produced, and swords and tobacco manufactured. Pop. 18,000.

Mosul, a decayed town of Mesopotamia, is situated on the right bank of the Tigris, opposite the ruins of ancient Nineveh (q.v.), 200 miles up the river from Bagdad, and on the Bagdad railway. It is partly surrounded by crumbling walls. During the middle ages it was a very prosperous city, with much industry—*muslin* takes name from this

town; now its bazaars are filled with the manufactures of the West, and almost the only export is gall-nuts, from the Kurdish mountains. Mosul was formerly the metropolis of the Mesopotamian Christians (the Nestorians, the Uniat Chaldeans, the Jacobites, &c.), and still contains many Catholic Christians. Pop. about 60,000. The town, which existed in 636, enjoyed its greatest prosperity in the 9th century, and onwards, until the desolating inroads of the Mongols in the 12th. Then came the Seljuks; and they were followed by the Osmanli, and from then Mosul steadily declined, till Mesopotamia was detached from their empire. Whether the town and vilayet of Mosul should remain so detached proved a difficult question, which the League of Nations attempted to solve in 1925. See H. C. Luke, *Mosul and its Minorities* (1925).

Moszkowski, MORITZ, pianist and composer, born 1854 at Breslau, was educated at Dresden, and the Stern and Kullak Conservatories at Berlin. After teaching at Berlin he went to Paris in 1897. He was made a member of Berlin Academy in 1899. His chief works are *Boabdil, der Maurenkönig* (1892), the ballet *Laurin* (1896), *Jeanne d'Arc*, and *Aus aller Herren Landen*.

Motacillidæ. See WAGTAIL.

Motazilites, a 'heretical' Mohammedan sect, founded by Wasil ibn 'Ata in the 2d century after Mohammed. They denied predestination, and recognised in man a power over his own actions.

Mote-hill. See CASTLE. For the very different Moothill (often confused with Mote-hill), see FOLKMOOT.

Motett, a name applied to two different forms of musical composition—(1) a religious cantata, consisting of several unconnected movements, as a solo, trio, chorus, fugue, &c.; (2) a choral composition, generally also of a religious character, beginning with an introduction in the form of a song, perhaps with figurative accompaniment; after which follow several fugue subjects, with their expositions, the whole ending either with the exposition of the last subject, a repetition of the introduction, or a special final subject. A motett differs from a double or triple fugue in that the subjects never appear simultaneously, but are introduced one after the other. In one form of the motett the successive phrases of an entire choral are treated as so many fugal subjects.

Mother Carey's Chicken, a name (a corruption of *Mater cara*) familiarly given by sailors to the Storm Petrel and other small oceanic species of Petrel.—The name MOTHER CAREY'S GOOSE is, in like manner, given to the Giant Petrel or 'Nelly' (*Ossifraga gigantea*) of southern seas (see articles on PETREL and FULMAR).

Mother of Pearl. See PEARL.

Motherwell and Wishaw, a police burgh of Lanarkshire, 12 miles S.E. of Glasgow. Until 1920, when the burghs were amalgamated by mutual consent under Act of Parliament, Motherwell and Wishaw were separate towns, founded in 1865 and 1855 respectively. The new town is entirely industrial, possessing, as it does, important iron and steel works. It has fine public parks. Pop. (1921) 68,869.

Motherwell, WILLIAM, Scottish poet and antiquary, was born in Glasgow, 13th October 1797, and educated in Edinburgh and at the grammar-school of Paisley, where, in his fifteenth year, he entered the office of the sheriff-clerk. At the age of twenty-one he was appointed sheriff-clerk depute of the county of Renfrew. In 1819 he published his first work, the *Harp of Renfrewshire*, containing biographical notices of the poets

of that district from the 16th to the 19th century. This work was but the prelude to one of far greater importance—his *Minstrelsy, Ancient and Modern* (1827). In 1828 he started the *Paisley Magazine*, in which some of his finest original pieces first saw the light, and in the same year accepted the editorship of the *Paisley Advertiser*, a Conservative journal. In 1830 he became editor of the *Glasgow Courier*. In 1832 he published a collection of his best poems, entitled *Poems Narrative and Lyrical*. He died in Glasgow, 1st November 1835, at the early age of thirty-eight. Motherwell displays in his best moods (but only then) a rich, beautiful, and strong imagination, great warmth and tenderness of feeling, and a thorough knowledge of the technique of a poet. His *Jeanie Morrison* is unsurpassed for the mingled pathos and picturesque beauty of its reminiscences of boyish love; and the little piece beginning, 'My heid is like to rend, Willie,' has seldom been read without tears. An enlarged edition of his poetical remains, with a memoir, was published in 1849, and reprinted in 1881.

Motherwort (*Leonurus Cardiaca*), a plant of the family Labiatae, found about hedges and



Motherwort
(*Leonurus cardiaca*)

in waste places in Europe, and now abundantly naturalised in some parts of North America. It is not very common in Britain, and probably has been introduced. It is perennial, has a branched stem about 3 feet high, stalked leaves, the lower ones 3-lobed, and crowded whorls of reddish-white flowers. The plant was formerly in much use as a domestic pectoral medicine, but is now comparatively little employed. It has a strong, but not agreeable smell.—Other species of the same genus are found in Europe and the north of Asia.

Moths (*Heterocera*), a name applied to those Lepidoptera

which are not butterflies (*Rhopalocera*), but the distinction has little scientific value. In moths the antennae are rarely clubbed (as they are in butterflies, except the 'Skippers' or *Hesperiidae*); and there is usually a definite linking structure or frenulum connecting the base of the hind-wings to the fore-wings. Butterflies are as a rule diurnal and moths nocturnal, but many moths fly by day. There are more than forty different families; see **DEATH'S-HEAD MOTH**, **HAWK-MOTH**, **SILK**, &c. Clothes moths belong to the family *Tineidae*, and many to the genus *Tinea*. The small caterpillars mine in cloth, fur, and the like. Badly infested articles should be burned, or exposed to sun and air, or soaked in boiling water, carbolic acid, or petrol solution. Furs carefully wrapped in paper without holes are not attacked. The adult moths may be kept from drawers or wardrobes by using pieces of camphor, naphthalene, or 'moth powder.' See also **BUTTERFLY**, **CATERPILLAR**, **INSECTS**.

Motif, in a musical composition, means the principal subject on which the movement is con-

structed, and which, during the movement, is constantly appearing in one or other of the parts, either complete or modified. In elaborate and long compositions there are also secondary motifs. A leitmotif is a phrase associated with a character or an idea, introduced in the music when the composer wishes the hearer to call the associated subject to mind.

Motion. For the Laws of Motion, see **DYNAMICS**, **FORCE**, **NEWTON**; for Motion in Plants, see **PLANTS**, **INSECTIVOROUS PLANTS**, **SENSITIVE PLANTS**, **SPORE**; for Animal Locomotion, see **FLIGHT OF ANIMALS**, **HORSE**, &c.

Motley, JOHN LOTHROP, was born in Dorchester, Massachusetts, 15th April 1814, and studied at Harvard and several German universities. In 1839 he published an historical novel, *Morton's Hope*; another, *Merrymount*, a protest against the gloom of Puritanism, was better received (1849). In 1841 he went to St Petersburg as secretary of legation, but he disliked the post and the place, and soon resigned. In 1849 he served a term in the Massachusetts legislature; and by this time he was hard at work on what was to prove his first great literary triumph. Fully ten years were spent on his *Rise of the Dutch Republic* (1856), covering the period from the abdication of Charles V. to the assassination of William the Silent (1555-84); and this work established his fame. In 1857 he was once more in Boston, but soon returned to Europe, as the materials for European history were not accessible in the States. The *History of the United Netherlands* appeared in 1860-69; it begins where the *Dutch Republic* broke off, and comes down to the year 1609. His letters to the *Times* on the civil war were probably the most important of all the efforts made by patriotic Americans to enlighten the British public upon the issues involved. In 1861-67 he was minister to Austria, in 1869-70 to Great Britain, being summarily recalled through a feud between Grant and Sumner. His last work was *The Life and Death of John Barneveld*, a biography which is virtually a continuation of his main theme. After his wife's death in 1874 Motley paid another visit to the States; and on his return to England in 1876 he gradually sank, and died at Kingston Russell, the Dorsetshire residence of his son-in-law, Sir William Harcourt, 29th May 1877. Motley is a typical representative of the picturesque school in history. His laborious researches and his vivifying imagination enabled him to make the past live again, and, within certain limits, he was true to his materials; but he glories in being a partisan, though of his desire to be faithful there is no question. His elaborate and eloquent style sometimes attains real splendour, but is apt to fatigue.

See *Memoir* by O. W. Holmes (1878), his Correspondence edited by G. W. Curtis (1888) and by his daughter Mrs Mildmay (1910), short Life by Professor Jameson (1897), and Moncreu Conway's biographical introduction to the 1896 edition of the *Dutch Republic*.

Motor-cars. Cugnot, a Frenchman, constructed a steam-carriage in 1769, in which the motion was transmitted from the steam-cylinders to the driving-axle by ratchet wheel; a street accident put an end to his work. In England Trevithick built a steam-carriage in 1803, which ran successfully and attained a speed of 10 miles per hour. From 1823 to 1836, owing to improved roads, there was a revival of interest in the subject. Gurney in 1828 designed a steam-carriage; his coaches ran for some months in 1831 between Gloucester and Cheltenham. Ogle in 1831, with a carriage able to carry 16 passengers, obtained a speed of 30 miles per hour; and Hancock during the years 1829-36 did some very successful work:

in 1836, for over 20 weeks, his omnibuses kept up a regular service in London. The opposition of those interested in railways, and of the road trustees, strangled this promising new development, and the Locomotive Act of 1836 put an end to all further attempts at automobilism in Great Britain till its repeal in 1896. In France interest in automobilism was again roused, after over a century of rest, by Serpollet, who in 1891 patented a steam-car, using superheated steam; and in 1891 a car with a Daimler petrol motor ran from Paris to Brest. From that date the progress in automobilism has been perhaps the most remarkable development in the field of mechanical engineering.

Steam Cars are now almost negligible, except that wagons for heavy commercial loads have held their own, owing to their cheapness and simplicity. The steam-engine will work at low speeds, and a simple 'link-motion' takes the place of an elaborate gear-box. The boilers are usually of the 'flash' type, in which the water passes through a long coil of tubing, heated by oil-burners, and is converted into superheated steam.

Petrol Cars.—The principle of the petrol-engine is explained in the article INTERNAL-COMBUSTION ENGINE. The fuel is chiefly petrol of about 720 sp. gr.; a mixture of petrol and benzol is often used, while alcohol and other substitutes have been tried. Cooling is effected by a water-jacket (small motors for cycles are air-cooled), the water being circulated either by pump or naturally by changes in density owing to temperature changes. The jacket water is cooled by passing through air-cooled radiators.

The reciprocating motion of the pistons is converted into a rotary motion by the crank-shaft, and owing to the high speed of the internal-combustion engine a fly-wheel is fitted, to maintain an even and smooth running, especially at slow speeds. In order that the engine may run at a suitable high speed while the car is running at widely different speeds or is struggling with a hill or an unusually heavy load, it is necessary to provide a means for varying the gearing by which the road-wheels are driven. It is also necessary to have means of travelling backwards, and a reverse-gear is therefore fitted.

The system almost universally adopted is to connect the crank-shaft to a gear-box containing parallel shafts, upon each of which are toothed gear-wheels which are free to slide along the shafts, but not to revolve round them. By means of selector-levers the different gear ratios are obtained by meshing different combinations of wheels. The top gear is usually a 'direct drive'—i.e. the propeller-shaft leading out of the gear-box is connected directly to the shaft entering the gear-box and revolves at the same speed.

To change gears it is necessary temporarily to disconnect the engine from the shaft leading into the gear-box, and this is done by a clutch. The drive being transmitted by the friction of surfaces held together by a strong spring, release of the pressure disconnects the drive.

In the very early cars the drive was often taken to the axle by a chain or belt, but except in the motor-cycles and cycle-cars this has been discontinued. The usual practice is to take the drive from the gear-box to the centre point of the back axle by means of a 'propeller' or 'cardan' shaft. The back axle is divided in the centre. To the outer end of each half-shaft is fixed the hub of the road-wheel, while the inner end has a bevel pinion working in what is known as the differential gear. This gear compensates for the fact that when the car is travelling in a curve the outside wheel has to cover a longer distance than the inside wheel, and consequently has to travel faster.

Electric Cars.—These are of two classes. In one

the current is derived from storage batteries, and the car can only run until the batteries 'run down.' A few broughams for town use have been made of this type, but the chief adaptation of this principle is for trolleys used in railway stations and in large works for transporting goods at low speeds. Electric-power companies occasionally employ large lorries of this type, finding them cheap to run in view of the facilities for charging the batteries. The other type uses electric power as a device to avoid gear-box transmission. The ordinary internal-combustion engine drives a dynamo, which in turn supplies an electric-motor geared to the road-wheels. One well-known make of heavy chassis for lorries and buses follows this design.

Motor-cycles.—The early motor-cycles were of medium power—3 or 4 horse-power. They had battery ignition, usually only a fixed gear, and a belt-drive. Motor-cycles have now been designed to suit almost every requirement of cost, power, and speed. They range from cheap light machines with engines as low as $1\frac{1}{2}$ h.p. to heavy racing cycles of as high as 10 h.p. Two-stroke engines are used for many of the lighter makes, but four-stroke engines—often with two, and very rarely with four cylinders—are used for the heavier models. Chain-drive is gradually ousting belt-drive, and two, three, and even four-speed gear-boxes with clutch and kick-starter are fitted. Refinements are constantly being made in such matters as sprung frames, mechanical lubrication, and electric-lighting generated by a small dynamo. Sidecars superseded trailers, but are in turn losing their popularity in competition with the very cheap light cars. See also CYCLING.

MOTORING.—Few movements have made such rapid and universal progress as motoring. When the century began it was the pursuit of a comparatively few pioneers in France, with a small vogue in Germany, and a still smaller vogue in the United Kingdom.

The motor-car has reopened many of the highways of Europe and made them once more the arteries—secondary, it is true—of travel and communication, has saved rural districts from depletion and comparative isolation, has quickened the daily life of city and town. The motor taxi-cab has displaced the horsed-cab, the motor-bus has driven the horsed-bus off the road, the railways have suffered, and all despite a natural antipathy on the part of the public to the changes involved. The abridgment of time and space secured by the use of the motor-car in its various forms is but the beginning of a revolution, the end of which no one may yet see. The motor-car made the aeroplane-engine a possibility. The navies of the world, as at present constituted, are threatened with supersession because the motor-car has shown the possibilities of the internal-combustion engine for hitherto unthought-of purposes, and the arts of agriculture and of war are being transformed.

Although to Germany belongs the honour of the inception of the motor-car engine, to France the world owes its rapid development and the practical evolution of the motor-car. It is generally asserted by apologists that the diatribe of Great Britain in adventuring into the new movement was due to the repressive Highways Act of 1865, which restricted mechanical traction on public roads to a speed of 4 miles per hour, and required a man to walk in front with a red flag. This was amended in 1896 as the immediate result of a demonstration of mechanically propelled vehicles organised by Sir David Salomons, and the speed-limit was raised to 14 miles per hour. But not until 1903, when the legal limit was increased to 20 miles per hour, was the British industry really founded. Rapid development in efficiency and power was due to the system of

racing competitions inaugurated by the Automobile Club de France, founded in 1896. In 1894 *Le Petit Journal* had organised the first motor-car road-race—from Paris to Rouen; and this was followed a year later by one from Paris to Bordeaux and back, which was won by a car equipped with a 4-h.p. engine, and is also memorable as marking the first adoption of pneumatic tyres for motor-cars. Then followed in annual sequence races from Paris to Dieppe, Amsterdam, and Berlin. At this point Mr James Gordon Bennett of New York presented a trophy for a regularised international contest to evidence the advance of the nations in motor-car construction. The first race for this was held from Paris to Lyons, and was won by France. This phase of racing competition died out because it became unreal, and produced cars unsuitable for ordinary purposes. In England it was supplanted in 1905 by the Tourist Trophy Race promoted in the Isle of Man by the Royal Automobile Club. This contest was soon abandoned because its object had been attained—the development of a car of moderate horse-power capable of considerable speed on a low-fuel consumption. The foundation of Brooklands track, a huge cement-surfaced course over two miles in circuit constructed by private enterprise at Weybridge, Surrey, helped to suppress road-racing in the United Kingdom. For many years the Royal Automobile and other clubs had conducted reliability trials which enabled designers to improve their cars, and the motoring public to distinguish between the types offered them. These also in time outlived their usefulness, and were abandoned in 1910. The Great War of 1914–18, fought upon motor transport, tested every type of engine, and improved the general design. The tax of £1 per horse-power has had a curious effect on the course of design in Britain. For this purpose the horse-power is not the actual horse-power, but is calculated according to a formula which takes into account the bore of the cylinder but not the stroke. Manufacturers have therefore striven to produce cheap light cars with a small rated horse-power. In America the cheapness of petrol and lowness of tax have not brought about the same type of high-compression, high-efficiency, small-capacity engine.

Concurrently with the rise of motoring, organisations to promote, conserve, and protect motoring interests grew up in every country. The Automobile Club of Great Britain and Ireland was founded in 1897, and obtained the prefix Royal in 1907. The Motor Union, founded by the Automobile Club in 1902, broke away from it in 1907, and became fused with the Automobile Association (founded in 1905) in 1910.

Motril, a town of Spain, 31 miles S. by E. of Granada, with factories and lead-mines. The port is at Calahonda, $6\frac{1}{2}$ miles SE. Pop. 17,000.

Motto, in Heraldry, a word or short sentence which forms an accompaniment to a coat-of-arms, crest, or household badge; it was called in Scotland the 'ditton.' In France and Scotland it was frequently placed above the crest, in England almost invariably below the escutcheon.

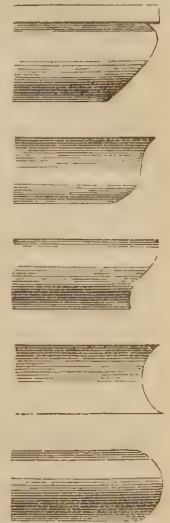
Mouflon (*Ovis Musimon*), the wild sheep of Corsica, Sardinia, central Asia, &c. See ARGALI, and SHEEP.

Moukden. See MUKDEN.

Mould, the common name of many minute fungi which make their appearance, often in crowded multitudes, on decaying or diseased plants and animals and vegetable substances. To the naked eye they often seem like patches of fine cobweb, which are shown by the microscope to consist of cellular threads. Their structure and history are described in the article FUNGI, from the

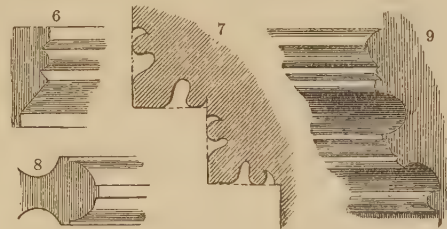
systematic part of which it will be seen that the popular name is applied to many very different forms—e.g. the common White Mould (*Mucor mucedo*), the Bread Mould (*Euotium Aspergillus-glaucus*), the mould of fruit and jam (*Penicillium glaucum*), &c. See also DRY ROT.

Mouldings, the curved and plane surfaces used as ornaments in cornices, panels, arches, &c., and in all enriched apertures in buildings. In classic architecture the mouldings are few in number, and definitely fixed in their forms. The illustration shows (1) the Echinus, (2) Cyma Recta, (3) Cyma Reversa, (4) Scotia, (5) Torus; another is the Fillet (q.v.); and each of these mouldings has its proper place assigned to it in each order (see COLUMN). In Gothic architecture, and all other styles, the mouldings are not reduced to a system as in the Greek and Roman styles, but may be used in every variety of form at the pleasure of the artist. Certain forms generally prevail at one period in any style. Thus, in Gothic architecture the date of a building may in many instances be determined by the form of the mouldings. The Norman mouldings were very simple in outline, and frequently enriched with the zigzag and billet ornaments. Fig. 6 is a common Norman form.



Classic Mouldings.

In the English style the mouldings are also simple in outline, and are usually arranged in rectangular divisions, as in fig. 7, and consist of alternate rounds and hollows. In



Various Mouldings.

late examples of this style the fillet was introduced (fig. 8) and led to the more elaborate form of mouldings during the Decorated period (fig. 9). The mouldings of the Perpendicular style are generally flatter and thinner than the preceding, and have large hollows separated by narrow fillets.

Moulins, the capital of the French department of Allier, on the right bank of the river Allier, here crossed by a handsome stone bridge of thirteen arches, lies 196 miles by rail SSE. of Paris and 124 NW. of Lyons. A clean, well-built town, with pretty promenades, it has a cathedral (1468–1871), the choir old; a square tower of the old castle of the dukes of Bourbon; a 15th-century belfry; and the chapel of a former convent. Marshals Villars and Berwick were natives, and Clarendon wrote here great part of his History. Nor must Sterne's Maria be forgotten. Pop. 23,000.

Moulmein. See MAULMAIN.

Moulton. See MULTAN.

Moulting, a general name for the process by which birds lose some of their feathers, or crustaceans cast their cuticular shells, or young insects get rid of their outer husk in metamorphosis. The shedding of the hair in mammals and the sloughing of snakes, &c. are also analogous. See BIRD, CRAB, CRUSTACEA, HAIR, INSECTS, SNAKE, &c.

Moulton, LOUISE CHANDLER (1835-1908) was born in Pomfret, Connecticut, married at the age of twenty W. U. Moulton, a Boston publisher, and published children's stories, novels, essays, and poems. Her stories are unaffected and well constructed, full of grace and tenderness; her verse reveals the rarer gift of lyrical music. Here may be named *Bedtime Stories* (1873; followed by a second series in 1875, and a third in 1880); *Some Women's Hearts* (1874); *Miss Eyre from Boston*, &c. (1889); and *In the Garden of Dreams* (1890), a volume of charmingly tender and pathetic verse.

Moultrie, FORT, a fortress on Sullivan's Island, at the mouth of Charleston Harbour, South Carolina, celebrated for the repulse of a British squadron commanded by Sir Peter Parker, 28th January 1776. The fort, which had 26 guns and 435 men, and was commanded by Colonel William Moultrie (1731-1805), had been hastily built of palmetto logs, in two rows 16 feet apart, with the space between filled with sand. The spongy wood of the palmetto (*Sabal Palmetto*; see PALMS) was found to resist the cannon balls perfectly.

Mound-birds (*Megapodiidae*), a peculiar family of shy Gallinaceous birds, many of which lay their eggs, sometimes socially, in mounds of soil and vegetable matter. Others lay in holes in sandy soil. In neither case is incubation necessary, for sufficient warmth is afforded by the decaying vegetation or by the sun. The young are remarkably precocious, sometimes flying almost immediately after they extricate themselves. The headquarters are in the Australian region, but the range includes Samoa, the Nicobars, and the Philippines. Among the members of the family may be mentioned *Megapodius* (about the size of a small fowl), *Lipoa* (the Mallee Hen or Native Pheasant of South and West Australia), the 'Brush Turkey' (*Catharturus lathami*) of East Australia, and *Talegallus* of New Guinea, one species of which makes a mound 11 feet high with an internal temperature of 93° F. See Wallace's *Malay Archipelago*, and Hickson's *Naturalist in North Celebes*; and the article TALEGALLA.

Mound Builders, the name given to a vanished race of North America, by whose labour the remarkable earth mounds found in the United States were raised. These mounds exist in extraordinary numbers over all the country between the Alleghany and Rocky Mountains, but chiefly in Ohio, Illinois, Indiana, and Missouri; they are abundant in all the Gulf States, and even farther south, and they extend at least as far north as the Great Lakes. Their usual height is from 6 to 30 feet, with a diameter of 40 to 100 feet. The majority are simply conical burial mounds, mostly rising from 15 to 25 feet, though one in West Virginia is 70 feet high and over 300 feet in diameter at the base. But very many others of these mounds are defensive, and others again have a religious origin. The fortifications, usually earthworks raised on heights near some water-course, embrace walls, trenches, watch-towers, and are too skilfully constructed to have been temporary defences: many archaeologists believe that there was a connected line of defensive works from New York to Ohio. In the Mississippi Valley, where the largest mounds are, these forts disappear; and it is supposed that the principal

enemies of the Mound Builders had their home in the east—perhaps in the Alleghanies. Some of the Ohio fortresses enclose over 100 acres, the walls of earth, winding in and out, in each case being several miles long. In the alluvial valleys other enclosures have been found, regular—circular, square, &c.—in shape; these have been called 'sacred enclosures,' but on very problematical grounds; and the same criticism applies to the identification of the smaller low mounds, from a few inches square to 50 by 15 feet, which have been called 'altars.' Of the 'temple' mounds, however, there are numerous examples, some very large: one in Illinois reaches a height of 90 feet, and measures 700 by 500 feet at the base; and another in Mississippi is 600 by 400 feet, and its topmost mound is 80 feet above the base. To these must be added the curious mounds constructed in the shape of animals, and sometimes extending to a length of 400 feet. They are most numerous in Wisconsin, but one of the most interesting is the serpent mound near Bush Creek, Ohio; Fort Ancient, the largest in the same state, is a mile long.

The general tendency is to connect the Mound Builders with the Natchez and kindred tribes whom the Spaniards found on the Mississippi, partly because their chief was both king and deity—he was regarded as the child of the sun—and so we find evidences of the religious feeling and the despotic power necessary to secure the accomplishment of such enormous works. All this favours the theory that the Mound Builders possessed a degraded form of the 'archaic civilisation' derived from Mexico and originally from Egypt. It is held by believers in the transmission of this culture that the mounds were built by seekers after gold, copper, and pearls—hence their distribution. The contents of the mounds support this view. It is evident that the Mound Builders, like the later Mexican tribes, were in the transition stage between the stone and metal age; copper they had obtained in the same primitive manner as it was obtained in Mexico, but the weapons and tools were stone implements, and knives of obsidian especially—the well-known sacrificial knives of the Aztecs—were common. Their art and manufactures were both of a low standard; but it is well known that the invaders of the Mexican tableland partly absorbed the civilisation they found there, partly degraded it. Finally, it may be mentioned that the sepulchral mounds yield many evidences of the cruel rites of their builders; and the pyramidal form of the 'temple' mounds is reproduced in the Teocalli (q.v.) of Mexico.

See W. K. Moorehead, *Primitive Man in Ohio* (1892); Thomas in Report of Washington Bureau of Ethnology (1894), and his *North American Archaeology* (1898); Perry, *Children of the Sun* (1923).

Mountain, the extreme party in the French Revolution led by Danton (q.v.) and Robespierre (q.v.), so called from their sitting in the highest part of the hall when the French Convention assembled. See MONTAGNARDS. For Mountain-leather, &c., AMPHIOLE; Mountain Meadow, DANITES; and for Mountaineering, ALPINE CLIMBING.

Mountain Ash, an urban district of Glamorganshire, 4 miles N.E. of Aberdare, included since 1918 in Merthyr-Tydfil parliamentary borough, has coal and iron mines; pop. 43,000. For the tree, see ROWAN.

Mountains, a name given somewhat vaguely to any region the surface of which rises with a more or less steep gradient to a height of 1000 feet or more. Mountains differ vastly in form—some assuming pyramidal or conical shapes, others

forming ridges, others occurring as irregular amorphous masses. Some again stand in more or less isolated positions, whilst in other cases very many crowd together, forming a billowy mass of elevated ground; and yet others, amongst which are the most prominent mountains of the globe, extend continuously in definite directions as long ranges and chains for hundreds or thousands of miles. Notwithstanding this diversity of form and of grouping, all mountains may be classified as—(a) Original or Tectonic, and (b) Subsequent or Relict Mountains. In the former class—original or tectonic mountains—are included all heights which owe their origin either (i.) to the piling or heaping of materials at the surface, or (ii.) to subterranean action which has resulted in the deformation of the earth's crust. Our subsequent or relict mountains have had quite a different origin. They have neither been built up by accumulation at the surface, nor are they due to crustal deformation. On the contrary, they are the remaining portions of former high land—relics or fragments of more or less lofty regions which have otherwise been gradually reduced and largely removed by the forces of decay.

(a) ORIGINAL or TECTONIC MOUNTAINS: (i.) *Accumulation Mountains*.—Volcanoes may be taken as the type of this class of mountains (fig. 1). These are of course formed by the accumulation of igneous materials around the focus or foci of

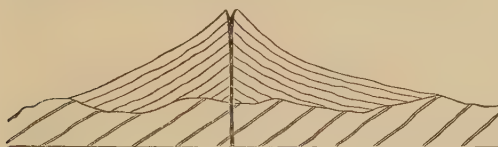


Fig. 1.—Volcano; Mountain of Accumulation.

eruption. Most volcanoes are more or less conical in shape; but in the case of those which have been long extinct the form has often been greatly modified by the denuding action of the subaerial agents. Some very ancient ones have been so demolished that frequently all that remains of them are mere stumps, formed of the hard crystalline rocks that plug up the pipes or flues through which the igneous materials found a passage to the surface.

(ii.) *Deformation Mountains*, so termed because they owe their origin to crustal deformation. Three types are recognised, namely, *folded mountains*, due essentially to flexuring and folding of the crust; *dislocation mountains*, due chiefly to fracturing and dislocation of the crust; and *laccolith mountains*, due to bulging of the crust over intrusive masses of formerly molten rock.

(1) *Folded Mountains* are much the most important type, constituting as they do the greatest chains and ranges of the world. The Alps, the Pyrenees, the Carpathians, the Himalayas are all folded mountains, and the same is the case with the Andes, the Rockies, and the corresponding chains and ranges of Eastern Asia and its archipelagoes. Mountains of this type indicate lines of weakness along which the rocks have yielded to excessive lateral compression by folding and doubling up during the sinking down of the cooled outer shell of the globe upon the cooling and contracting hot nucleus. The simplest structure presented by such mountains is shown in the Uinta Mountains of Wyoming and Utah. This is a flattened arch of strata, having a breadth of 50 miles and a length of 150 miles, which bulges up to a height of 5000 or 6000 feet above the plains on either side. It shows a broad plateau-like

surface which has been deeply eroded. Powell was of opinion that a thickness of $3\frac{1}{2}$ miles of strata had been denuded from its surface. In the Jura Mountains we have a series of parallel ridges, each ridge coinciding with a symmetrical anticlinal or saddle-backed arrangement of strata, while the intervening hollows occupy symmetrical

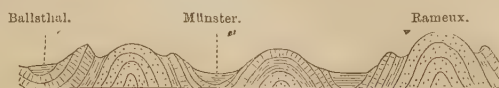


Fig. 2.—Symmetrical Flexures of Swiss Jura (Mountains of Elevation).

synclinal troughs (fig. 2). The tops of the anticlines are all more or less denuded. In the western part of the same range of mountains the flexures of the strata are mostly unsymmetrical



Fig. 3.—Unsymmetrical Flexures of Swiss Jura (Mountains of Elevation).

(fig. 3). In the Alps and many other great ranges the folding of the strata is still more pronounced, and the accompanying geological structures are often extremely complicated. Usually the folds are closely compressed, the crests of the anticlines tending to lean over in one general direction. To such an extent does this overfolding take place that strata becomes inverted or turned upside down, older beds being overturned upon younger beds. Frequently, indeed, so great has been the crustal compression that the folds have yielded, and the upper limbs have been driven forward over the lower, the dislocation being known as a 'thrust-plane.' Overthrusts of this kind vary in importance. In some cases the degree of displacement is inconsiderable, while now and again great mountain-masses have been pushed forward for 20 or 30 miles, or even greater distances. Very remarkable examples of such vast rock-translations have been noted in the Swiss Alps.

(2) *Dislocation Mountains*.—This is a type of deformation mountains which differs essentially from that described in the foregoing paragraph. In dislocation mountains rock-folding is either inconspicuous or absent. They owe their origin, therefore, rather to fracturing and displacement of the crust than to folding. Usually they occur at more or less isolated heights rising abruptly above adjacent lowlands, from which they are severed by vertical dislocations or 'faults.' Such mountains are termed 'Horste' by German geologists, who cite the Harz as a prominent example. Occasionally dislocation mountains occur as a series of parallel ranges or long rectangular blocks separated one from another by vertical faults. The ranges of the Great Basin, North America, are of this type, and of similar origin are the Vosges and the Black Forest of our own Continent.

(3) *Laccolith Mountains*.—This is the name given to a type of mountains which are well developed in Southern Utah and elsewhere in North America. A laccolith (stone cistern) is a mass of igneous rock of lenticular shape, connected with a subjacent pipe-like 'feeder.' The formerly molten rock has risen through this vertical pipe or fissure, but, being unable to burst across the superincumbent strata, it has been compelled to insinuate itself between the beds, and thus caused these to bulge upwards so as to produce a dome-like elevation at the surface. The typical laccoliths of North

America are of Late Tertiary age, and consequently are still in an excellent state of preservation.

(b) **SUBSEQUENT or RELICT MOUNTAINS.**—These have not been constructed or built as mountains, but are merely remnants or fragments of formerly more extensive elevated areas. They have been carved out of ancient tablelands or plateaus, and shaped into mountains by the gradual removal of masses by which they were at one time surrounded. Hence they are often termed 'mountains of circumsenuation.' Tablelands or plateaus are of various origin, but two well-marked types are recognised, distinguished from each other by their geological structure. In the one case a tableland consists of a great succession of approximately horizontal strata, so that its plain-like surface is an expression of this regular bedded arrangement. In the other case there is no such correspondence between surface configuration and internal structure. On the contrary, the rocks may show every possible variety of arrangement—not infrequently, indeed, the geological structure is quite as complicated as that of folded mountains. The two types may thus be distinguished as *plateaus of accumulation* (fig. 4) and *plateaus*

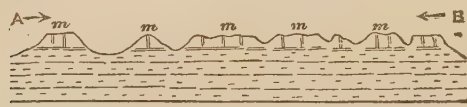


Fig. 4.—Plateau of Accumulation, A—B; showing Relict Mountains (m, m).

of erosion (fig. 5). The origin of the former is



Fig. 5.—Plateau of Erosion, A—B; showing Relict Mountains (m, m).

obvious—it is simply a more or less extensive area of strata which has been uplifted *en masse*, so that the horizontal arrangement of the beds has been left practically undisturbed. A plateau of erosion, on the other hand, represents an old land, often hilly or mountainous, which, after having been reduced by denudation to its base-level so as to form a plain, has been uplifted bodily.

All tablelands are in time more or less profoundly modified by erosion. Valleys are hollowed out by streams and rivers, and as its hydrographic system continues to develop, a plateau may eventually be so remodelled that its original configuration may be almost, or even entirely, obliterated. The primeval plain-like surface, in short, is replaced by regular or irregular ranges or groups of hills and mountains, all of which are necessarily 'relict mountains,' or 'mountains of circumsenuation' (figs. 4, 5).

In regions where the strata are not so highly inclined as in folded mountains, the part played by different kinds of rock and rock-arrangements in determining the characteristic features of the land is readily recognised. After prolonged denudation the less resistant rocks are usually found to occupy the lower grounds, while the harder or less readily reduced rocks form the heights. But geological structure is even a more important factor in determining the surface features worked out by erosion. In the annexed diagram (fig. 6), representing moderately inclined and undulating strata, three common types of hill are shown. The two beds *e, e* are beds of hard limestone intercalated in a series of less resistant strata. The

limestones being more durable than the beds above and below them have come to project so as to form *escarpments*, while the synclinal arrange-



Fig. 6.—Escarpments (*e, e*) and Hills of Circumsenuation (*h, h*).

ment of the strata—which is a relatively strong structure—has determined the position of the hills *h, h*. The isolated hill *d*, on the other hand, is due to the intrusion among the strata of a much harder igneous rock.

See the larger textbooks of Geology and Physical Geography; also J. Geikie's *Mountains: their Origin, Growth, and Decay*.

Mountmellick, a town in Queen's County, Ireland, on the Grand Canal, 7 miles N. of Maryborough by rail. It has a brewery, a tannery, and manufactures woollens and tobacco. Pop. 2300.

Mount Vernon, memorable as the residence and the burial-place of General Washington, is on the right bank of the Potomac, in Virginia, 15 miles below Washington. In 1856 the mansion and surrounding property were saved from the auctioneer's hammer and secured as a national possession by the Ladies' Mount Vernon Association, assisted principally by Edward Everett.—Mount Vernon has given its name to a number of places in the United States, the most important of which is a residential city of Westchester county, New York, a few miles above New York City; pop. 43,000.—Another is a city, the capital of Knox county, Ohio, on the Vernon River, 44 miles by rail NNE. of Columbus, with many handsome residences, and ample water-power; pop. 9000.

Mourning. See FUNERAL RITES.

Mousa. See BROCH.

Mouse (*Mus musculus*), a familiar rodent, representative of a large genus to which rats also belong. It is not necessary to describe the soft 'mouse-coloured' fur occasionally varying to white; the scaly tail so useful in climbing; the bright, conspicuous eyes, and the well-hidden cosy nest. Not less familiar is the way in which this tiny mammal has followed man everywhere over the earth; breeding all the year round, and bringing forth four or five young at a birth, its extraordinary fecundity sometimes causes a plague in a district (as in the wheat-fields of South Australia in 1890). It may be well, however, in the face of continually recurrent discussion, to note the power that at least some of the common mice have of making musical sounds, 'not squeaking,



1, Harvest-mouse (*Mus minutus*);
2, Long-tailed Field-mouse (*Mus sylvaticus*).

have of making musical sounds, 'not squeaking,

but singing, musically and rhythmically, in a high key, with a thin and wiry, but not displeasing quality—something like a weak-voiced canary bird. Mice are occasionally cannibals, and have been known to eat painters' putty with red lead in it. Larger than the above is the beautiful Wood-mouse (*M. sylvaticus*), an abundant pest in the fields and gardens of Europe, notable for the stores of grain and other food which it accumulates among the grass or just under the surface of the ground. Smaller than either, and smallest of British mammals, is the Harvest-mouse (*M. minutus*), which makes a neat globular nest of woven leaves among the grasses and reeds. The white-footed mouse (*Hesperomys leucopus*), which is exceedingly common in North America, has small cheek-pouches, structures best developed in the related family of Cricetinae or hamsters. Corresponding to the European harvest-mice are the American species of Ochetodon, of which *O. humilis* measures only about 2 inches in length, not including the tail. Finally, the Water-mice (*Hydromys*) of Australia may be noted as remarkably divergent. The name is sometimes extended, as we have seen, to include the smaller species of other genera than *Mus*, rat being an equally wide title for the larger forms. But, while the wide application of the name is naturally justified, care must be taken to keep the shrews (*Sorex*) in their entirely distinct, though somewhat analogous, position among Insectivora. See RAT, SHREW, VOLE.

Mousquetaires, the mounted body-guard of the kings of France, all of noble birth, were organised by Louis XIII. and disbanded in 1815.

Moussorgsky. See MUSSORGSKI

Mousterian, Le Moustier. See ANTHROPOLOGY.

Mouth. See the articles dealing with Palate, Digestion, Teeth, Tongue, Cancrum Oris, Salivation, Scurvy, &c.

Moveables. See HERITABLE AND MOVEABLE.

Moville, a seaside resort in County Donegal, on Lough Foyle, 19 miles NNE. of Londonderry. It is a calling-station of Transatlantic steam-packets; pop. 1000.

Moving Plant (*Desmodium gyrans*), a papilionaceous plant of India, remarkable, as are also some other species of the same genus, for the spontaneous movement of the leaves. See PLANTS (MOVEMENT OF).

Mowing-machine, a machine for mowing lawns and bowling-greens, differs from the reaping-machine in principle, chiefly in having revolving instead of horizontal cutters. The first successful mowing-machines in use in Britain were those invented by Shanks of Arbroath and by Green of Leeds about 1850. Improved forms of these are yet the best where the wear and tear are heavy. Some of their rivals, chiefly American, are preferable for lightness of draught, and consequently ease and speed of performance.

Mowra, MOWA, or MAHWA SEEDS, the oil-yielding seeds of *Bassia latifolia* and *B. longifolia*; also called Illipe or Illupi nuts. The solidified oil or 'butter' is used as a substitute for or adulterant of ghi, and is made into soap and candles. See BUTTER-TREE, SAPOTACEÆ.

Moxa is a peculiar form of counter-irritation which was early practised in the East, particularly by the Chinese and Japanese, from whom it was learned by the Portuguese. One or more small cones, formed of the downy covering of the leaves of *Artemisia Moxa* (as used by the Chinese), or of the pith of various plants (as of the common sunflower), or of linen steeped in nitre, are placed on the skin over the affected part, and the ends remote

from the skin are ignited. The combustion gradually proceeds through the cone and forms a superficial eschar on the skin. The surrounding parts must be protected by a pad of wet rag, with a hole in it for the moxa.

Mozambique, or MOÇAMBIQUE, or PORTUGUESE EAST AFRICA, extends from the Rovuma to beyond Delagoa Bay, a distance of 1300 miles. A tongue extends along the upper Zambezi between Nyasaland and Southern Rhodesia. Mozambique is divided into two by the Zambezi River, while other principal rivers are in the north the Lurio, and in the south the Pungwe and the Limpopo. The coast belt is low and swampy; but the interior rises into high grass-covered plateau, with here and there forests, the chief of which is the Amatonga, of valuable timber. The soil is naturally fertile, and yields in addition to sugar (which during the war years rose to a very important industry, the banks of the Zambezi being the site of many factories) maize, rice, manioc, and abundance of products such as sisal, cotton, tobacco, Mauritius hemp, coconut, medicinal plants. The exports are sugar, ivory, ground-nuts, wax copal, oil-seeds, and minerals. The northern portion of the country was the scene of the latter part of the German East Africa campaign, and the Kionga Triangle, at the mouth of the Rovuma, was thereafter handed over to Portugal. Mining is little prosecuted, although the country is rich in minerals, gold, silver, iron, and copper. The population is estimated at about 3,500,000. There are several railways, including lines from Delagoa Bay to the Transvaal and to Swaziland, Beira to Rhodesia, and from Beira to the Zambezi for Nyasaland. The chief towns are Lourenço Marques, Beira, Mozambique, Tete, Quilimane, and Port Amelia. Chinde, at the mouth of the Zambezi, was practically wiped out by a cyclone in 1922. The Mozambique territories are administered by a governor-general residing at Lourenço Marques, assisted by a partly-elected government council and a provincial council. Certain districts, such as Zambezia and Nyasa, are administered by companies. There is a native force officered by Portuguese, and service is compulsory.

Mozambique, the former capital of Portuguese East Africa, stands on a small island almost closing the entrance to a magnificent bay. It has a fine government house, cathedral, and many interesting old Portuguese colonial buildings. The town faces the bay, the sea front being covered by the fort (founded by Albuquerque in 1508, which stands at the north end of the island) and the blank walls of many go-downs. The city has been superseded as capital of the colony by Lourenço Marques. It was a great slave-trading post, but now does not equal Lourenço Marques and Beira in its trade. Population of the island about 5000, of whom 4000 are natives and 500 Europeans.

Mozambique Channel, between Madagascar and the east coast of Africa, is about 1000 miles in length and 400 in average breadth. At its northern extremity lie the Comoro Islands.

Mozárabes. See MORISCOS; and for Mozarabian Liturgy, see LITURGY.

Mozart, WOLFGANG AMADEUS CHRYSOSTOM, was the younger child of Leopold Mozart, Kapellmeister to the Archbishop of Salzburg, and was born in Salzburg on 27th January 1756. Numerous anecdotes are related of his childhood, illustrating an almost incredible precocity of genius, whose early promise, however, was amply fulfilled in his after-life. On his first professional tour through Europe, when he was six years old, he was accompanied by his sister Marianne, and under their father's care the children visited Vienna,

Paris, Belgium, and London. The greatest triumphs of Mozart were won in Bologna, then the musical centre of Italy. The Philharmonic Academy there suspended the rule by which no one under twenty was eligible for membership, in order to elect this young prodigy of barely fifteen. The wonderful power of his memory was illustrated by a famous feat performed in this Italian tour. The Easter music in the Sistine chapel was jealously kept from the eyes of outsiders, and no copy of it was permitted to be made. After one hearing, Mozart wrote from memory a full and minutely correct vocal score. During all the years of childhood and boyhood Mozart had been ever under the immediate care of his father, until his twenty-first year, when, stung by the indignities heaped upon him at the archiepiscopal court, he asked permission to leave it. In September 1777 he left Salzburg for Paris, with his mother as companion and adviser; and from this date began that struggle with the world in which he was to be so soon overthrown. In Mannheim, which he visited on the way, he made the acquaintance of a new instrument, the clarionette, which he was the first to incorporate in the modern orchestra, and fell in love with Aloysia Weber, the second daughter of a poor man with a considerable family. For many obvious reasons Leopold Mozart was greatly disturbed, and the correspondence between the anxious loving father and the disappointed but always dutiful son throws a flood of light on the relation, as beautiful as it is rare, in which they stood to each other.

In Paris mother and son had to practise the strictest economy, for the mature musician no longer commanded the limitless admiration and interest so readily accorded to the prodigy fifteen years before. In poor lodgings and amid depressing surroundings the mother's health gave way; she died in her son's arms; and Mozart returned to the paternal roof in Salzburg.

In 1781, having re-entered the service of the archbishop, he followed him with the rest of the prelate's household to Vienna. Although the archbishop was proud to have such a famous artist in his suite, he hated Mozart, and even the compliments so easily won on all hands by the young man were made so many occasions to wound his proud spirit. At last, stung by the studied and systematic insult to which he was subjected by his patron, Mozart retorted in language more caustic than prudent, which procured him an instant and ignominious dismissal.

Mozart took lodgings with his Mannheim friends, the Webers, who had now settled in Vienna. The father, his firm friend, was now dead, and Aloysia was married; but her place in Mozart's heart was taken by her younger sister Constance, a very gentle and attractive girl. Constance made a loving and devoted wife, but a wretched manager. She kept her husband up to his engagements, and amused him by her powers as a story-teller; but debts and difficulties increased. Just a month previous to his marriage he produced the charming little opera, *Die Entführung aus dem Serail*, which paved the way for the next, *The Marriage of Figaro*, the most delightful of lyric comedies. With his magic wand he touched the somewhat coarse or at least questionable elements in Beaumarchais' play, and these assumed an ideal form in a supernatural atmosphere of pretty piquancy where naughtiness is unknown. The opera was more than a success, it created a furore; yet jealousy and court intrigue prevented any reward, any acknowledgment that the greatest living musician was labouring and hungering in their midst. More generous appreciation was offered him in Prague, and, being commissioned to write an opera for the theatre there, he set

to work on *Don Giovanni*. The summer-house and the little stone table on which most of the charming music was written are still shown in the gardens, where, amid the noise of conversation and skittles, he worked apparently undisturbed. The extraordinary success of *Don Giovanni* made it impossible for the court still to overlook the composer, and he was appointed 'Kammer-Musicus' to Joseph II., his duties being to supply dance-music for the imperial balls at a salary of £80 a year.

Pecuniary embarrassments pressed heavily on his heart once so light, and he writes of gloomy thoughts, which he has to repress with all his might. He had great hopes that a journey to Berlin, *via* Dresden and Leipzig, in company with his friend and pupil, Prince Lichnowski, might give some chance of bettering his condition; and indeed Frederick-William II. of Prussia was so delighted with him that he offered him the post of Kapellmeister with about £450 a year. But a sentimental loyalty prevented him from accepting it. Ever-increasing difficulties induced him to inform the emperor of the king of Prussia's offer, and when Joseph seemed painfully surprised, Mozart, confirmed in an unreasoning affection for a monarch who did so little for him, exclaimed: 'I throw myself upon your kindness and remain.' Joseph II. ordered a new opera, *Così fan Tutte*, but owing to his death, and the indifference to art of his successor Leopold II., the composer reaped no pecuniary benefit. He made one more desperate application for a regular post, and was rewarded by being appointed assistant and successor (without pay for the present) to the Cathedral Kapellmeister, who outlived him many years. His carelessness and improvidence beset him with endless petty embarrassments, and Constance's frequent illnesses, which necessitated prolonged visits to health-resorts, were an additional and serious drain on the precarious income. He was hastened towards financial ruin too by his heedless and overpowering generosity, often casting his pearls before swine—'false friends,' his sister-in-law terms them, 'secret blood-suckers and worthless people, intercourse with whom ruined his reputation.' In 1791, Mozart's health even then breaking down, an adventurer, a brother freemason, applied to him for help. This was Schikaneder, a theatre manager, who found himself in difficulties, from which he said only a new opera by Mozart could save him. He suggested the subject himself, *The Magic Flute*, and, seeing Mozart's failing health and uncertain powers of work, he took care to keep him under his own eye, giving him working accommodation in his own house, and keeping him in good humour with copious supplies of wine and frequent invitations to dinner. For a short time Mozart, harassed and ailing, sought to forget himself in a continual fever of excitement, and the lapses of these few sad weeks, multiplied and magnified, gave rise to the judgments which upon those who so hastily condemn reflect double the dishonour they would impute. As the struggle with the world became more unequal, as the iron entered deeper into his soul, his vision became clearer to read the mystery of life. In six weeks he wrote his three greatest symphonies, in which first throbs that intense expression of passion and 'Weltschmerz' which was to raise Beethoven, his stronger successor, to the highest place of honour in Music's temple.

In March 1791 he began the *Magic Flute*, which was produced on the 30th September; and, though it was at first coldly received, it rapidly conquered public opinion, and in the end made the fortune of the lucky Schikaneder. While he was at work on the opera Mozart received the famous visit about which so much mystery has been made.

One night a stranger, now known to have been the steward of a nobleman, Count Walsegg, appeared and commissioned him to write a Requiem Mass to be finished in a month. He enjoined the strictest secrecy, and departed as mysteriously as he had come. The month passed, and Mozart was just stepping into the travelling-carriage which was to take him to Prague for the production of a new opera, when the stranger again appeared and reminded him of his promise. The incident made a deep impression on him; and the idea that it was a summons from the other world grew upon the fevered brain and broken heart of the composer. He was really dying, and, as he worked hard at the Requiem, he felt, as he said, that he was writing it for himself. On the 4th of December a few friends met in his room to rehearse the part of the work which was finished, but the dying composer was unequal to the effort. During the evening he seemed, even in unconsciousness, to be occupied with his work until an hour after midnight came the last summons.

He was buried in the common ground of St Mark's Churchyard, and no friendly eye saw his remains laid in their last resting-place. When the bereaved wife made inquiries a few days afterwards she found that the gravedigger had been changed, and her search for the grave proved fruitless; thus no one knows where Mozart was buried. It was many years after his death that Vienna awoke to sense of her shame and erected a beautiful monument to the memory of her adopted son.

Mozart wrote 624 compositions; he left no branch of the art unenriched by his genius; and he takes a high place in all. Indeed, in opera and symphony, in spite of the more advanced writings of Wagner and Beethoven, he may be said to be second to none. Gifted with an inexhaustible vein of the richest, purest melody, he is at once the glory and the reproach of the Italian school (see OPERA); for, while he surpasses all Italians on their own chosen ground, his strict training in the German school placed at his service those wonderful resources of harmony and instrumentation in which the south-erners have always been deficient. His most important operas are those already mentioned, *Don Giovanni*, *The Magic Flute*, and *Figaro*. The first stands upon a pinnacle of its own in the history of opera. It has no rival, and commands the unlimited admiration of every true musician; the great deficiencies of the libretto are forgotten in the charm of the music, in the masterly combinations of effect shown in the finales and concerted pieces, and in the triumph of sustained dramatic power in the last scene. The greatest compliment that could be paid the *Magic Flute* is that it still holds its place as a classic on the opera-stage, in spite of the most incoherent and incomprehensible plot. The importance of the orchestration gives the work a place only second to *Don Giovanni*, and it has been a favourite study with all great opera-composers. *Figaro* is perhaps the most perfect opera of the three, for in it the plot is slight, and the time required for its development very short.

Of forty-one symphonies there are three which will occupy an honoured place so long as music exists. These are the C major (called the 'Jupiter'), G minor, and E♭. The first deserves its name from the proud and noble rhythm of the first part, and the absolute ease with which the last movement sets forth a triumph of the most complicated counterpoint. In the G minor beat the first distinct pulses of that great wave of romanticism and passion which was to flood with its influence all future musical development.

The E♭ is very lively and good-humoured and tender withal. It might almost be called a 'Carnaval,' written before Schumann had shown the

way to such titles. The quartets are very beautiful and exceedingly original; but they are not associated with Mozart's name as they are with that of Haydn, nor is the fame of the earlier creator overshadowed in this branch of the art as is the case in the realm of orchestral writing. His pianoforte sonatas, and those for the violin and piano, are of no great importance except in the development of musical form; but an exception must be made in the case of the *Fantasia in C minor*, which, like the G minor symphony, foreshadows much of the new school, and reaches even so far as the influence of Schubert. His Masses are all youthful works, with the faults of youth easily recognisable, and the marks of the haste with which they were supplied as occasion required. The *Ave Verum*, a late church composition, though simple, is very expressive and touching. The unfinished *Requiem* remains a noble monument of his genius.

The great authorities on Mozart's life are Otto Jahn (1856-59; 3d ed., rev. by Deiters, 1889; Eng. trans. by Townsend, 1882); and Wyzewa and Saint-Foix (1912); see also the Life by Nohl (Eng. trans. by Lady Wallace, 1877), that by Meinardus (1882), the English one by Holmes (1845; 2d ed. 1878); and Dent, *Mozart's Operas* (1913). Nohl edited the Correspondence (2d ed. 1877). See also the Life by Fischer (1888) of Mozart's second son, Wolfgang Amadeus (1791-1844), who wrote a few compositions of slight importance.

Mozdok, a town of Russian Caucasus, on the Terek, 58 miles N. of Vladikavkaz, with three large annual fairs for horses, sheep, cattle, &c. It grows excellent melons and wine. Pop. 15,000.

Mozly, JAMES BOWLING, an able theological writer and High Church divine, was born in Lincolnshire in 1813. Educated at Oriel College, Oxford, he became a fellow of Magdalen, vicar of Old Shoreham, canon of Worcester, and in 1871 regius professor of Divinity at Oxford. Mozley had great intellectual force, subtlety of analysis, and imaginative versatility, but he wrote without facility, and his style is not in keeping with his thought. He died 4th January 1878. See his *Letters* (1884).—His elder brother THOMAS (1806-93), rector of Plymtree, Devon, wrote *Times* leaders, and was the author of *Reminiscences chiefly of Oriel College and the Oxford Movement* (1882), and *Reminiscences, chiefly of Towns, Villages, and Schools* (1885).

Mozuffernugger. See MUZAFFARNAGAR.

Msket, or MTZKHET, a town of the Caucasus, at the confluence of the Aragwa and the Kura, 12 miles NNW. of Tiflis, claims to be the oldest continuously inhabited town in the world, and to have been founded by Mtzkhetos, fifth in descent from Noah. Down to the 5th century it was the capital of the Georgian kings. Now scarce more than a village, it is dominated by the cathedral, said to occupy the spot to which Christ's shroud was brought from Golgotha. It already existed in the 4th century, and the Georgian kings were crowned and buried in it. One of the best specimens of Georgian architecture is the walled nunnery of Samtavr, with two frescoed churches, a beautiful isolated belfry, and the cell of St Nino, who brought Christianity to Georgia. A fortified monastery overlooks the town. Numerous ruins of monasteries and churches, castles and palaces, are scattered along the banks of both rivers.

Mtzensk. See MZENSK.

Much Wenlock. See WENLOCK.

Mucilage is the term applied to the solution of a gum in water—thus, mucilage of acacia, mucilage of tragacanth. The term is also sometimes applied to the natural solution of gummy substances found in plants. See GUM.

Muckers, the popular name of a sect which sprung up at Königsberg in 1835. The movement

seems to have originated in the dualistic and theosophic views of John Henry Schönherr (1771–1826) concerning the origination of the universe by the combination of a spiritual and a sensual principle. The most notable of his followers were two clergymen, J. W. Ebel (1784–1861) and Diestel, both of whom were in 1839–42 degraded from their office. Hepworth Dixon (in his *Spiritual Wives*, 1868) pointed out the resemblance of the Mucker sect to the Agapemone (q.v.) and the Perfectionists (q.v.).

Mucor. See FUNGI.

Mucous Membrane. Under the term mucous system anatomists include the skin, mucous membranes, and true glands, all of which are continuous with one another, and are essentially composed of similar parts (see SKIN, GLANDS). The mucous membrane is divided into the alimentary mucous membrane (for which see DIGESTION), the respiratory (see NOSE, RESPIRATION), and the genito-urinary (see KIDNEYS, &c.).

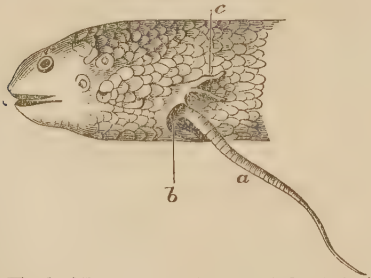
Mucuna. See COWHAGE.

Mudania, a small town of Asia Minor, on the Sea of Marmora, 15 miles NW. of Brusa, of which it is the port.

Mudar (*Calotropis*), a genus of Asclepiadaceæ found in India, Persia, &c. The inspissated juice is used as a purgative and sudorific medicine. The bark yields a fibre, and the seed a floss resembling Kapok (q.v.).

Mudéjares. See MORISCOS.

Mud-fishes (*Dipnoi*), a small but interesting order, which in some respects link fishes to Amphibians. There are three extant genera, whose antique character is indicated by their wide geographical distribution—*Ceratodus* (or more strictly *Neoceratodus*) from Queensland, *Protopterus* from tropical Africa, and *Lepidosiren* from tropical South America. There are numerous extinct representatives, from Palæozoic, Triassic, and Jurassic formations. The term 'mud-fish' refers to the habit that *Protopterus* and *Lepidosiren* have of burrowing into the mud when the dry season sets in and remaining in a torpid state till the rains return. But *Ceratodus* never leaves the water. The term *Dipnoi* (double-breathers) refers to the fact that



Head of *Protopterus* (after Wiedersheim):
Showing fore-limb (a), entrance to gill-cavity (b), external gills (c).

while they have gills, the swim-bladder has become a lung, single in *Ceratodus*, double in the two others. Among other peculiarities may be noticed: the median segmented axis in the paired fins, the approximation to a three-chambered heart, the possession of a vein resembling the inferior vena cava of higher Vertebrates, the occurrence of multicellular glands in the skin, the external gills of the larvæ of *Lepidosiren* and *Protopterus* (and in some adults of the latter as well), the large eggs with total unequal segmentation as in Amphibians. All the three forms take both vegetable and animal food. The flesh of all three is much esteemed. The development of *Lepidosiren* was elucidated by Graham Kerr's re-

searches in the Chaco country in 1896.—Another kind of 'mud-fish' is a Ganoid (*Amia calva*), not uncommon in some of the fresh waters of the United States, which attains a length of two feet, is carnivorous in diet, and gulps air at the surface of water, the air-bladder having truly pulmonary functions. But it is not a Dipnoan.

See CERATODUS, FISHES, LEPIDOSIREN; also Sedgwick, *Student's Textbook of Zoology*, vol. ii. (1905), and Bridge in the *Cambridge Natural History*, vol. vii. (1904).

Mudie, CHARLES EDWARD (1818–90), founder of the celebrated library which bears his name, was born at Chelsea. Having started as a bookseller, he established his library in 1842, which became a limited company in 1864. He published poetical *Stray Leaves* (1873).

Mudir (Arab. *mudîr*), the governor of a village or canton (in Turkey) or of a province (in Egypt).

Mudki, often spelt MOODKEE, a village of the Punjab, India, 26 miles S. of the Sutlej, and on the old road from Ferozpur to Karnal. Here the first battle in the Sikh war of 1845–46 was fought (18th December 1845), when the British under Sir Hugh Gough repulsed the Sikhs, and Sir Robert Henry Sale, 'Fighting Bob,' was killed.

Mud Volcanoes. See VOLCANOES.

Mudwort (*Limosella aquatica*), a small scrophulaceous plant, rare in Britain, growing on the margins of ponds. It has a tuft of narrow leaves, and small pale-coloured flowers, and spreads by runners.

Muehlenbeckia, an Australian and South American genus of Polygonaceæ. The leaves of *M. platyclados* drop off, and their functions are performed by the flattened green branches.

Muermo, a Chilean tree of the small South American and Australian genus *Eucryphia*, forming the order Eucryphiaceæ. It furnishes a hard and valuable wood.

Muezzin (Arab. *Mu-zin* or *Mu-azzin*; sometimes *Mueddin*), the official attached to a Mohammedan mosque who announces the different times of prayer.

Mufti. See ULEMA.

Muggletonians, a sect that arose in England about the year 1651, and of which the founders were John Reeve and Lodowick Muggleton (1609–98), obscure men, but who claimed to have the spirit of prophecy. Muggleton was a journeyman tailor. He professed to be the 'mouth' of Reeve, as Aaron was of Moses. They affirmed themselves to be the two witnesses of Rev. xi. They asserted a right to curse all who opposed them, and did not hesitate to declare eternal damnation against their adversaries. They favoured the world with a number of publications, one of which—particularly directed to the Parliament and Commonwealth of England, and to his Excellency the Lord General Cromwell—was entitled a *Remonstrance from the Eternal God*. The prophets were at that time imprisoned as nuisances in Old Bridewell. Another publication was a *General Epistle from the Holy Spirit* in 1756; Muggleton's writings were collected again in 1832. He had assailed the Quakers, and was answered effectively by Penn and George Fox. He denied the doctrine of the Trinity, held anthropomorphist opinions, with many strange doctrines over and above, as that the devil became incarnate in Eve, &c. A few Muggletonians lingered in England well into the 19th century. See Jessopp's *Coming of the Friars*, and other *Essays* (1888).

Mugwumps, a title conferred, during the United States presidential election of 1884 (New York *Sun*, June 15), on such Republicans as threw over the nominee of their party for Cleveland, the

Democratic candidate, in the interests of civil service reform. The title implied a belief that these Independents set themselves up as superior to their former associates.—The word means 'big chief' in the Algonquin Indian dialects, and John Eliot, who spelled it 'Mugquomp,' employed it to translate 'leader' and 'duke' (as in Gen. xxxvi. 15) in his Indian version of the Bible.

Muhammad. See MOHAMMED.

Mühlberg, a town of Prussian Saxony, on the Elbe, 36 miles SE. of Wittenberg, where, on 24th April 1547, the Emperor Charles V. defeated John Frederick the Magnanimous, Elector of Saxony. See SCHMALKALD.

Mühlhausen, a town of Prussian Saxony, on the Unstrut, 25 miles by rail NNW. of Gotha. An important imperial free city in the 13th century, it came to Prussia in 1802, to Westphalia in 1807, and again to Prussia in 1815; and it is still an active centre of commerce, with manufactures of woollen and cotton goods, hosiery, &c. Pop. 34,000.

Muir, JOHN, a distinguished Sanskrit scholar, was born in Glasgow in 1810, studied at the university there and at Haileybury, and at eighteen went out to Bengal to join the East India Company's Civil Service, in which he remained for twenty-five years. His last years were spent in Edinburgh, where he died, March 7, 1882. Muir was a munificent patron of learning, and himself a scholar of unusually wide intellectual and spiritual sympathies. He founded and endowed a chair of Sanskrit in Edinburgh, as well as prizes for high attainments in that language, and also provided the funds for a lectureship in comparative religion. His great work was his *Original Sanskrit Texts on the Origin and History of the People of India, their Religion and Institutions* (5 vols. 1858-70; 2d ed. 1868-73). Another book is *Metrical Translations from Sanskrit Writers* (1878).

SIR WILLIAM MUIR, his brother, was born in 1819, and at eighteen joined the Bengal Civil Service after having attended lectures at both the universities of Edinburgh and Glasgow. He rose rapidly in rank, was made K.C.S.I. in 1867, and was lieutenant-governor of the North-west Provinces, 1868-74, and Financial Minister to the government of India, 1874-76. After his return to England he sat on the Council of India in 1876-85, and from 1885 till 1903 he was Principal of the university of Edinburgh. He early became an eminent Arabic scholar, and his *Life of Mahomet* (4 vols. 1858-61; enlarged ed. 1912) and *Annals of the Early Caliphate* (1883) are works of solid and enduring value. Other books are *The Corân, its Composition and Teaching, and the Testimony it bears to the Holy Scriptures* (1878); *Extracts from the Corân* (1880); and *The Early Caliphate and Rise of Islam, the Rede Lectures for 1881*. He died 11th July 1905.

Muirkirk, a town of Ayrshire, 26 miles E. by N. of Ayr, bleakly situated, 720 feet above sea-level. It is the seat of great ironworks, dating from 1787, and chemical works. Pop. 3600.

Mukaddasi, an Arab geographer, born at Jerusalem, voyaged extensively for twenty years, and described Moslem lands in a work published in 985 A.D. It was edited by De Goeje in 1877; and the part relating to Syria and Palestine was translated from the Arabic for the Palestine Pilgrim's Text Society in 1837 by Guy Le Strange.

Mukden, or MOUKDEN, capital of Manchuria, is on a branch of the Liao, 425 miles NE. of Peking. Mukden is the Manchu name; the Chinese call it Shingking. Hence for five years the Russians controlled Manchuria, and soon after the fall of Port Arthur Mukden became the objective of three or more Japanese armies. The contest before Mukden

—one of the bloodiest in history—began in the end of February 1905, and ended with the rout of the Russians on the 12th March (see JAPAN). Previous to 1625 the town was called Shenyang; in that year Nurhachu, the founder of the late reigning family in China, made it his capital and called it Mukden. Numerous temples adorn the city. About four miles to the east is the tomb of Nurhachu. Mukden contains other imperial tombs of the same family. Good coal exists in the vicinity. Its port is Newchwang (q.v.); and it is an important point on the great railway system which connects the Siberian line with Port Arthur and the China Sea, and is rapidly transforming itself into a commercial and industrial centre.

Mulberry (*Morus*), a genus of trees of the natural order Moraceæ, natives of temperate and warm climates, with deciduous leaves, unisexual flowers in short, thick spikes, a 4-parted perianth, containing either four stamens or one pistil with two styles, the perianth of the female flowers becoming succulent and closing over the small pericarp, the whole spike coalescing into an aggregate fruit.—The Common Mulberry, or Black Mulberry (*M. nigra*) is a native of the middle parts of Asia, but was known to Theophrastus, and is now almost naturalised in the south of Europe. It is a low tree, much branched, with thick rough bark, and broad heart-shaped leaves, which are unequally serrated, and very rough. It is cultivated in the middle parts of Europe, and succeeds well in the south of



Common Mulberry (*Morus nigra*).

England, but in the northern parts of Britain it requires a wall. The perianth and stigmas are roughly ciliated, and the fruit is of a purplish-black colour, with dark red juice, fine aromatic flavour, and subacid sweet taste. The fruit is much esteemed for dessert; an excellent preserve and a pleasant light wine are made of it. The tree often produces its fruit in prodigious quantity. The wood is employed in cabinet-work, but is not of much value. The leaves are sometimes used for feeding silkworms. The Black Mulberry lives long; trees still existing in England are known to be more than 300 years old. It is propagated by seed, by suckers, by layers, or by cuttings. It succeeds best in a rich light soil.—The White Mulberry (*M. alba*) is a native of China, and has been there planted from time immemorial for the sake of its leaves, which are the best food for silkworms; on this account also it has been cultivated in the south of Europe since the 12th century. In North America it does not succeed farther north than 43° lat., being somewhat more impatient of

frost than the Black Mulberry. The perianth and stigmas are smooth; the fruit is almost white, and is much less palatable than that of the Black Mulberry, although in this respect there is great difference among the many varieties. A rob made of it is useful in sore throat. The best variety for feeding silkworms, on account of its rapid growth and abundant leaves, is that called the Philippine Mulberry. In India the White Mulberry is treated as a bush, and cut down twice a year; the shoots, stripped of their leaves, being thrown away, although the bark has long been used in China and Japan for making paper. It grows readily from cuttings. The root has a considerable reputation as a vermifuge.—The Red Mulberry (*M. rubra*), a native of North America, abounding particularly on the lower parts of the Missouri, endures severe frosts much better than either of the preceding, and is therefore preferred for cultivation in some parts of Europe. Its fruit is deep red, and almost as pleasant as the Black Mulberry. It forms a tree 60 to 70 feet high, with a circumference of about 6 feet; the wood is fine grained and strong.—The Indian Mulberry (*M. indica*) has black fruit of a delicate flavour, and the leaves are extensively used for feeding silkworms in China, Cochin-China, and Bengal.—*M. celtidifolia*, a Peruvian species, and *M. levigata*, the species most common in the north of India, produce pleasant fruit. There are numerous other species. The Mauritius Mulberry of Mauritius and Madagascar has been put in another genus, as *Ampalis madagascariensis*.

The Paper Mulberry (*Broussonetia papyrifera*) differs from the true mulberries in having the female flowers collected in a globular mass. The tree is of moderate size, or, in cultivation, a bush of 6 to 12 feet high, with leaves either simple or lobed, a native of India, Japan, and the islands of the Pacific Ocean, but now not uncommon in pleasure-grounds in Europe and North America. The islanders of the Pacific cultivate the Paper Mulberry with great care. They make a kind of clothing from the bark, using for this purpose the bark of small branches about an inch in diameter, which they macerate in water, and then, scraping off the epidermis, they press and beat the moist slips together. The paper also which is used in Japan and many parts of the East is in great part made from the bark of the young shoots of this plant, which for this purpose is boiled to a pulp, and treated somewhat in the same way as the pulp of rags in Europe. When the shoots are cut, new ones spring up very rapidly. Silkworms eat the leaves of the Paper Mulberry. The fruit is oblong, of a dark-scarlet colour, sweetish, but insipid. *B. papyrifera* also yields a fibre in Japan.

Mulcaster, RICHARD, philologist, (c.1530–1611), in 1548 became a scholar of King's College, Cambridge, but attracted no notice till 1555, when he removed to Oxford, and was chosen student of Christ Church, quickly becoming eminent for his knowledge of eastern literature. In 1561 he was appointed master of Merchant Taylors' School, and in 1596 master of St Paul's School. He enjoyed great reputation as a Greek and oriental scholar and successful schoolmaster. His English and Latin works were celebrated in their day, the principal being *Positions, &c. necessarie for the Training up of Children* (Lond. 1581) and *Elementarie on the Right Writing of our English Tung* (1582). He was early addicted to dramatic composition, and assisted in the performance of plays before Queen Elizabeth.

Mulder, GERARD JOHANNES (1802–80), was professor of Chemistry at Utrecht, best known from his investigations on protein and vegetable physiology.

Mule, the hybrid offspring of the male ass and the mare, much used and valued in many parts of the world as a beast of burden. The head, ears, croup, and tail show very distinctly the 'prepotency' of the ass; but in bulk and stature the mule is nearer the horse, and seems to excel both its parents in sagacity, muscular endurance, sure-footedness, and length of life. Though never much used in Britain, it has been common from ancient times in many parts of the East, and is a very important animal in most of the countries round the Mediterranean, and in the mountainous parts of South America. The best European breeds are found in France, Spain, and Italy; those of Kentucky, Missouri, Minnesota, and Mexico are also renowned. The carrier-mules of South America and elsewhere are driven in troops, each led by a bell-bearing old mare. Her they follow with such docility and affection that when the troops mingle in their halting-places they are readily separated by securing the leader. In ancient times mules were often reserved as the peculiar steeds of princes, and they are still used to draw the carriages of Italian cardinals and other ecclesiastical dignitaries. Mules are very surefooted, strong of limb and firm of hoof, clever at passing steep places and sharp turns, easy to please with food. They may be ridden, driven, or used for pack purposes. Their flesh is edible.

Mules are sterile when paired together, and there is no clear proof of what is often alleged, that a mule-mare may produce a foal to a horse or to an ass. Mule-mares have been known to adopt and suckle foals. The hinny or companion hybrid of the mule, the offspring of a female ass and a stallion, is not common, and is decidedly inferior in size, strength, and beauty. See ASS, HORSE, HYBRID, CANARY; and for the Spinning-mule, see SPINNING.

Mulgrave. See SHEFFIELD (JOHN).

Mulgrave Islands, a name given to some of the Marshall Islands (q.v.) from their discoverer, the navigator Lord Mulgrave (1744–92).

Mulhacén. See SIERRA NEVADA.

Mülhausen (Fr. *Mulhouse*), a town of Alsace-Lorraine, on the Ill and the Rhone and Rhine Canal, 68 miles by rail SSW. of Strasburg and 20 NW. of Basel. It consists of three parts, the old town, the new town, and the artisans' town, and is a place of first-rate industrial importance. The cotton manufacture employs many thousands of work-people in the town and adjacent villages. Besides this, it has printing and dye works for cotton, linen, calico, wool, and silk fabrics, chemical factories, iron and other metal works, and shops for making machinery, railway plant, &c. Pop. (1821) 13,027; (1861) 45,887; (1885) 69,759; (1910) 105,488; (1921) 98,393. Mülhausen, which existed as early as 717, was made a free imperial city by Rudolf of Hapsburg in 1273. By siding with some of the Swiss cantons in the 14th century it was enabled to maintain a certain degree of neutrality in the feuds between the empire and France. In 1515 it joined the Swiss Confederation, and in 1528 adopted the Reformed faith. But in 1798 it was incorporated with France, and began to come to the front as an industrial place after 1829. It is noted for the excellent arrangements made for the housing, &c., of the working-classes. It became a town of the German empire after the war of 1870–71. It was occupied by the French in August 1914, ceded to France with the rest of Alsace in 1919, and included in Haut Rhin.

Mülheim, (1) a manufacturing town of Rheinland, on the river Ruhr, 16 miles N. of Düsseldorf. It has great ironworks and an extensive trade in coal. Pop. (1875) 15,445; (1919) 128,205.—(2) MÜLHEIM-AM-RHEIN is now part of Cologne.

Mull, an Argyllshire island, the largest of the Hebrides after Lewis and Skye, is separated from the mainland by the Sound of Mull (19 miles long and $1\frac{1}{2}$ to $3\frac{1}{4}$ miles wide), and is engirt by a number of smaller islands—Gometra, Ulva, Staffa, Iona, &c. It is 347 sq. m. in area, and has a maximum length and breadth of 30 and 29 miles, but is so deeply indented, especially towards the Atlantic, by a dozen sea-lochs and bays—the chief, Loch-na-Keal and Loch Scridain—that the coast-line cannot be less than 300 miles. The rocks are chiefly volcanic, with fine red granite in the south-west; and the surface is mountainous. Benmore (3185 feet) is the loftiest summit, Bentalloch the most beautiful, where there is much that is beautiful—these misty heights, the stretching moors, the sea-cliffs at Carsaig, the terraced basaltic plateaus, the glens, streams, and lakes, and the patches of wood and green pasture. The climate is good for the Highlands, and the soil of fair fertility, but grazing answers much better than corn-crops. Tobermory (q.v.), in the north, is the only town. Aros and Duart Castles are interesting ruins; and Mackinnon's Cave was pronounced by Dr Johnson 'the greatest natural curiosity he had ever seen.' Pop. 3800, of whom the majority are Gaelic-speaking.

Mullein, the common English name of the genus *Verbascum*, belonging to the Scrophulariaceæ, and containing some two hundred species, of which six (Great Mullein, White, Dark, Moth, &c.) are natives of England, and have been naturalised in the United States. The leaves and stem (2 to 4 feet high), of the common and larger species, are covered with a dense, woolly growth; the flowers form a dense spike a foot long.

Müller, F. MAX-. See MAX-MÜLLER.

Müller, FRITZ (1821-97), naturalist, Darwin's 'prince of observers,' born near Erfurt, studied natural history and medicine at Berlin and Greifswald, and went in 1852 to Blumenau in Brazil. *Für Darwin* (1864) did much to advance Darwinism. He published also important observations on butterflies.

Müller, HERMANN (1829-83), brother of Fritz Müller (q.v.), was born at Mühlberg, studied at Halle and Berlin, and became a teacher at Lippstadt. He wrote on the local fauna and flora; but his renown rests on his *Befruchtung der Blumen durch Insekten* (1873) and other books on insect-pollination of flowers.

Müller, JOHANNES, one of the most eminent physiologists of the 19th century, was born at Coblenz on 14th July 1801, studied at Bonn and Berlin, chiefly anatomy and zoology, and in 1826 was appointed professor of Physiology and Anatomy at Bonn; in 1833 he succeeded Rudolphi as professor of Anatomy and Physiology at Berlin, and held that post until his death, 28th April 1858. He is regarded as the founder of modern physiology, on the ground that he summed up the work of his predecessors, instituted the methods of experimental and microscopic investigation of physiological properties, himself carried out and recorded most valuable observations in connection with the mechanism of sight, hearing, and voice, and the chemical and physical properties of chyle, lymph, and bile, and studied in an original and fruitful way the phenomena of reflex action and the glands. Moreover, his *Handbuch der Physiologie des Menschen* (2 vols. 1833-40) exercised a great influence. Müller was scarcely less eminent as a student of comparative anatomy; he observed rapidly and accurately, and possessed a remarkable insight into the interrelations of structural parts. In this department his most famous memoirs were those

on the Amphioxus, on fishes, the Echinoderms, and the Cæcilians.

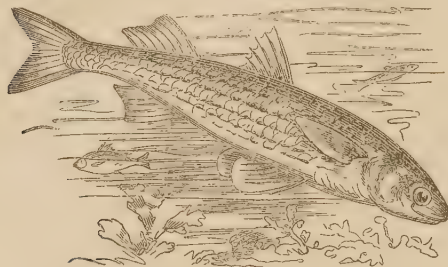
Müller, JOHANNES VON, historian of Switzerland, was born 3d January 1752 at Schaffhausen, studied at Göttingen under Heyne, Schlözer, and others, and in 1772 was appointed professor of Greek at Schaffhausen. Already he had begun the investigation of Swiss chronicles and documents. From 1774 to 1780 he lived in Geneva, taught there, and wrote his *Allgemeine Geschichte* (3 vols. 1810), and published the first volume of his great work, *Geschichte der Schweizer*. Shortly afterwards he was given the professorship of History and a librarianship at Cassel, but resigned both posts in 1783. In 1786 he became librarian and councillor of state to the Elector of Mainz, and began the publication of his larger *Geschichte der schweizerischen Eidgenossenschaft* (5 vols. 1786-1808; improved ed. 1826). In support of the confederation of the German princes he wrote a *Darstellung des Fürstenbundes* (1787). In 1792, when Mainz was taken by the French, he went to Vienna, where the Emperor Leopold nominated him a member of the privy-council; but, a Protestant at a Roman Catholic court, he did not see much prospect of advancement, and in 1804 left Vienna for Berlin, where he was appointed historiographer of the Hohenzollern family, and wrote *Ueber die Geschichte Friedrich's I., Ueber den Untergang der Freiheit der alten Völker, and Versuch über die Zeitrechnungen der Vorwelt*. Introduced to Napoleon after the battle of Jena, he was appointed by him (1807) secretary of state in the new kingdom of Westphalia; but died at Cassel, 29th May 1809. His *Sämmtliche Werke* were published, 27 vols. Tübingen, 1800-19; new ed. 40 vols. Stuttgart, 1831-35. See Lives by Heeren (1820), Döring (1835), Monnard, in French (1839), and Thiersch (1881).

Müller, JULIUS (1801-78), a German theologian, was born at Brieg, brother of Karl Otfried Müller, the antiquary. He studied at Breslau and Göttingen, at first law, next theology, and after a severe mental struggle adopted opinions in religion opposed to those of the Rationalists. He was professor at Göttingen, Marburg, and Halle. His reputation chiefly rests upon *Die christliche Lehre von der Sünde* (Bresl. 1839; 6th ed. 1878).

Müller, KARL OTFRIED, classical archaeologist, was born 28th August 1797, at Brieg, in Silesia, studied at Breslau and Berlin, and in 1819 was appointed professor of Archaeology and director of the Philological Seminary at Göttingen. He died at Athens, 1st August 1840, whilst on a tour through Italy and Greece. His great design was to embrace the whole life of ancient Greece, its art, politics, industry, religion, in one warm and vivid conception—in a word, to cover the skeletons of antiquity with flesh, and to make the dry bones live. Thus his activity ranged over the whole field of Greek antiquity. We are indebted to him for many new and striking elucidations of the geography and topography, literature, grammar, mythology, manners and customs of the ancients. His work on the Dorians (*Die Dorier*; Eng. trans. 1839) forms the 2d vol. of his *Geschichte Hellenischer Stämme und Städte* (new and improved ed. 1844), his principal production; the first vol. deals with Orchomenos and the Minyans. The treatises on the ancient Macedonians (1825) and on the Etruscans (2 vols. 1828; new ed. 1877-78) continue the same line of investigations. Other valuable works from his pen are *Ancient Art* (1830; new ed. 1878; Eng. trans. 1847); *System of Mythology* (1825; Eng. trans. 1844); and *History of the Literature of Ancient Greece* (1846), undertaken at the request of the British 'Society for the Diffusion of Useful

Knowledge,' translated into English by Sir George Cornwall Lewis and Dr Donaldson, the latter of whom continued the work down to the taking of Constantinople. The German original was published by Müller's brother (2 vols. 1841; new ed. 1882-84). Müller issued useful critical editions of Varro, *De Lingua Latina* (1833); Festus, *De Significatione Verborum* (1839); and Æschylus, *Eumenides* (1833-35). See Memoirs by Lücke (1841) and F. Ranke (1870).

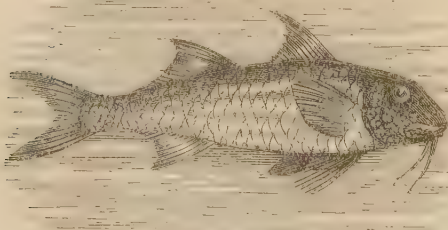
Mullet (*Mugil*), a genus of bony fishes, type of the family Mugilidæ. 'Gray mullets,' as they are called, are widely represented palatable fishes, chiefly found in coastal and brackish waters. Some tropical forms occur in fresh water. They feed on the small animals, confervoid algæ, and organic debris in the mud. In adaptation to this diet, there is an interesting filtering arrangement in the pharynx which keeps the gills from being



Common Gray Mullet (*Mugil capito*).

clogged. The useless stuff is in part rejected; in part passed down to the tough-walled, muscular, gizzard-like stomach, beyond which there is an exceedingly long intestine. The dentition is feeble. The colours are plain. Some attain to a weight of 10 or 12 pounds. Two British species are *M. chelo* and *M. capito*, the latter ranging from Scandinavia to the Cape of Good Hope. The Mediterranean gray mullet formed a favourite Roman dish, and the preserved roe is a special delicacy.

The so-called 'red mullets' (*Mullus*) are entirely different fishes in the family Mullidæ, nearly related to the sea-breams (*Pagrus*) and the American 'sheep's head' (*Diplodus*), one of the best salt-water fishes of the United States. From these and other Sparidæ the 'red mullets' differ in their very weak dentition, in the presence of two long erectile barbels, which, when at rest, lie hidden in two



Surmullet.

grooves behind the mouth. The body is slightly compressed, the scales are large and thin, the colours are brilliant. The food consists mainly of small crustaceans, worms, and the like, found in the mud. The Mullidæ are most abundantly represented in tropical and sub-tropical parts of the Indo-Pacific Ocean, but they are present in most warm seas, and extend to northern Europe. The surmullet (*M. surmuletus*) has three or four longitudinal yellow bands on a fine pink-red

ground colour, and was for a time erroneously regarded as the female form of *M. barbatus*, which is a distinct species or variety. It rarely exceeds two pounds in weight, and is much esteemed as a food-fish. The Romans used to bring surmullets alive into the banqueting-room, that the guests before eating the fishes might see the fine colours which they display as they die. There is a repulsive modern custom of securing (for market purposes) a relative permanence of the bright colour by scaling the fish before it is really dead.

Mullet. See HERALDRY.

Mullingar, the chief town of Westmeath, in Ireland, 50 miles WNW. of Dublin by rail, on the Royal Canal and the river Brosna. It is an important trading town, and a centre for anglers visiting the Westmeath lakes. Pop. 5500.

Mullinger, JAMES BASS (1834-1917), born at Bishop's Stortford, had a distinguished career at Cambridge, where in 1890 he became a lecturer on history. He wrote a history of his university (vols. i.-iii. 1873-1911), *The Schools of Charles the Great*, and other works.

Mullion, the upright division between the lights of windows, screens, &c., in Gothic architecture. Mullions are rarely met with in Norman architecture, but they become more frequent in the Early English style, and in the Decorated and Perpendicular are very common. They have sometimes small shafts attached to them, which carry the tracery of the upper part of the windows. In late domestic architecture they are usually plain. See WINDOW.

Mulock, MISS. See CRAIK.

Mulready, WILLIAM, genre-painter, was born at Ennis, in Ireland, 1st April 1786. When a boy he went to London with his parents, and at the age of fifteen entered as a student in the Royal Academy. Having tried classical subjects and landscape, he soon found his true sphere in genre-painting—painting subjects such as 'A Road-side Inn,' 'Horses Baiting,' the 'Barber's Shop,' and 'Punch' (1812), 'Boys Fishing' (1813), 'Idle Boys' (1815). He was elected an Associate of the Royal Academy in November 1815, and an Academician in February 1816. He also worked indefatigably at portrait-painting and the illustration of children's books; designed the famous 'Mulready envelope' for Sir Rowland Hill; and was throughout conscientious, careful in drawing, and rich in colouring. 'The Truant' (1835), 'The Seven Ages' (1838), 'The Sonnet' (1839), 'First Love' (1840) are famous works of his middle period; and his illustrations to the *Vicar of Wakefield* are well known. His later works, 'Women Bathing' (1849), 'Blackheath Park' (1849), 'The Toy Seller' (1862), showed failing powers. He died in London, 7th July 1863. See Stephens, *Memorials of Mulready* ('Great Artists' series, 1890).

Multan, or MOOLTAN, an ancient city of India, in the Punjab, stands on a mound formed by the ruins of ancient cities that occupied the same site, 4 miles from the left bank of the Chenab, the inundations of which sometimes reach Multan. It is surrounded on all sides except the south by a wall 10 to 20 feet high. The European quarter lies to the north and west of the city, whilst to the south is the citadel, which contains two Mohammedan shrines, the ruins of an ancient Hindu temple, and a massive obelisk (70 feet) to the memory of Vans Agnew and Anderson, murdered here in 1848. The vicinity abounds in mosques, tombs, shrines, &c. Manufactures of silks, cottons, and carpets are carried on; and the glazed pottery and enamel work enjoy a high reputation. Multan is an important centre of

trade in all the products of the Punjab. In 1849 Multan was taken by the British troops and annexed. Pop. (1868) 54,652; (1881) 68,674; (1891) 74,562; (1911) 99,243; (1921) 84,806.

Multiple-poining is a well-known form of legal process in Scotland, by which competing claims to one and the same fund are set at rest. A person who has funds in his possession, to which there are more claimants than one, is liable to be harassed by double distress; and hence he commences a suit called the action of multiple-poining, by which he alleges that he ought not to be made to pay the sum more than once; and as he does not know who is really entitled to payment, he cites all the parties claiming it, that they may fight out their claims among themselves. The corresponding process in England is Interpleader (q.v.).

Multiple Proportions. See CHEMISTRY.

Mummius. See CORINTH.

Mummy. See EMBALMING.

Mumps, a popular name of a specific inflammation of the salivary glands described technically as *Cynanche Parotidea*, or *Parotitis*. In Scotland it is frequently termed *The Branks*. The disorder usually begins with a feeling of stiffness about the jaws, which is followed by pains, heat, and swelling beneath the ear. The swelling begins in the parotid, but the other Salivary Glands (see SALIVA) usually soon become implicated, so that the swelling extends along the neck towards the chin, thus giving the patient a deformed and somewhat grotesque appearance. One or both sides may be affected, and in general the disease appears first on one side and then on the other. There is seldom much fever. The inflammation is usually at its highest point in three or four days, after which it begins to decline, suppuration of the glands scarcely ever occurring. In most cases no treatment further than to relieve fever, due attention to the bowels, and protection of the parts from cold, by the application of flannel or cotton-wool, is required, and the patient completely recovers in a week or a fortnight. The disease is infectious; and the infection probably remains for at least a fortnight after apparent recovery. Like most infectious diseases, it seldom affects the same person twice. It chiefly attacks children and young persons. A singular circumstance connected with the disease is that in many cases the subsidence of the swelling is immediately followed by swelling and pain in the *testes* in the male sex, and in the *mammae* in the female. The inflammation in these glands is seldom very painful or long continued, but is apt in the male to lead to permanent atrophy of the organs.

München. See MUNICH; also GLADBACH.

Münchhausen, KARL FRIEDRICH HIERONYMUS, BARON VON, a member of an ancient, noble family of Hanover, whose name has become proverbial as the narrator of false and ridiculously exaggerated exploits and adventures, was born 11th May 1720, at Bodenwerder, in Hanover, served as a cavalry officer in Russian campaigns against the Turks, and died at his birthplace, 22d February 1797. A collection of his marvellous stories, or stories attributed to him, was first published in English under the title of *Baron Münchhausen's Narrative of his Marvellous Travels and Campaigns in Russia* (Lond. 1785). They were compiled by Rudolf Erich Raspe, an expatriated German (whose financial enterprises were not creditable to him), and by other hack writers. The book went rapidly through several editions; and in 1786 appeared the first German version edited by the poet Bürger. Ellisen's edition (reprinted in 1890) is enriched by an admirable introduction. So is Secombe's English edition (1894), which points out many hits at Bruce, Montgolfier, &c. Several of the adven-

tures ascribed to the baron occur in Bebel's *Facetiae* (1508); others in Lange's *Deliciae Academicæ* (1765). See T. Secombe's Introduction to his edition (1894).—A Freiherr von Münchhausen (1813-86) became in 1850 head of the government of Hanover; and after the annexation of Hanover by Prussia (1866) he made himself a champion of the national party.

Muncie, capital of Delaware county, Indiana, 54 miles by rail ENE. of Indianapolis, is an important railway junction, and has manufactories of machinery, iron and steel, &c. Pop. 36,500.

Munday, ANTHONY (1553-1633), translator of chivalry romances and maker of ballads, plays, pageants, &c., was born and died in London, and was also an actor, a stationer, and a spy on the English Catholics at Rome.

Münden, a town of Hanover, at the influx of the Werra and Fulda to the Weser, 15 miles NE. of Cassel. Engirt by wooded hills, it has a school of forestry (1868), an old castle (with museum), various small manufactures, and a trade in timber. Pop. 12,000. See also MINDEN.

Mungo, St. See KENTIGERN.

Mongoose. See ICHNEUMON.

Munich (Ger. *München*), the capital of Bavaria, is situated in a flat, barren plain, 1700 feet above the sea-level, chiefly on the left or west bank of the impetuous Isar, a tributary of the Danube. By rail it is 440 miles SSW. of Berlin, 272 W. of Vienna, and 867 SE. of London. Several bridges, including a railway bridge, span the river to the suburbs on the right bank. The elevated site of the city and the neighbourhood of the Alps render it liable to sudden changes of temperature, sometimes ranging over 20° in twenty-four hours. The population, in 1801 only 48,885, was in 1880 230,023; by 1900 it had increased to 499,959; by 1919 to 630,711. The inhabitants are predominantly Roman Catholic. Munich is one of the handsomest cities in Germany, and perhaps the richest in treasures of art, while itself famous for its school of painting. Especially under King Ludwig I. (1825-48), who spent nearly 7,000,000 thalers in beautifying the city, it has been decorated with buildings of almost every style of architecture, many of them ornamented with frescoes and sculpture; wide and handsome streets have been constructed; and the squares and gardens adorned with statues and other monuments. Among the imposing buildings erected to house the public collections are the Glyptothek (1816-30), with its magnificent collection of ancient and modern sculpture, including the famous *Äginetan* marbles, discovered in 1811; the Old Pinakothek (1826-36), containing a large valuable collection of paintings by the old masters, besides engravings and many drawings, and a priceless collection of antique vases; the New Pinakothek (1846-53), devoted to the works of modern painters; the National Library, rich both in printed works and in MSS.; and the Bavarian National Museum, illustrating the history of civilisation and art. The New Palace includes an older palace and chapel, the Königsbau (1826-35), in the style of the Pitti Palace at Florence, with Schnorr's frescoes of the Nibelungenlied, and the sumptuously-adorned Banqueting Hall building. Other public structures are the Court Theatre, one of the largest in Germany, with room for 2600 spectators; the old and the new town-house; the Temple of Fame, a Doric colonnaded building containing busts of eighty illustrious Bavarians, in front of which rises the colossal statue of Bavaria, 65 feet high; the Generals' Portico (1844), a copy of the Loggia dei Lanzi at Florence; the conspicuous Maximilianeum, on its terrace on the right bank of the Isar, a college for civil servants, containing

a gallery of modern historical paintings; and various palaces and administrative buildings. Among the gates of Munich the most beautiful are the Gate of Victory, designed after Constantine's triumphal arch in the Forum; the old Isar gate, with its elaborate frescoes; and the Propylæa (1862), commemorating the Greek war of independence. The numerous churches are all, except two or three, Roman Catholic. The oldest is St Peter's (1294). The huge brick church of Our Lady (1468-88), the cathedral of the archbishopric of Munich-Freising, is remarkable for its two unfinished towers (325 feet), now capped with cupolas; in the interior is the elaborate tomb of the Emperor Louis the Bavarian. St Michael's, or the Jesuits' church (1583-91), contains a monument by Thorwaldsen to Eugène Beauharnais; the Theatine Church (1767) contains the royal burial-vault; the Louis Church (1830-44) is embellished with Cornelius's fresco of the 'Last Judgment'; the beautiful church of St Mariahilf (1831-39) is noted for its gorgeous painted glass and fine wood-carvings; and the basilica of St Boniface (1835-50) for its sixty-six monoliths of gray Tyrolean marble and resplendent interior decoration. The Court Chapel of All Saints is a perfect casket of art-treasures. Munich is admirably endowed with scholastic, literary, scientific, and benevolent institutions, including Royal Academies of Art and Science, a Polytechnic School, &c. The university, the second largest in Germany, was founded at Ingolstadt in 1472, was removed to Landshut in 1800, and transferred thence to Munich in 1826; its library is extensive; and its subsidiary institutions are numerous and well equipped. Adjoining the palace is the Court Garden, bounded on two sides by arcades adorned with frescoes; farther north is the English Garden, a park 600 acres in area; and on the right bank of the Isar are the attractive Gasteig promenades. The industrial development of Munich lags behind its æsthetic development. Its stained-glass works, iron, brass, and bell foundries, lithographing and engraving works, and manufactories of optical and mathematical instruments, and various artistic articles are, however, deservedly noted. Still more famous are the enormous breweries of Bavarian beer; of the annual production the greater part is consumed in the city itself, but much is also exported. Munich carries on a large trade in grain and in objects of art.

In 1158 Henry the Lion raised the *Villa Munichen* from its previous obscurity by establishing a mint and a salt-emporium within its precincts, the name (also appearing as *Forum ad Monachos*) being derived from the monks who owned the site. In the 13th century the dukes of the Wittelsbach dynasty selected Munich for their residence and fortified the town. In 1327 the old town was nearly destroyed by fire, and was rebuilt by the Emperor Ludwig the Bavarian very much on the plan which it still exhibits; but it was not until the fortifications were razed at the close of the 18th century that the limits of the town were enlarged to any extent. The true history of modern Munich is the account of its artistic development, with which the artists most closely identified are Klenze and Gärtner the architects, Schwanthaler the sculptor, and Cornelius and Kaulbach the painters. The modern Munich school of painting, once headed by K. von Piloty (1826-86) and W. Diez (1839-1907), is characterised by marked realism in colour and detail, in contrast to the romanticism of the older masters. The 1918 revolution was headed in Munich by Kurt Eisner, after whose assassination in February 1919 Munich experimented in 'council' government.

Municipal Architecture is shown in the buildings used for municipal purposes, such as town-halls, guildhalls, &c. These were first built

when the towns of the middle ages rose in importance and asserted their freedom. Those of North Italy and Belgium were the first to move, and consequently we find in these countries the earliest and most important specimens of municipal architecture during the middle ages. Municipal buildings always partake of the character of the architecture of the period when they were erected. In Italy, for instance, they are of the Italian-Gothic style in Vicenza, Venice, Florence, &c., during the 13th, 14th, and 15th centuries. In Belgium, during the same period, they are of the northern Gothic style, and are almost the only really fine specimens of the civil architecture of the middle ages now extant. The wrecked Cloth-hall at Ypres, and the town-halls of Brussels, Bruges (see BELFRY), Oudenarde, the Exchange at Antwerp, and many other markets, lodges, halls, &c., testify to the early importance of the municipal institutions in Belgium. We look for town-halls in vain in France or England till the development of industry and knowledge had made the citizens of the large towns so wealthy and important as to enable them to raise the municipal power into an institution. But from the 15th and 16th centuries there exist in Britain abundant instances of buildings erected for the use of the guilds and corporations and the municipal courts. See also GUILDHALL.

It is a curious fact that in France, where the towns became of considerable importance during the middle ages, so few municipal buildings remain. This arises from the circumstance that the resources of the early municipalities of France were devoted to aid the bishops in the erection of the great French cathedrals, and the townspeople used these cathedrals as their halls of assembly, and even for such purposes as masques and amusements.

Municipality (from Lat. *municipes*, from *munus* and *capio*, 'one who enjoys the rights of a free citizen'), a town or city possessed of certain privileges of local self-government, the governing body in such a town. Municipal institutions originated in the times of the Roman empire. The provincial towns of Italy, which were from the first Roman colonies, as also those which, after having an independent existence, became members of the Roman state, though subjected to the rule of an imperial governor, were allowed to enjoy a right of regulating their internal affairs. A class of the inhabitants called the *curia*, or *decuriones*, elected two officers, called *dumviri*, whose functions were supposed to be analogous to those of the consuls of the imperial city, and who exercised a limited jurisdiction, civil and criminal. There was an important functionary in every municipality called the *defensor civitatis*, or advocate for the city, the protector of the citizens against arbitrary acts on the part of the imperial governor. The municipal system declined with the decline of the empire, yet it retained vitality enough to be afterwards resuscitated in union with feudalism, and with the Saxon institutions of Britain. Some cities of Italy, France, and Germany have indeed derived their present magistracy by direct succession from imperial Rome. For British Municipalities, see BOROUGH, CITY. See also FREE IMPERIAL CITIES; and Dawson, *Municipal Life and Government in Germany* (1914).

Munjeet. See MADDER.

Munkacs, or MUKAČEVO, a market-town of the Ruthene territory of the Czechoslovak Republic, situated at the foot of the Carpathians, 101 miles by rail NE. of Debreczin, has mines of iron and rock-crystals. The citadel, built on an isolated height, resisted the imperial arms for three years (1685-88); and, having fallen in 1848 into the hands of the Hungarians, was captured by the Russians in the following year. Pop. 20,000.

Munkacsy, MICHAEL, painter, whose real surname was LIEB, was born at Munkacs, 10th October 1846. He went a turner's apprentice to Vienna, and studied painting there, at Munich, and at Düsseldorf, and in 1872 settled in Paris. Except a few portraits, his works are nearly all genre-pictures. Three classes may be distinguished—those depicting Hungarian life, mostly very dark in colouring; those illustrative of the social life of Paris, much lighter and brighter in tone; and historical pieces. Vigorous characterisation and pictorial breadth are conspicuous traits. Insane from 1897, he died 1st May 1900.

Munro, SIR HECTOR (1726–1805), of Novar, served in the Low Countries, embarked for India in 1760, won the great battle of Buxar in Bihar in 1764, and shared with Coote in the defeat of Hyder Ali. He returned to England in 1781, held military appointments at home, and spent his last years in improving his estate at Novar in Ross-shire.

Munro, HUGH ANDREW JOHNSTONE, Latin scholar, born at Elgin in 1819, was educated at Shrewsbury and Trinity College, Cambridge, elected fellow of his college in 1843, was professor of Latin in his university in 1869–72, and died at Rome, 30th March 1885. His greatest achievement was an edition of *Lucretius* (1864; 4th ed. 1885), text, translation, and notes, one of the finest and most brilliant works of British scholarship. His *Horace* appeared in 1869; his *Criticisms and Elucidations of Catullus* in 1878; and his translations into Latin and Greek verse were printed in 1884.

Munro, NEIL, born 3d June 1864 at Inveraray, became a journalist in Glasgow. *The Lost Pibroch* (1896) called attention to his insight into the Highland mind. Longer Highland romances and other tales followed—*John Splendid* (1898), *Gilian the Dreamer* (1899), *The Daft Days* (1907), &c.

Munro, SIR THOMAS (1761–1827), son of a Glasgow merchant, was educated at the Glasgow grammar-school and university, arrived as an officer in the H.E.I.C.S. at Madras in 1780 in time to serve in the operations against Hyder Ali in 1780–83, assisted in the reorganisation of Mysore, administered Kanara, and introduced the raiyatwari system of tenure, subsequently extended to most of Madras and Bombay. In 1807–15 he was in England, where he had great influence on Indian legislation. Having commanded in the second Mahratta war, he was in 1819 named governor of Madras. He died of cholera. See *Lives* by Gleig (1830), Arbuthnot (1889), and Bradshaw (1894).

Munster. See IRELAND.

Münster, capital of Westphalia, stands on a small stream, by rail 101 miles N. by E. of Cologne and 106 SSW. of Bremen. It retains numerous remains of mediæval architecture, including the mixed Romanesque and Gothic cathedral (12th to 14th century); Our Lady's Church, Gothic (1340); the Gothic church of St Lambert (14th century); the church of St Ludgerus, also Gothic, dating from 1330; the Gothic town-hall, in which, in 1648, the peace of Westphalia was signed (also signed simultaneously at Osnabrück, q.v.); the castle, built in 1767, and surrounded by fine pleasure-grounds, including botanical gardens; and the 16th-century town wine-cellar, in which are preserved some rare pictures of the Old German school. The old Catholic university of Münster was reduced in 1818 to an academy, which in 1902 regained the rank of university. Attached to it are a library, a natural history museum, and collections of art and antiquity. The industrial products of Münster include woollen, cotton, and silk fabrics, and paper, besides dyeing, printing, and enamelling. The trade is limited to linens, woollens, thread,

cattle, corn, &c. Pop. (1875) 35,705; (1885) 44,060; (1919) 100,452, mostly Catholics. Münster was known under the name of Mimigardevord in the time of Charlemagne, who in 791 made it the see of the new bishop of the Saxons, St Ludgerus. Towards the middle of the 11th century a monastery (whence Münster) was founded on the spot, and by 1186 it had grown into a town. In the 12th century the bishopric was elevated into a principality of the empire. In the 13th century the city became a member of the Hanseatic League; and in 1532 it declared its adhesion to the Reformed faith, notwithstanding the violent opposition of the chapter. During 1535 Münster was the scene of the violent politico-religious movement of the Anabaptists (q.v.). The bishop repossessed himself of the city, and in 1661 Bishop Bernhard built a strong citadel within the walls, and deprived the citizens of nearly all their liberties. In both the Thirty Years' War and the Seven Years' War Münster suffered severely. The bishopric, which since 1719 had been held by the Archbishop of Cologne, although it retained a special form of government, was secularised in 1803, and divided among various reigning houses. The Congress of Vienna gave the greater part of the principality to Prussia, a small portion being apportioned to Oldenburg, while Hanover acquired the territories of the mediatised Dukes of Aremberg. The bishopric was reconstituted in 1821.

Münster, SEBASTIAN, scholar, was born at Ingelheim in the Palatinate in 1489, studied at Heidelberg and Tübingen, and became a Franciscan monk, but at the Reformation he embraced the new doctrines (1529). He then taught Hebrew and theology at Heidelberg, and from 1536 mathematics at Basel, in which city he died on 23d May 1552. He brought out the first Hebrew Bible (1534–35) edited by a German; wrote *Cosmographia* (1544), a work on geography that kept its ground for more than a century; and published a Hebrew grammar, a Chaldaic grammar (1527), and lexicon (1527), and a Latin-Greek-Hebrew dictionary (1530).

Muntjak (*Cervulus muntjac*). These small deer, of which there are several species, appear to connect the true deer with the Chevrotains (q.v.); they inhabit the forest tracts of the oriental region—i.e. India, China, Java, Sumatra, Formosa, and the Philippines. The males have large canine teeth as in the Chevrotains; the horns are borne upon a long pedicel covered with hair, which seems to resemble the 'horn' of the giraffe.

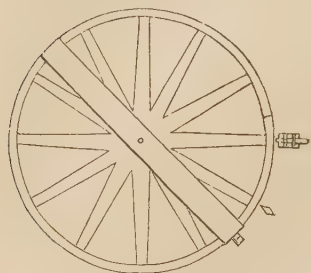
Muntz's Metal. See BRASS.

Münzer, THOMAS, one of the leaders of the Anabaptists, (q.v.), was born at Stolberg, in the Harz, about 1489, studied theology, and in 1520 began to preach at Zwickau. His Christian socialism and his mystical doctrines soon brought him into collision with the Reformers and the town authorities. He thereupon made a preaching tour through Bohemia, Silesia, and Brandenburg, and settled in Thuringia (1523). Again deprived of his office, he visited Nuremberg, Basel, and other south German cities, and was finally in 1525 elected pastor of the Anabaptists of Mühlhausen, where he won the common people, notwithstanding Luther's denunciations of him, introduced his communistic ideas, and soon had the whole country in insurrection. But on 15th May 1525 he and his men were totally routed at Frankenhausen by Philip of Hesse. Münzer himself was captured in flight and executed on 30th May at Mühlhausen.

See *Lives* by Melancthon (1525), Strobel (1795), and Seidemann (1842); also Belfort Bax, *The Rise and Fall of the Anabaptists* (1903), and other works cited at ANABAPTISTS.

Muræna. See EEL.

Mural Circle, an astronomical instrument for



Mural Circle.

the observation of celestial bodies at their meridian passage. It consists of a large metal circle, turning on an axis the end of which projects from a solid stone pier or wall (whence the name), close to which the circle moves. The plane of the circle is set as nearly

as possible in the meridian. Fixed immovably to the circle is a telescope, which by turning the circle is made to point to the star to be observed, at the time of its meridian passage. The mural circle is now almost obsolete, modern improvements enabling all its work to be much better done by the transit circle.

Mural Crown. See CROWN.

Mural Decoration dates from very ancient times. The Egyptian and Etruscan monuments form an integral and important part of the history of Painting (q.v.), and have helped to mould the development of certain styles of art (see ARABESQUE). Incised work and reliefs have been largely employed. The Greeks tinted their temples and 'picked out' their sculptured friezes and pediments with colour; coloured bricks were used in Assyrian, and wall tiles (see POTTERY) in Moslem, architecture. Some of the Roman walls were built of tufa and red brick, coloured brick, terra-cotta, and variegated arrangements of marble were largely used in Italy. The plaster-work known as Sgraffito (q.v.) is especially adapted for this use. Many English churches of the mediæval period have been built of flint and stone, and much Tudor work of parti-coloured brick. Distemper and Fresco are described in separate articles; water glass is a silicate process of which there is an example in the Houses of Parliament. Mosaic-work is extensively used in floors and ceilings, but also occasionally employed in mural decoration. The dado of the Albert Memorial Chapel at Windsor is composed of slabs of inlaid marble hatched with coloured gold cement. See also TAPESTRY, WALL-PAPER.

Another system is that known as Encaustic Painting (Gr. *enkaustikē*, 'fixed by fire'), a manner of mural painting with a medium composed principally of wax, practised by the ancients. As the name implied that fire was used in the execution, some have been led to suppose that encaustic painting was the same as enamel painting; but notices by Pliny and other writers show clearly that it was a species of painting in which the chief ingredient used for uniting and fixing the colours was wax dissolved by heat. Various attempts have been made in modern times to revive it. About the middle of the 18th century Count Caylus and Bachelier, and in 1792 Mrs Hooker of Rottingdean, under the name of Emma Jane Greenland, made various successful experiments with this view. Encaustic painting was again taken up in Germany under the patronage of Louis I. of Bavaria, who commissioned Louis Schnorr to execute a series of historical subjects on the walls of the royal palace, Munich. For preparing her medium Mrs Hooker dissolved gum-arabic in water, afterwards adding gum-mastic, which was dissolved by stirring and boiling, and when the mixture had reached the boiling-point

she put in the wax. After painting the picture, she passed a thin coating of melted wax over it with a hard brush, and then drew over the surface an iron—for ironing linen—moderately heated. After the picture cooled it was rubbed with a fine linen cloth. The German method is somewhat similar, but some other ingredients are used; among these, potash with the wax; and, in place of an iron being passed over the surface, the wax is brought to the surface by a vessel containing fire being held at a little distance from the picture. It is also possible to employ a medium made of a mixture of turpentine and beeswax sufficiently plastic to be worked like oil. A modification of the system was also devised by Mr Gambier-Parry, and is known as Spirit Fresco. By his method the walls are coated with wax and gum compounded with spirit of lavender. The colours are ground with the same medium.

Murano, famous as the seat of the Venetian glass manufacture, is an island and town a little more than a mile north of Venice, with 6000 inhabitants. It possesses a fine 12th-century cathedral, and another church with some valuable pictures, including Paul Veronese's 'St Jerome in the Desert.' But the chief interest centres in the glass-factories—an industry established in the 13th century, and revived in 1860 by Antonio Salviati (1816-90).

Murasaki, a lady of the Japanese aristocracy, who, early in the 11th century, wrote a long novel *Genji Monogatari* and a diary. The former, translated by Mr Arthur Waley (*The Tale of Genji*, vol. i., 1925) was hailed by critics as one of the world's great novels, appealing especially to 20th century readers by its delicate sensitiveness.

Murat, JOACHIM, king of Naples, was the son of an innkeeper at La Bastide-Fortunière, near Cahors, in France, and was born 25th March 1767. He was at first intended for the priesthood, but the outbreak of the Revolution fired his enthusiasm; he entered the army, and soon rose to the rank of colonel. Attaching himself closely to Bonaparte, he served under him in Italy and in Egypt, distinguishing himself in many battles; rose to the rank of a general of division (1799); returned with Bonaparte to France, and rendered him most important assistance on the 18th Brumaire, by dispersing the Council of Five Hundred at St Cloud. Bonaparte now entrusted him with the command of the Consular Guard, and gave him his youngest sister, Caroline, in marriage. Murat held his usual post, the command of the cavalry, at Marengo, where he covered himself with glory, and in 1801 was nominated governor of the Cisalpine Republic. On the establishment of the French empire he was loaded with honours. He continued to command the cavalry in the armies led by the emperor, and contributed not a little to the victory at Austerlitz (1805), at Jena, at Eylau, and to many other victories. In 1806 the newly-erected grand-duchy of Berg (q.v.) was bestowed upon him, and on 1st August 1808 he was proclaimed king of the Two Sicilies by the style of Joachim I. Napoleon. He took possession of Naples, but the Bourbons, supported by the fleet of Britain, retained Sicily. By the moderation of his government he won the hearts of his subjects. In the expedition against Russia he commanded the cavalry, and indeed the army after Napoleon left it. After completing the rout at Dresden (1813), and helping to fight the disastrous battle of Leipzig, he concluded a treaty with Austria, and a truce with the British admiral, and promised the allies an auxiliary corps; but, as soon as he learned of Napoleon's escape from Elba and return to France, he commenced a hasty war against Austria. He was, however, defeated at Ferrara (12th April 1815), and again at Tolentino (2d May). With a few horsemen he fled

to Naples, where all was insurrection and commotion; thence he found his way to France. After Napoleon's final overthrow, he took refuge in Corsica, from which he proceeded with a few followers to the coast of Calabria, and proclaimed himself king and liberator, but, being presently taken prisoner, was tried by court-martial, and shot at Pizzo, on 13th October 1815. See biographical accounts by Gallois (Paris, 1828), Coletta (Paris, 1821), Helfert (Vienna, 1878), Weil (1910), and Hilliard-Atteridge (1911); and *Lettres et documents pour servir à l'histoire de Murat* (1907 et seq.).—His widow (1782–1839) assumed the title of Countess of Lipona, and resided in the neighbourhood of Trieste till her death. His two sons went to the United States, where the elder, NAPOLÉON ACHILLE (1801–47), settled in Florida, married a niece of Washington, and published *Exposition des Principes du Gouvernement Républicain en Amérique* (1833). The younger, NAPOLÉON LUCIEN CHARLES (1803–78), suffered reverses in fortune; but, returning to France after 1848, he attached himself to Louis Napoleon, who sent him as ambassador to Turin and made him a senator.

Muratori, LODOVICO ANTONIO, Italian antiquary and historian, was born at Vignola, in the duchy of Modena, 21st October 1672. In 1695 he was appointed a librarian of the Ambrosian Library at Milan. His first work was to issue collections of inedited Latin fragments, *Anecdota Latina*, followed later by *Anecdota Græca*. In 1700 he was recalled by the Duke of Modena to take charge of the D'Este Library and the ducal archives at Modena. In 1723 the first folio volume of his great collection, *Rerum Italicarum Scriptores*, was published, and between that date and 1751 twenty-eight more. This work contains all the chronicles of Italy from the 5th to the 16th century, illustrated with commentaries and critical notices. It was accompanied by a collection of dissertations illustrative of the religious, literary, social, political, military, and commercial relations of the several states of Italy during the same period, in 6 vols. folio, 1738–42, a work which, although far from being free from errors, is still regarded as a treasure-house of mediæval antiquities. Muratori likewise undertook a general history of Italy (*Annali d'Italia*, 12 vols. 4to, 1744–49); compiled in two vols. *Antichità Estensi* (1717); and published *Antiquitates Italicæ Mediæ Ævi* (6 vols. 1738–42), and a collection of Ancient Inscriptions (6 vols. 1739–42). In his later years he was attacked by the Jesuits on the ground of teaching heresies; but he found a protector in Pope Benedict XIV. He died at Modena, 23d January 1750. The *Antiquitates Italicæ* (vol. iii.) contains a catalogue or canon of the New Testament Scriptures, a fragment (the 'Muratorian Fragment'), apparently drawn up by a contemporary of Irenæus; see BIBLE. Lightfoot assigned it to Hippolytus; see his *Clement of Rome* (vol. ii. 1890). Muratori's *Collected Works* fill 36 volumes (Arezzo, 1767–80), and 48 volumes in another edition (Venice, 1790–1810). See the Life by his nephew (1756).

Murchison, SIR RODERICK IMPEY, geologist and geographer, was born at Tarradale, Ross-shire, 19th February 1792. He was educated at the grammar-school of Durham and the Military College, Great Marlow. He entered the army at an early age, served as an officer in Spain and Portugal, and was present at Vimeiro and the retreat to Coruña. Quitting the army in 1816, he devoted himself to science, especially geology, and travelled in various parts of the globe. He found the same sedimentary strata lying in the earth's crust beneath the Old Red Sandstone in the mountainous regions of Norway and Sweden, in the vast

and distant provinces of the Russian empire, and also in America. The result of his investigations was the discovery and establishment of the Silurian system, which won for him the Copley Medal of the Royal Society, and European reputation as a geologist. His subsequent exposition of the Devonian, Permian, and Laurentian systems increased and confirmed his reputation. He explored several parts of Germany, Poland, and the Carpathians; and in 1840–45, with De Verneuil and others, carried out a geological survey of the Russian empire. Struck with the resemblance in geological structure between the Ural Mountains and the Australian chain, Murchison in 1844 first predicted the discovery of gold in Australia. He was president of the British Association in 1846, and of the Royal Geographical Society in 1844–45, was re-elected in 1857, and continued to hold that post till 1870, when he was compelled to resign it by paralysis. Perhaps no contemporary did more to promote geographical science at home, and kindle the spirit of adventure among those engaged in Arctic exploration on the one hand and African discovery on the other. In 1855 he was made director-general of the Geological Survey and director of the Royal School of Mines. His investigations into the crystalline schists of the Highlands established a striking instance of regional metamorphism on a large scale. In 1870 he founded the chair of Geology of Edinburgh University. He died 22d October 1871. Most of his contributions to science appeared in the *Transactions* of the Geological and other Societies. His principal works were *The Silurian System* (1839); *The Geology of Russia in Europe and the Ural Mountains* (1845; 2d ed. 1853). See Life by Sir Archibald Geikie (1875).

Murcia, an ancient town of Spain, on the left bank of the Segura, by rail 46 miles SW. of Alicante and 50 N. by W. of Cartagena. It stands in the productive vale of Murcia, an old-fashioned Moorish town, embosomed in gardens of mulberry, orange, fig, palm, and other fruit trees. Almost the only notable buildings are the bishop's palace and the cathedral, this last begun in 1353, but reconstructed in 1521, and surmounted by a fine bell-tower. Silks, saltpetre, soda, gunpowder, musical instruments, and glass are manufactured; fruit-growing, the preparation of olive-oil, and the weaving of esparto also flourish. Pop. (1877) 91,805; (1921) 141,175. Alfonso X. of Castile took the city from the Moors in 1263; an earthquake almost destroyed it in 1829; and it was captured by the insurgents in 1843.—The province of Murcia has an area of 4453 sq. m. and pop. of 640,000. Along with the present province of Albacete it was an independent Arab kingdom for 27 years in the 13th century.

Murder is the unlawful and intentional killing of a human being by a human being. The most compendious statement of the distinctions drawn by the law of England between murder and manslaughter is given by Sir James Fitzjames Stephen in article 223 of his *Digest of the Criminal Law*. He says: 'Manslaughter is unlawful homicide without malice aforethought. Murder is unlawful homicide with malice aforethought. Malice aforethought means any one or more of the following states of mind preceding or co-existing with the act or omission by which death is caused, and it may exist when that act is unpremeditated: (a) an intention to cause the death of, or grievous bodily harm to, any person, whether such person is the person actually killed or not; (b) knowledge that the act which causes death will probably cause the death of, or grievous bodily harm to, some person, whether such person is the person actually killed or not, although such knowledge is accompanied by indifference whether death or grievous

bodily harm is caused or not, or by a wish that it may not be caused; (c) an intent to commit any felony whatever; or (d) an intent to oppose by force any officer of justice on his way to, in, or returning from the execution of the duty of arresting, keeping in custody, or imprisoning any person whom he is lawfully entitled to arrest, keep in custody or imprison, or the duty of keeping the peace, or dispersing an unlawful assembly, provided that the offender has notice that the person killed is such an officer so employed.' If the act of killing is done in the heat of passion caused by provocation, it is not murder, but manslaughter. The law presumes that every one who has killed another has murdered him, unless there are circumstances in the case to raise a contrary presumption. Murder is punished by death, manslaughter by penal servitude for life, or by a fine, according to the degree of culpability involved in the crime. The law of Scotland does not substantially differ from that laid down by Sir James Stephen, the chief distinction being that what in England is called manslaughter is in Scotland called culpable homicide. In the United States the only noteworthy distinction from the law of England is the recognition of different degrees of murder. An early act of the legislature of Pennsylvania distinguishes murder by poison or waylaying, or any other deliberate and premeditated killing, or murder committed in the furtherance of any arson, rape, robbery, or burglary, as murder of the first degree, and murder of all other kinds as murder of the second degree. The statute law of other states has similar provisions. In England and Wales during 1899-1923 the average annual number of murders committed and known to the police was 148. During that same period the average annual number of persons tried for murder was 64. The proportion of homicides of all kinds to population during this period was in England and Wales 1 to 200,000. From differences in legal classification and administration, it is notoriously difficult to compare the frequency of murder in different countries. But an estimate has been made that, whereas in England there are 7.1 murders per 10,000 deaths, in Germany the proportion is 6.4 murders to 10,000, in France 8, in Austria 8.8, in Switzerland 13.8, in Spain 23.8, in Italy as many as 29.4 per 10,000 deaths. The arguments for and against the abolition of Capital Punishment (q.v.) have been discussed in a separate article; see also EXECUTION, BIRTH (CONCEALMENT OF), SUICIDE.

Murdock, or **MURDOCH**, WILLIAM, inventor of gas for illuminating purposes, was born in August 1754, near Auchinleck, Ayrshire. His family traced their descent from some Flemish architects or engineers; and his father, a millwright and miller near Old Cumnock, designed the first iron-toothed gearing in Great Britain. Murdock worked under his father till he was twenty-three, then entered the employment of Boulton & Watt, Birmingham, and showed such marked ability that he was sent to Cornwall to superintend the erection of mining engines there. At Redruth he constructed in 1781 the model of a high-pressure engine to run on wheels. Watt showed some jealousy at these efforts; but Boulton offered him a reward for an engine capable of carrying two persons and the driver. His labours in Cornwall were arduous, though he had not more than £1 per week up till his forty-fourth year; and, a request for an increase of salary not being promptly acceded to, he made up his mind to change. The mining companies at last realising the value of his services, offered him £1000 a year as chief engineer at the mines. But he declined, returning to Boulton & Watt, who gave him a like salary as general manager of Soho Works. Mur-

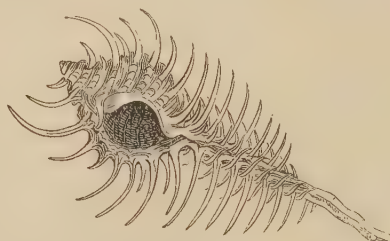
dock's inventive brain was never idle; he introduced labour-saving machinery, a new method of wheel rotation, and an oscillating engine (1785). He also improved Watt's engine; introduced a method of casting steam cases for cylinders in one piece, instead of in segments; a rotatory and compressed-air engine; a steam gun; cast-iron cement; a method of heating by circulating water through pipes; a method of sending messages through an exhausted air tube; and many other inventions. His investigations in the distillation of coal-gas began at Redruth in 1792, when he lighted his offices and cottages by its agency. He publicly showed the results in 1797 and in 1798, the premises at Soho being lighted with gas. But he did not reap due profit from this useful invention. He died 15th November 1839. See a life of him by his kinsman Alexander Murdoch (1892).

Mure, **SIR WILLIAM**, of Rowallan, in Ayrshire, Scottish poet, was born in 1594, a kinsman of the author of *The Cherrie and the Slae*. He was wounded at Marston Moor, and died about the end of 1657. He translated into English sapphics Boyd of Trochrig's Latin poem, *Hecatombe Christiana*, but his principal work is his *True Crucifix for True Catholics* (Edin. 1629). His fine version of the Psalms dates from 1639. See the Scottish Text Society's edition of his poems (2 vols. 1898).

Mure, **WILLIAM**, was born at Caldwell in Ayrshire in 1799, educated at Westminster and the universities of Edinburgh and Bonn, represented Renfrewshire 1846-55, was Lord Rector of Glasgow University 1847-48, and died in London, 1st April 1860. Colonel Mure was for many years commandant of the Renfrewshire militia. He was the author of *A Critical Account of the Language and Literature of Ancient Greece* (5 vols. 1850-57), a work of sound scholarship and great learning; he maintains the unity of the Homeric poems. Mure also wrote *Journal of a Tour in Greece* (1842) and a couple of treatises on Egyptian chronology.

Muret (**MURETUS**), **MARC ANTOINE**, a celebrated humanist, was born at Muret, near Limoges, 12th April 1526. In early life in France he read lectures on civil law with great success, but subsequently in Italy he seems to have devoted himself entirely to literature till 1576, when he took orders. He afterwards resided in Rome till his death, 4th June 1585. His well-known *Orations*, though shallow, are remarkable examples of elocution in the style of Cicero. His poems, Latin and French, though graceful and fluent, are now considered worthless; but his learned criticisms and commentaries, *Variae Lectiones*, in 5 books, are held in great estimation. There are editions of his works by Ruhnken (1789) and Frotscher (1834-41), and 2 vols. of *Scripta Selecta* (1871-73) by Frey. See also the monograph by Dejob (Paris, 1881).

Murex, a genus of marine Gasteropods, nearly related to dog-whelks. The numerous species



Venus Comb (*Murex tenuispina*).

prey upon other molluscs, boring into them by means of the radula. The shells bear rows of

spines or rough fringes, very long in 'Venus Comb,' probably of protective value. Several species, e.g. *M. trunculus* and *M. brandaris*, used to be crushed to furnish the famous Tyrian purple (dibromindigo), which is a secretion of the mollusc. See DYING.

Murfreesborough, capital of Rutherford county, Tennessee, and from 1819 to 1826 capital of the state, is 33 miles by rail SE. of Nashville, and has several colleges. Close by was fought the bloody battle of Stone River, 31st December 1862 and 2d January 1863, between Generals Rosecrans and Bragg; the Confederate army was compelled to retreat, but the losses on both sides were nearly equal. Pop. 5000.

Murger, HENRI, novelist and poet, was born in Paris on 24th March 1822. He began life as a notary's clerk, and afterwards acted as secretary to Count Tolstoi, at a salary of about a pound a week. He gave himself to literature, and for several years led the life of privation and adventure which he has described in his *Scènes de la Vie de Bohème* (1845). At last his genius was recognised by Arsène Houssaye, the editor of the *Artiste*, and during his later years his popularity was secure. Every journal was open to him, but he wrote slowly and fitfully in the intervals of dissipation, and was never in easy circumstances. He died in hospital in Paris on 28th January 1861. His first and best novel, *Scènes de la Vie de Bohème*, is, says Mr Saintsbury, a work final and perfect, which deserves a place in the literature of humanity. A vivid transcript from the scenes, alternately sombre and jovial, of the writer's years of struggle, it is in parts infinitely pathetic, in parts irresistibly amusing. Murger had a rich gift of humour, but his predominant tone is one of poignant melancholy. *Le Manchon de Francine* is one of the saddest, as it is one of the most beautiful, short stories ever penned. He had uncommon literary skill, and could portray certain types of character admirably. But he had only one subject which he could handle successfully—the Bohemia of literary Paris. Next to the *Scènes de la Vie de Bohème*, his best prose works are *Scènes de la Vie de Jeunesse*, *Les Buteurs d'Eau*, and the short tales included in the volume entitled *Madame Olympe*. His poems, *Les Nuits d'Hiver*, are graceful, sincere, and often deeply pathetic, bearing strong traces of the influence of De Musset. One of them, *La Chanson de Musette*, is a lyric masterpiece—'a tear,' said Gautier, 'which has become a pearl of poetry.' Several of Murger's pieces were translated with rare felicity by Andrew Lang in his *Lays of Old France*. Murger was likewise the author of *Le Dernier Rendezvous*, *Scènes de Campagne*, *Le Pays Latin*, *Le Sabot Rouge*, *Les Vacances de Camille*, &c.

See the notices of Murger by Gautier, Houssaye, Janin, and Saint-Victor in *Les Nuits d'Hiver* (1862).

Murghab, a river that rises in the mountains north-east of Herat in Afghanistan, flows north-west, and loses itself in the desert of Turkestan beyond Merv.

Muriatic Acid. See HYDROCHLORIC ACID.

Muridae, a family of rodent quadrupeds, containing many genera and a very large number of species, distributed over all parts of the world, of which rats and mice may be regarded as typical examples. To this family belong also voles, lemmings, hamsters, gerbilles, &c.

Murillo, BARTOLOMÉ ESTEBAN, was born of humble parentage at Seville, and baptised 1st January 1618; and, after receiving some education, was placed with his relative, Juan del Castillo, to study painting. Having saved a little money, which he made by painting somewhat stiff and

rough religious pictures for the fairs of Seville and for exportation to South America, he went to Madrid in 1641, being then in his twenty-fourth year; was favourably noticed by his celebrated townsman, Velázquez; and through his influence was enabled to study the *chefs-d'œuvre* of Italian and Flemish art in the royal collections. In 1645 he determined to return to Seville, though advised to proceed to Rome by Velázquez, who offered him letters from the king. After settling in Seville, he painted eleven large and remarkable pictures for the convent of San Francisco. He at once became famous, and, receiving numerous important commissions, was soon acknowledged as the head of the school there. In 1648 Murillo married a lady of fortune; he now maintained a handsome establishment, and his house was the resort of people of taste and fashion. About this time he passed from his first or 'cold' style—dark with decided outlines—to his second or 'warm' style, in which the drawing is softer and the colour improved. Of the second style good examples are 'St Leander,' the 'Nativity of the Virgin,' and 'St Antony of Padua.' In 1656 he was engaged on four great semicircular pictures, which are the first examples of his third or 'vaporous' manner, the outlines vanishing in a misty blending of light and shade. The three styles, it should be said, are not strictly chronological, the warm style constantly reappearing. The Academy of Seville was founded by him in 1660, but he filled the office of president only during the first year. After this came Murillo's most brilliant period; eight of the eleven pictures painted in 1661–74 for the almshouse of St Jorge, including 'Moses striking the Rock,' 'Abraham and the Angels,' 'The Miracle of the Loaves and Fishes,' 'St Peter released from Prison,' and 'St Elizabeth,' are accounted his masterpieces. He executed some twenty pieces for the Capuchin Convent after 1675. He frequently chose the Immaculate Conception or Assumption of the Virgin as a subject, and treated them much alike; the famous 'Conception' now in the Louvre was sold in 1852 at the sale of Marshal Soult's pictures for £24,000. In 1681 he went to Cadiz, and while there fell from a scaffold when painting an altarpiece in the church of the Capuchins, returned to Seville, and soon after died from the injury he received, April 3, 1682. Murillo's pictures naturally fall into two great groups—scenes from low life, Gypsies and beggar children (mostly executed early in his life), and scripture and religious works. Of the former, by which he is largely known abroad, very few are to be seen in Spain. Though his best pictures show much technical skill, truth to nature, and sentiment of a kind, they seldom show ideal beauty or sublimity of feeling.

See Miss E. E. Minor, *Murillo* ('Great Artists' series, 1882), C. B. Curtis, *Velasquez and Murillo* (1883), the latter giving a list of 481 pictures; Calvert, *Murillo* (1908); and *Murillo: des Meisters Gemälde* (ed. Mayer, 1913).

Murman Coast is the north-east coast of the Kola Peninsula. The town of Murmansk, till 1917 Romanov (pop. 2000), on the Tuloma, north of Kola, is capital of the new government of Murmansk (pop. 20,000), a port open all the year.

Murphy, ARTHUR, dramatic and miscellaneous writer, was born in Roscommon in 1727. Intended by his father for business, he was placed in a London bank, but having, during his education at the college at St Omer, in France, reached extraordinary proficiency in Greek and Latin, he contracted literary and dramatic tastes. In 1752–74 he published the weekly *Gray's Inn Journal*, which obtained him the acquaintance of Dr Johnson. Disappointed of some expectations and already in debt, he went on the stage, and

made his first appearance as Othello. In one season he paid his debts, and left the stage with £400 in his pocket; and, determining to study law, he entered Lincoln's Inn in 1757. In 1758 he produced his first play, *The Upholsterer*, a successful farce; in 1762 he was called to the bar, but with so poor a result that in 1788 he retired. He continued to write comedies and other plays for the stage, and is said to have produced more stock pieces than any man of his time. His translation of Tacitus (1793) is excellent; but his *Essay on Johnson and Life of Garrick* did not add to his fame. His dramatic works fill 8 vols. Late in life he became a Commissioner of Bankrupts, and enjoyed a pension of £200 a year. He died in 1805. See his *Life* by Jesse Foot (1811).

Murrain is the generic term loosely used to designate a variety of diseases of domestic animals, but more generally restricted to the vesicular epizootic, popularly known as foot-and-mouth disease. It is a contagious, infectious eruptive fever, affecting cattle, sheep, and pigs; but is rarely communicable to birds, horses, or men. It is characterised by the appearance of little bladders or vesicles in the mouth, on the lips, gums, and tongue, on the coronets and interdental spaces of the feet, causing inability to eat, drivelling of saliva, sometimes heat and swelling of the udder, and lameness. The disorder runs a fixed and definite course usually in eight or ten days. Good nursing, comfortable lodgings, and a liberal supply of soft, easily digestible food, are the chief requisites for speedy recovery. A laxative may be given if needed. The mouth may be washed out twice daily with a mild astringent solution, which may be made with half an ounce of alum, oxide of zinc, or sugar of lead, to the quart of water. When the udder in milch cows, in which the complaint is usually most serious, is affected, it should be bathed with tepid water before and after milking, which must be attended to very regularly, the feet kept clean, loose horn removed, and washed occasionally with the lotion used for the mouth. Outbreaks of the disease have been met by isolation and by wholesale slaughter. In 1924 Frosch and Dahmen announced the discovery of the causal organism, a filter-passing bacillus which they claimed to have isolated, cultivated, and photographed (by ultra-violet light and the ultra-microscope). See also ANTHRAX, RINDERPEST, PLEURO-PNEUMONIA.

Murray, ALEXANDER, philologist, was born the son of a shepherd in the parish of Minnigaff, Kirkcudbright, 22d October 1775, and had hardly any education save what his father could impart, till 1788, when he was at school for a short time. Yet by diligent and omnivorous reading of all such books as fell in his way or could be borrowed, he, when engaged as a shepherd, acquired, besides a scholarly knowledge of English literature, a mastery of the classics, all the principal European tongues, and Hebrew. The fame of the learned shepherd led to an invitation to Edinburgh, where he obtained a bursary, gave private lessons, and continued his linguistic labours, which were extended to oriental tongues and ancient and modern Abyssinian. In 1806 he became minister of Urr, in 1812 professor of Oriental Languages in Edinburgh University; but he died 15th April 1813. His *History of the European Languages* was published in 1823.

Murray, DAVID CHRISTIE, novelist, was born 13th April 1847, at West Bromwich, in Staffordshire, and had served as reporter and then as war-correspondent (1877-78) for several newspapers, when in 1879 he published *A Life's Atonement* in 'Chambers's Journal.' In the same journal appeared *Val Strange* and *John Vale's Guardian*. Other

works are *By the Gate of the Sea*, *The Way of the World*, *Aunt Rachel*, *Old Blazer's Hero*, *The Weaker Vessel*, *Verona's Father*, *The Brangwyn Mystery* (1906). He died 1st August 1907.

Murray, EUSTACE CLARE GRENVILLE, the 'Roving Englishman,' was born 2d October 1819, the natural son of the second Duke of Buckingham. After studying at Oxford, he served till 1849 in the Austrian army; in 1851 joined the British embassy at Vienna as attaché; in 1853-54 went on a special mission to the islands in the Aegean Sea; in 1857 was attaché at Teheran; and in the next year consul-general at Odessa. For exposing in the public press in 1866 certain abuses connected with the foreign office he was dismissed the service. He spent the rest of his life in Paris, and died at Passy, on 20th December 1881. As a journalist he is best known for his brilliant papers in the *Daily News* and *Pall Mall Gazette*, and as an author by *The Roving Englishman* (1854-55), *Embassies and Foreign Courts* (1855), *History of the French Press* (1874), *Men of the Second Empire*, &c. (1872-74), and a few brilliant novels. Of the last, *The Member for Paris* (1871) is the cleverest, but *Young Brown* (1874), from the circumstances of its hero's birth, has the most interest.

Murray, SIR JAMES AUGUSTUS HENRY, was born at Denholm, Roxburghshire, in 1837, was educated at Minto school, removed to Hawick, and was appointed assistant-teacher in the parish school there, and afterwards master of a subscription academy. He next removed to London, filling the post of foreign correspondent in the *Oriental Bank* for some years. Later he became senior assistant-master at Mill Hill school. His work on the *Dialect of the Southern Counties of Scotland* (1873) established his reputation as a philologist. He was familiar with almost all European and a large number of oriental tongues. The great work of his life, the editorship of the *Philological Society's New English Dictionary*, issued by the Clarendon Press, was begun while he was at Mill Hill (1879), an iron building in his garden there being utilised for the assortment of the two tons of material to which he fell heir from his predecessors in the editorship, Herbert Coleridge and Dr Furnivall. This work has been continued at Oxford, where Sir James Murray, with a staff of assistants, devoted his whole attention to the task. He fought his way to the front rank as an authority in the history and derivation of words, and his great *English Dictionary* is the most thorough and important work of the kind ever undertaken. A civil list pension of £250 per annum was conferred upon him in 1884; and he was knighted in 1908. He died 26th July 1915, when the dictionary was all but complete to the end of T. Portions of the dictionary have been edited by Professor W. A. Craigie, Dr Henry Bradley, and Mr C. T. Onions. See memoir by Bradley (1919).

Murray, JOHN, the name of four generations of English publishers, will for ever remain associated with the palmiest days of English literature in the 18th and 19th centuries. The founder of the house, John M'Murray, was born in Edinburgh in 1745. He obtained a commission in the Royal Marines in 1762, and in 1768 was still second-lieutenant, when, disgusted with the slowness of promotion, he purchased the bookselling business of Paul Sandby, 32 Fleet Street, London, and dropping the Scottish prefix, became a bookseller and publisher. He brought out the *English Review*, and published the first two volumes of the elder Disraeli's *Curiosities of Literature*, &c. He died 16th November 1793, and was succeeded in due time by his son JOHN (born 27th November 1778), a

minor of fifteen at his father's death, who was for a short time associated as partner with his father's shopman, Mr Highley. One of the earliest hits of John the second was Mrs Rundell's Cookery-book, of which over 300,000 copies were sold. He became connected with Mr Stratford Canning, afterwards Lord Stratford de Redcliffe, through the assistance he lent him and other Etonians with their publication of *The Miniature*. In 1808-9 he projected the *Quarterly Review*, a Tory organ, in opposition to the Whig *Edinburgh Review*; his first step being to obtain Canning's countenance. A severe criticism of Scott's *Marmion* in the *Edinburgh Review* suggested to Murray a visit to Scott; he secured his co-operation, as also that of Heber, Canning, George Ellis, and Sir John Barrow. The first number was published February 1, 1809, under the editorship of William Gifford. The new periodical was completely successful, attaining a circulation of 18,000 copies, and brought Murray into communication not only with the chief literati, but also with the Conservative statesmen of the time. A still more fortunate connection was that with Lord Byron (1810), whom he offered £600 for the first two cantos of *Childe Harold* (published 1812). Murray now removed from Fleet Street to Albemarle Street, where the business is still carried on. Here Byron and Scott first met, and here Southey made the acquaintance of Crabbe. Almost all the literary magnates of the day were 'four o'clock visitors' in Albemarle Street—'wits and bards; Crabbes, Campbells, Crokers, Freres, and Wards.' Murray paid Byron nearly £20,000 for his works, and his dealings with Crabbe, Moore, Campbell, and Irving were princely. He had at one time dealings with Constable and Ballantyne, but never approved of their methods of business. Hearing that Byron was in difficulties in 1815, he sent him a cheque for £1500, promised another for the same amount, and even offered to sell the copyright of his works on his behalf if necessary. (As to Byron's autobiography, see BYRON.) Perhaps his only unsuccessful venture was the *Representative* (1826) newspaper; his 'Family Library' was begun in 1829, and he issued the travels of Mungo Park, Belzoni, Parry, Franklin, and others. The second John Murray died in his sixty-fifth year, 27th June 1843, and was succeeded by his son, JOHN MURRAY the third, born in 1808, and educated at the Charterhouse and at Edinburgh University. A more practical and realistic age had succeeded that of Byron, and the 'Home and Colonial Library' was the precursor of much of the cheap railway and other literature of the present day. Many of the greatest works in history, biography, travel, art, and science were issued by the third Murray. Among his successes may be mentioned Dr Livingstone's *Travels and Last Journals*, Smiles's *Life of George Stephenson*, *Self-help*, Darwin's works, Sir W. Smith's dictionaries, and the well-known *Handbooks for Travellers* (begun 1836; see GUIDEBOOKS), of the first five of which he was author. He died 2d April 1892. His son, the fourth JOHN MURRAY (born 1851), then became head of the firm, which amalgamated with Smith, Elder, & Co. in 1917. See S. Smiles, *A Publisher and his Friends* (1891), and *John Murray III.*, by John Murray IV. (1919).

Murray, JOHN (1741-1815). See UNIVERSALISM.

Murray, SIR JOHN (1841-1914), born at Cobourg, Ontario, studied in Canada and at Edinburgh University, and, after a voyage on a whaler, was appointed one of the naturalists to the *Challenger Expedition* (1872-76), and successively assistant-editor and editor-in-chief (1882) of the *Reports*. He wrote a *Narrative of the ex-*

pedition and a report on deep-sea deposits, and published innumerable papers on oceanography and biology, fresh-water lakes, &c.

Murray, LINDLEY, grammarian, was born at Swatara, Lancaster county, Pennsylvania, in 1745, the eldest of twelve children, and was educated at a school in Philadelphia belonging to the Society of Friends. On his father's removal to New York he was placed in a counting-house, but his thirst for study was so ardent that he escaped to a school in New Jersey. He then studied law, and was admitted to the bar at the age of twenty-one, and commenced a good practice. During the revolutionary war he engaged in mercantile pursuits with such success as to accumulate a handsome fortune. In 1784, his health failing, he came to England and purchased an estate at Holdgate, near York, where he devoted himself to literary pursuits. In 1787 he published his *Power of Religion on the Mind*, which passed through nineteen editions, and was translated into French. His *Grammar of the English Language* was issued in 1795, and was followed by *English Exercises*, the *Key*, the *English Reader*, *Introduction and Sequel* (both translated into French), a *Spelling Book*, *A First Book for Children*, *A Compendium of Faith and Practice*, and *The Duty and Benefit of a Daily Perusal of the Scriptures*. The lesson-books all passed through numerous large editions, and there can be no stronger indication of how entirely the systematic study of the English language was long neglected by scholars than the fact that Murray's Grammar was for half a century the standard textbook throughout Britain and America. Murray wrote an autobiography to the year 1809, which was published after his death, 16th February 1826.

Murray, THE REGENT. See MORAY.

Murray River, the principal river of Australia, rises in the Australian Alps, flows north-west along the borders of New South Wales and Victoria, and in South Australia passes southward through the shallow Lake Alexandrina towards the sea at Encounter Bay. In its 1600 miles' length it drains 270,000 sq. m. The chief tributaries are the Murrumbidgee and the Darling, themselves large rivers. Under an irrigation scheme, there is at Lake Victoria, 4 miles from the river and 35 below the mouth of the Darling, a large water storage basin, while half a mile below the inflow of the Mitta-Mitta there is the great Hume reservoir, one of the largest in the world. These storage basins, together with a system of locks, are designed also to render navigation continuous throughout the year by averaging out the river's annual flow in flood and drought; but as a valuable waterway the Murray continues to be handicapped by its mouth, which cannot be entered by ships of any size; now, however, its course is tapped at various points by railway. Fruit is the principal product of the Murray valley. See also AUSTRALIA, NEW SOUTH WALES, VICTORIA.

Mürren, a Swiss resort in the Weisse Lütscheline valley, 3 miles S. of Lauterbrunnen.

Murrumbidgee, a river of New South Wales, rises in the Australian Alps, 40 miles from the Pacific coast, flows first northwards through a hilly country, then westwards through great plains, and finally enters the Murray after a course of some 1350 miles. The Lachlan is its principal tributary. Where the river leaves the hills is the Burrinjuck dam, serving the Murrumbidgee irrigation area 240 miles lower down, and regulating also the river's flow for purposes of navigation.

Murshidabad, a town of India, situated on the left bank of the Bhagirathi, a branch of the Ganges, 124 miles N. of Calcutta. During the 18th

century it was the capital of Bengal and a very populous city; but after (1790) the British made Calcutta their headquarters it declined, and the population is now under 11,000. The chief buildings of note are the palace of the Nawab (1837), the Imámbara ('house of prayer'), and a mosque. Two miles south of the city is Motijhil or Pearl Lake; on its bank stood the palace of Suraj-ud-Dowlah, in which the English Residents dwelt. The city is noted for its ivory-carving, its embroidery in gold and silver lace, silk-weaving, and the manufacture of hookah pipes and musical instruments.

Murten, battle. See MORAT.

Murviedro. See SAGUNTUM.

Murzuk. See FEZZAN.

Musa, a genus of Musaceæ (q.v.), to which the Banana (q.v.) belongs, and also Manila Hemp (see ABACA). A very interesting species, *Musa insularimontana*, has been discovered in the mountains of Formosa. Its fruit is full of seeds, and therefore inedible.

Musaceæ, a natural order comprising the largest of herbaceous plants, generally destitute or almost destitute of true stems, yet resembling trees in appearance, and sometimes rivalling palms in stateliness, the long sheathing bases of the leaf-stalks combining to form a false stem. The blade of the leaf has many fine parallel veins proceeding from the mid-rib to the margin. The flowers are congregated on spadices, which are protected by spathes. The fruit is either a 3-valved capsule or fleshy. The species are not numerous; they are natives of warm climates, in which they are widely distributed, and are of great value to the inhabitants of tropical countries; the fruit of some, particularly of the genus *Musa*, being much used for food, whilst the fibres of the leaves are employed for cordage and for textile purposes (see BANANA, ABACA, FIBROUS SUBSTANCES). A very interesting plant of the other Musaceæ is the Traveller's Tree (q.v.) of Madagascar.

Museus, one of the ancient mythical poets, seers, and priests of the Greeks, is said to have been the son of Eumolpus and Selene, or, according to others, the son and pupil of Orpheus. He was the reputed author of a number of poems, oracles, purificatory verses, hymns, &c., of which we possess but a few fragments, and those of doubtful authenticity.—A later MUSEUS, who flourished about the end of the 5th century A.D., was the author of a beautiful little poem in Greek, entitled *Hero and Leander* (ed. by Aldus Manutius c. 1494; by Dilthey, Bonn, 1874; trans. E. E. Sikes, 1920). See HERO.

Musa Ibn Nosair (born 640), the Arab conqueror of northern Africa (699–709) and of Spain (712), fell under the displeasure of the Khalif of Damascus, and died in poverty in the Hejaz in 717.

Musäus, JOHANN KARL AUGUST, a German writer, born on 29th March 1735, at Jena, where he studied theology. In 1763 he was appointed tutor to the pages at the ducal court of Weimar, and in 1770 became professor at the gymnasium. His first production in 1760 was a parody of Richardson's *Sir Charles Grandison*, a book at that time extravagantly admired in Germany. Eighteen years later he satirised Lavater in *Physiognomische Reisen*. But his literary fame rests upon his version of *Volksmärchen der Deutschen*, which professed to be a collection of popular tales noted down from the lips of old people; but such is not exactly the case: their chief note is an artificial naïveté. Nevertheless, they are tinctured with such a blending of satirical humour, quaint fancy, and graceful writing that they have become a

classic of their kind. He continued to work the satirical vein in *Freund Heins Erscheinungen in Holbeins Manier* (1785), and began a course of tales, *Straussfedern* (1787), which he did not live to complete, dying at Weimar, 28th October 1787. See Life by M. Müller (1867) and Ad. Stern in *Literatur-fragmente* (1893).

Muscae Volitantes is the term applied to ocular spectra, which appear like flies on the wing, or floating black spots before the eyes. There are two kinds of muscae volitantes—the one a perfectly harmless kind, while the other is symptomatic of serious disease of the eyes. Whoever will look through a minute pin-hole in a card at the clear sky may see floating before his sight a number of translucent tubes or fibres, and many little beads, of which some are separate, some attached to the tubes, and some apparently within them. Some of the tubes or fibres are straight, others looped or twisted, and others again forked. All these objects are bright in the middle, and bounded by fine black lines, beyond and parallel to which may be seen an appearance of coloured lines or fringes. The doublings and crossings of the loops or knots in the twisted fibres appear as black points. Though the eye be fixed, these bodies change their position with greater or less rapidity. These appearances are produced by the shadows of minute corpuscles and fibres present in the vitreous humour. They are not generally noticed under ordinary conditions; but some persons, especially those who have small pupils or who are short-sighted, readily see them, especially on looking at a bright surface, such as a white cloud or a brightly-illuminated sheet of paper. If attended to and watched they become more prominent, and may cause a good deal of annoyance. When they become visible and troublesome under ordinary conditions they generally indicate some defective state of health, particularly of the digestive organs. The appearance of dark spots before the eyes not answering to the above description generally points to the existence of a diseased condition of the deeper parts of the eye, vitreous humour, retina or choroid: and as these, or the morbid conditions causing them, are almost always visible with the ophthalmoscope, the eyes should be thoroughly examined in any doubtful case (see EYE, OPHTHALMOSCOPE).

Muscardine, or SILKWORM ROT (*Botrytis Bassiana*, so called from the Italian physician Bassi, who first proved its true nature in 1836), is a Discomycete fungus first observed on the silkworm in Piedmont and France in the later part of the 18th century. It was frequently epidemic during the first half of the 19th, but has since been practically stamped out. De Bary showed that it occurs not unfrequently upon a variety of insects.

Muscat, or more correctly MASKAT, capital of Oman (q.v.) or Muscat, stands in a narrow rocky cove shut in by high hills on the Gulf of Oman. Communication with the interior of Arabia is through Matrah, 2 miles up the coast. The town is surrounded by a wall, and defended by forts on the rocky heights above. Its streets are narrow and not over clean; in summer the heat is intense; hence it is not a healthy place. Yet its situation makes it of great importance for the commerce (and smuggling trade) between eastern Arabia, Persia, India, the east coast of Africa, and the Red Sea. Its exports are chiefly dates, limes, and other fruits, cotton goods, hides, mother-of-pearl, pearls, and fish, in which its coastal waters are extraordinarily rich; imports include arms and ammunition (but gun-running is being suppressed), coffee, rice, sugar, piece-goods, &c. Most of the trade is with India. Although a very ancient

place, Maskat remained small until under Portuguese rule (1508-1648) it developed into a prosperous commercial centre. It was subsequently governed by native rulers (*imams*), who succeeded the Portuguese also as masters of Zanzibar and some places on the east coast of Africa. These African possessions were, however, wrested from the imams by a younger branch of the family in 1856. A British Political Agent to advise the Sultan resides at Maskat. Pop. about 10,000.

Muscatel (Ital. *moscado*, 'musk'), the name given to many sweet, strong French and Italian wines, whether white or red. Amongst the finest are the white Rivesaltes and red Bagnol from Roussillon, and the Lunel from the Pyrenees, the Lacrymæ Christi of Naples, &c. Fine varieties are yielded by Syracuse, Sardinia, the Cape, Canary Islands, Corfu, Crete, and Cyprus.

Muscatine, capital of Muscatine county, Iowa, is on the west bank of the Mississippi, built mostly on rocky bluffs, where the river makes a great bend to the south, 211 miles by rail WSW. of Chicago. It has a large trade by river and rail, and contains great canning-works and manufactures of doors, buttons, jewellery, &c. Pop. 16,000.

Muschelkalk (Ger., 'shell-lime'), the middle member of the Triassic system as developed in Germany. It is wanting in Britain. The Muschelkalk consists chiefly of limestone—the series attaining a thickness of 550 to 1100 feet. The upper portion is more or less pure limestone and highly fossiliferous; the middle and lower portions consist mostly of dolomitic limestone, with which are associated rock-salt, gypsum, and anhydrite. One of the most abundant and characteristic fossils of the Muschelkalk is the lily encrinite (*Encrinurus liliiformis*). See TRIASSIC SYSTEM.

Muscle, the fleshy parts of an animal. Muscular tissue is specially distinguished by its power of contracting in one direction, and is the instrument by which all the sensible movements of the animal body are performed. When examined under a high magnifying power the fibres of which it is composed are found to exist under two forms, which can be distinguished from one another by the presence or absence of very close and minute transverse bars or stripes. The fibres of the *voluntary* muscles—those whose movements can be influenced by nerve impulses originated by the will—as well as the fibres of the heart, are *striped*; while those of the *involuntary* muscles, such as the muscular fibres of the intestinal canal, of Blood-vessels (q.v.), and in skin, are *unstriped*.

On examining an ordinary voluntary muscle with the naked eye, we observe that it presents a fibrous appearance, and that the fibres are arranged with great regularity in the direction in which the muscle is to act or contract. On closer examination

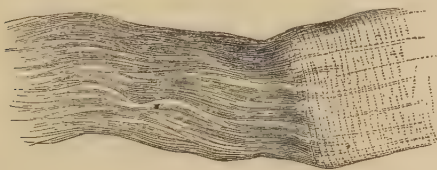


Fig. 1.—Attachment of Tendon to Muscular Fibre in the Skate.

it is found that these fibres are arranged in *fasciculi*, or bundles of various sizes, enclosed in sheaths of areolar tissue, by which they are at the same time connected with and isolated from those adjoining them; and when the smallest *fasciculus* visible to the naked eye is examined with the microscope it

is seen to consist of a number of cylindrical fibres lying in a parallel direction, and closely bound together. These fibres may end in blunt extremities or be forked as in the lips, or branched as in the tongue. Each fibre consists of an elastic homogeneous sheath—the *sarcolemma* (Gr. *sarx*, 'flesh,' and *lemma*, 'a skin or husk'), which contains a contractile semi-fluid material. This substance shows transverse striæ at regular intervals, as well as longitudinal striæ. Dilute mineral acids cause the fibre to cleave crosswise into discs. When highly magnified the transverse striæ resolve themselves into (1) a thin dim disc whose edges appear to adhere to the sarcolemma, (2) a clear space, (3) a broad dim disc, (4) a clear space like 2, (5) another disc like 1, &c.

Nerve fibres pierce the sarcolemma, and end upon the contractile substance (see NERVOUS SYSTEM). No blood-vessels penetrate the sarcolemma; they merely lie in the intervals between the fibres. Through the medium of tendon or aponeurosis the muscular fibres are attached to the parts which they are intended to move. Aggregated in parallel series, of greater or lesser size, and associated with nerves, vessels, tendinous structures, &c., they form the various muscles, which are for the most part solid and elongated, but are sometimes expanded (as in the diaphragm) into a membranous shape. In the human subject voluntary muscles are red, and although pale fibres are scattered through many of them, still nothing is ever seen to correspond with what may be found in the muscles of the rabbit. The colour is due to a substance closely akin to the blood-pigment. Each muscle has a middle portion or *belly* and two extremities which are attached. When the belly contracts it acts in a straight line, and drags equally on both extremities; but, as one is more



Fig. 2.—Sarcolemma of Mammalian Muscle.



Fig. 3.—Muscular Fibre of Frog's Tongue—mag. 200 diameters (after Kölliker).

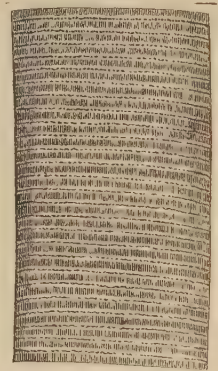


Fig. 4.—Portion of Human Muscular Fibre—mag. 600 diameters.

fixed than the other, the force is spent in bringing the movable attachment nearer to the fixed one, and thus the fixed end is named the *origin*, the movable end the *insertion*. Muscles are usually grouped around joints, and attached to bone.

The *involuntary* or *unstriped* muscular tissue most commonly occurs in the shape of flattened bands of considerable length, but of a width not exceeding $\frac{2}{30}$ or $\frac{1}{30}$ of an inch. Their substance presents fine longitudinal markings, and

each cell possesses an elongated nucleus, towards each end of which a few fine granules are found. Kölliker has shown that every one of these bands or fibres is either a single elongated cell (a fibre-cell) or is a fasciculus of such cells (see CELL). These fibres have not usually fixed points of attachment like the striated fibres, but form continuous investments around cavities within the body, such as the intestinal canal, the blood-vessels; or are dispersed through the substance of tissues, such as the skin, to which they impart a contractile property.

Cardiac muscle, although involuntary, differs in a remarkable manner from the fibres just described. It consists of quadrangular cells, which are often branched at their ends. Each cell has a clear oval nucleus near its centre, and the cells present transverse striæ not so distinct and less regular than those of voluntary muscle. Hitherto these cardiac fibres have not been shown to possess a sarcolemma.

The chemical composition of ordinary or voluntary muscle is described at FLESH. The fibrillæ, or the sarcous elements of which they are composed, consist of a substance termed Syntonin (q.v.), which closely resembles the fibrine or coagulating constituent of the blood; and the same syntonin is also the main constituent of the unstriated muscles, or at all events of their fibre-cells. Like the blood-fibrin, it exists in a fluid form in the living tissue, and only coagulates or solidifies after death.

Muscles vary extremely in their form. In the limbs they are usually of considerable length, surrounding the bones and forming an important protection to the joints; while in the trunk they are flattened and broad, and contribute very essentially to form the walls of

the cavities which they enclose. Muscles derive their names variously (1) from their situation—as the temporal, pectorals, glutæals; or (2) from their direction—as the rectus, obliquus, &c., of which there may be several pairs—as, for example, rectus femoris, rectus capitis; or (3) from their uses—as the masseter, the various flexors, extensors; or (4) from their shape—as the deltoid, trapezius, rhomboid; or (5) from the number of their divisions—as the biceps and triceps; or (6) from their points of attachment—as the sterno-cleido-mastoid, the sterno-thyroid.

The skeleton, which may be termed the locomotive framework, may be regarded as a series of levers, of which the fulcrum is, for the most part, in a joint—viz. at one extremity of a bone—the resistance (or weight) at the

further end, and the force (or muscle) in the intermediate portion. In most cases, in order to preserve the necessary form of the body, muscles are applied at a great mechanical disadvantage as regards the exercise of their power; that is to say, a much larger force is employed than would suffice,

if differently applied, to overcome the resistance. The two main sources of this disadvantage lie in the obliquity of the insertion, and consequently of the action of most muscles, and in the muscles being usually inserted very near the fulcrum. The first of these disadvantages is in many cases diminished by the enlargements of the bones at the joints. See fig. 8, A. The tendons (*i*) of the muscles (*m*) situated above the joint are usually inserted immediately below the bony enlargement, and thus reach the bone that is to be moved (*o*) in a direction somewhat approaching the perpendicular. If this enlargement did not exist (as in Fig. 8, B), the contraction of the muscle, instead of causing the lower bone to turn upon the upper one with comparatively little loss of power, would do little more than cause the two ends of the bones to press upon each other. The second mechanical disadvantage is compensated for by gain in the extent and velocity of movement, and by the avoidance of the great inconvenience of having the muscles extended in straight lines between the ends of jointed continuous levers. Thus, the bones of the forearm (fig. 9, *b, c*) are bent upon the bone of the arm (*a*) by the biceps muscle (*d*), which arises close to the head of the latter, and is inserted at *e*, at a short distance from the elbow-joint, which acts as the fulcrum of the lever (*c*). By this arrangement a contraction of a single inch in the muscle moves the hand (*f*), in the same time, through the extent of about 12 inches, but then the hand moves through every inch with only about the twelfth part of the power exerted by the muscle. By the junction of two or more levers in one direction,

as in the different segments of the extremities, the extent and velocity of their united actions are communicated to the extreme one. Thus, a blow of the fist may be made to include the force of all the muscles engaged in extending the shoulder, elbow, and wrist.

The great and characteristic property of muscular

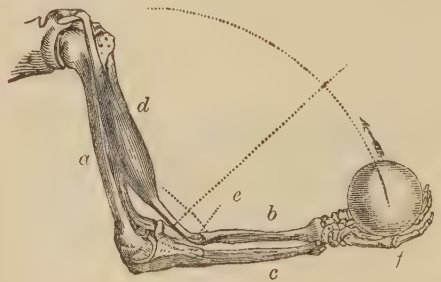


Fig. 9.

tissue—that of shortening itself in a particular direction when stimulated—is called *contractility*. The stimulus may be direct irritation by mechanical means, or by galvanism, or by some chemical substance, but in the living body the muscular fibres are, in most cases, made to contract by the immediate influence of the nerves distributed among



Fig. 5.

Muscular Fibre-cells from the coat of the Small Intestine (after Quain): *a*, complete cell showing nucleus, intranuclear network and longitudinal fibrillation; *b*, cell broken in process of isolation.

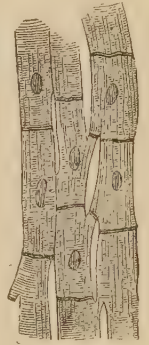


Fig. 7.—Muscular Fibres from the Heart.



Fig. 8.



Fig. 6.—Muscular Fibre-cells from Human Artery (after Kölliker):

n, nucleus; *e*, cell treated with acetic acid.

them, which are consequently termed *motor nerves* (see NERVOUS SYSTEM), and are under the influence of the will. By an exertion of volition, we can contract more or fewer muscles at once, and to any degree, within certain limits; and, as a matter of fact, there is hardly any ordinary movement performed in which several muscles are not called into play. But every voluntary muscle is also subject to other influences more powerful in their operation than the will. The movement of the features under the impulses of passion and emotion are more or less involuntary, as is shown by the very partial power the will has of restraining them, and the extreme difficulty of imitating them. Many movements ensue involuntarily when certain impressions, which need not necessarily be attended with consciousness, are made on the surface of the body, or on any part of its interior, either by external or internal causes. Such movements are termed *reflex*, and are noticed in the article NERVOUS SYSTEM. For important groups of muscles, see ARM, EYE, FOOT, HAND, KNEE, LEG, &c.; and for the source of energy, DIET, DIGESTION.

Muscogee, a city of Oklahoma, capital of Muscogee county, near the Arkansas River, is a commercial centre, with petroleum and other manufactures, and several colleges; pop. 30,000.

Muscovite. See MICA.

Muscovy. See RUSSIA.

Muses, originally included amongst the Nymphs, but afterwards regarded as distinct, had the power of inspiring song. They were first honoured amongst the Thracians, and, as Pieria around Olympus was the original seat of that people, it came to be considered as the native country of the Muses, who were therefore called *Pierides*. In the earliest period their number was three, though Homer sometimes speaks of a single muse, and once, at least, alludes to nine. This last is the number given by Hesiod in his *Theogony*, who also mentions their names—Clio, the muse of history; Euterpe, of lyric poetry; Thalia, of comedy; Melpomene, of tragedy; Terpsichore, of choral dance and song; Erato, of erotic poetry; Polyhymnia, of the sublime hymn; Urania, of astronomy; and Calliope, of epic poetry. Their origin is differently given, but the most widely-spread account represented them as the daughters of Zeus and Mnemosyne. Homer speaks of them as the goddesses of song, and as dwelling on the summit of Olympus. They are also often represented as the companions of Apollo, and as singing while he played upon the lyre at the banquets of the Immortals. Various legends ascribed to them victories in musical competitions, particularly over the Sirens. In the later classic times particular provinces were assigned to them in connection with different departments of literature, science, and the fine arts; but the invocations addressed to them appear to have been, as in the case of modern writers, merely formal imitations of the early poets. Their worship amongst the Romans was a mere imitation of the Greeks, and never became truly national or popular. Among the places sacred to them were the fountains of Aganippe and Hippocrene on Mount Helicon, and the Castalian spring on Mount Parnassus.

Museum (Gr. *mousetion*), originally the name given by the ancients to a temple of the Muses, and afterwards to a building devoted to science, learning, and the fine arts. The first museum of this kind was the celebrated Alexandrian Museum—a meeting-place for learned men and a library, founded about 280 B.C. in the palace. After the revival of learning in Europe the term museum came to be applied to collections of antiquities, and sculptures, and paintings. Collections illus-

trative of natural history and other sciences now form a chief part of the treasures of many of the greatest museums, and there are museums devoted to particular branches of science, and to illustrating the industrial arts. Of the museums of Britain, the British Museum (q.v.) and that of South Kensington (see KENSINGTON) are the most important. The museums of the Vatican in Rome, of the Louvre in Paris, of St Petersburg, Dresden, Vienna, Munich, and Berlin, and the National Museum at Washington also are among the greatest in the world. Many Russian and German palaces have been turned into museums since the revolutions. Russian nobles have in many cases stayed on as custodians in their old homes. See books by Sir W. Flower (1898), David Murray (1905), Margaret Jackson (1917), W. Clifford (1923).

Musha Islands. See OBOK.

Mushroom, or AGARIC, the popular name of a somewhat diverse group of fungi belonging to the Hymenomycetes. The best known of the true mushrooms to English readers is the Common Mushroom (*Agaricus campestris*), the type of the group. In Britain it is the most esteemed of its tribe, though little valued in countries where fungi more generally form an article of diet of the people; in Italy it is disapproved. It should be noted that some of the forms common to Europe and North America are esteemed in England, but found unpalatable in the United States. The Common Mushroom varies in appearance considerably ac-



Fig. 1.

1. Parasol Agaric (*Agaricus procerus*); a, young. 2. Orange milked Agaric (*Lactarius deliciosus*); b, young. 3. White Field Agaric (*A. virgineus*); c, young.

cording to soil and locality, but presents in all its variations the same essential characters. It has a fleshy head or *pileus*, smooth or scaly on the upper surface, varying in colour from white to different shades of tawny or fuliginous brown. The gills (*hymenium*) on the under side of the head are free, at first pallid, changing by gradations in age to pink, purple, and brown-black. The stem is white, varied in shape, full, firm, furnished towards the top with a white persistent ring. The Common Mushroom is widely distributed in most of the temperate regions of both the northern and the southern hemispheres. In Britain it is abundant chiefly in autumn in pastures and orchards.—The Horse Mushroom (*A. arvensis*) is very frequently found growing in company with the Common Mushroom. It is altogether a coarser and larger form, and is less favoured for

culinary purposes except in the making of ketchup. It often attains enormous dimensions; the top is generally smooth and snow-white, gills brownish white, ultimately with age becoming brown-black, stem pithy or hollow, with a ragged or floccose ring. This is the 'White-caps' Mushroom of some parts of England.—The true St George's Mushroom (*A. gambosus* of some, or *primulosus* of others), so called from appearing about St George's day (April 23), is sometimes confounded with the Common Mushroom. The head is thick and fleshy, at first convex, becoming undulated and irregular in outline, light yellow in colour in the centre, fading to opaque white at the edges, gills yellowish white, irregularly interposed, smaller and larger, overlying each other like the plaits of a frill; the stem is solid, white, when young bulging at the base, but in age either equal throughout or tapering to greater thickness above. The skin of this mushroom is soft and firm to the touch, and in appearance has been aptly described by Berkeley as resembling a cracknel biscuit. It is one of the most prized of the Agarics on the Continent, so much so in Rome that a dish of it is considered the most fitting present to any one whose good offices are to be propitiated.—The Fairy-ring Mush-



Fig. 2.

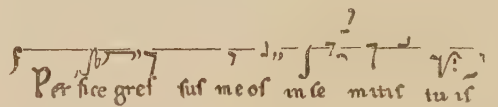
4. St George's Agaric (*Agaricus georgii*); d, young. 5. Common Mushroom (*A. campestris*); e, young. 6. Fairy-ring Mushroom (*Marasmius Oreades*); f, young. 7. *Clavaria phalloides*; g, young.

room (*Marasmius Oreades*), is common in pastures and in lawns in Britain, and in most parts of Europe. The head is small, smooth, fleshy, convex, having a boss (*umbo*) in the centre, tough, leathery, elastic, wrinkled; when soaked with water brown, when dry buff. The gills are free, distant, somewhat paler than the head; the stem equal in thickness, twisted, tough, fibrous, of a pale silky-white colour. This species is much esteemed by all who know it. Its flavour is extremely fine, and it is employed in the making of the best kinds of ketchup. On the Continent it is dried and used in the form of a powder to flavour various made dishes. Its peculiar mode of growing in circular patches or in rings, which procured for it its popular name, leads to the risk of an allied but poisonous species which sometimes grows in the same manner being confounded with it. This is the False Champignon (*Marasmius urens*), which is readily distinguished from the true Fairy-ring Mushroom by its having a flat top without any boss, and by its narrow gills being closely crowded together. The foregoing

are the most commonly esteemed of edible British mushrooms. But there are a number of others which are not only wholesome but extremely delicate in flavour and nutritious. There is the Parasol Mushroom (*A. procereus*); the Maned Mushroom (*Coprinus comatus*), of which young specimens only should be used; the Red-fleshed Mushroom (*A. rubescens*); the Clouded Mushroom (*A. nebularis*), appearing late in autumn in moist places on the borders of woods; and the Orange-milk Mushroom (*Lactarius deliciosus*). This last is much prized by connoisseurs in edible fungi on the Continent and in Britain. It has, as the name implies, orange-coloured milky sap in the head, and when broken or bruised both the flesh and the milk become green by exposure to the air. This is an excellent test when there is any doubt as to the identity of this and an allied but virulently poisonous species—*L. torminosus*—in which both the flesh and the milk are white, and do not change colour when broken or bruised. Although many of the British fungi are wholesome and nutritious food, yet it is proper that the inexperienced in diagnosing them should be cautioned strongly against eating any species of the wholesome qualities of which they are not absolutely assured. In many continental cities inspectors are appointed to examine all fungi that are brought to market, lest deleterious species should perchance be sold to the people. Those who desire to acquire an accurate knowledge of edible British species of fungi may refer to Dr Badman's *Esculent Funguses* (1863), M. J. Berkeley's *Outlines of British Fungology* (1860), M. C. Cooke's *Edible and Poisonous Fungi* (1894), and other works cited at FUNGI.

The culture of the common mushroom for profit in Britain has since 1875 become an important branch of gardening industry. About London in particular it is entered into by market-gardeners and even by specialists who live and thrive solely by the production of mushrooms for the million. To a lesser extent the industry is also being taken up in the vicinity of the larger provincial towns. In Paris the catacombs are utilised for the growing of mushrooms, as are caves in all parts of France; and in various places disused tunnels have been used for the same purpose. The principles of the culture of mushrooms are very simple, though considerable attention and skill are required in working out the practical details.

Music is an art, and in order to make an impression on our minds it must take as its founda-

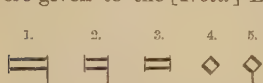


Neume Notation of the Tenth Century.

tion the succession of sounds embodied in the scales which we have chosen, and to which we are accustomed; it must also conform to the rules which have become the canon of music. We must look for its birth in Egypt, but it would serve no purpose here to occupy any space with the little that is known of Egyptian, or its offspring Greek music.

It is not improbable that the Israelites took with them to Palestine some songs they had learned in Egypt; and that many of the hymns of the early Christian church were identical with Temple melodies. As from these hymns was formulated the first authoritative musical system, we may say that in a double sense we are indebted to Egypt for the beginning of the modern art. It was St Ambrose towards the close of the 4th century, and Gregory the Great two centuries afterwards, who selected eight scales or 'modes' (the

'Gregorian') as proper for use in church music (see HARMONY), and till about 1600 A.D. the legitimate development of music was in the hands of the clergy. At first a rude system of dots and scratches (*neumes*) above the syllables in the Rubric served to indicate approximately when and how far the voice should be raised or lowered in pitch. This could only have been an aid to memory. The relative pitch of the notes was more definitely shown when a line of normal pitch was drawn through these neumes; and to this line were added three others in order to attain a more exact definition of intervals. The key or clef (*clavis*) was given to this stave of lines by a sign—usually C or F on the line which represented that note (C); sometimes F (f). Later the G (G) clef came into use, of which our treble or violin Clef (q.v.) is a corruption. With the idea of singing in parts instead of unison came the necessity for indicating the relative *duration* of notes as well as their pitch, and for this purpose different shapes were given to the [*Nota*] *Longa* (2)—the *Maxima*



(1) being twice as long—and to the *Brevis* (3) with its supplementary *Semibrevis* (4). A very short note was added—the *Minima* (5). When music came to be printed these signs were made open, and convenience in writing substituted the round form for the square or diamond. The semibreve (S) is now our longest note, although the breve is still to be met in church music, and in the indication of the measure 'two semibreves to the bar' (*Alla Breve*). In order to avoid a certain false relation of sound called the *tritonus*, which the pious old theorists called 'the very devil' ('*Mi contra fa diabolus est in musica*'), some of the church modes used $\text{B}^\flat$ instead of B. This was the only 'license' allowed, and was indicated by the 'B rotundum' (b) instead of the 'B quadratum' (B). These signs are the origin of our 'accidentals'—the flat (b), which lowers the pitch of a note one semitone, and the natural (♮), which restores it. The sharp ($\text{\#}$), which raises the pitch, is also a development of the 'B quadratum.' See also GUIDO ARETINUS, and H.

Counterpoint (1400-1600 A.D.).—Such were the materials with which Johannes Ockenheim or Okeghem (c. 1420-1513) and Josquin des Prés (c. 1450-1521) laid the foundation of Counterpoint (*punctus contra punctum*, 'note against note'), the art of combining one or more melodic parts with a principal melody called the 'Canto Fermo,' or fixed song. Counterpoint was the workshop in which were made many of the best tools used by great musicians of modern times. The art attained its perfection under Orlando di Lasso and Palestrina at the end of the 16th century, just when a new departure by Monteverde became the inauguration of the new school of harmony which was to supersede the old contrapuntal school by assimilating all that was good therein. Other influences which helped to break the monopoly of church counterpoint were the growing popularity and secularity of Madrigals (q.v.), at first distinguishable only by their words from church music; the improvement in organ-building and organ-playing, which encouraged freer part-writing and bolder melodic progressions than the limitations of unsupported human voices allowed; and doubtless also the natural warmth of musical feeling which had found expression among the troubadours of France and the minnesingers of Germany, and in the rude popular songs of these early ages.

Florence Academy.—Most potent factor of all in this new birth of music was the invention (in 1584-1600) of recitative music and the introduction of the dramatic principle by the Florence Academy—a group of literati and artists who met in the house of Count Bardi, a Florentine nobleman. Their aim and ambition was to restore the ancient accompanied Greek play; and by making use of all the slender resources which harmony could then put at their disposal they stumbled, as it were by accident, on the form of recitative, or, as they called it, 'Stilo rappresentativo.' The development of opera and oratorio, with all the various forms of aria, &c., was a natural consequent, a particular account of which will be found under their proper headings.

Monteverde.—The great landmark which separates the old school of counterpoint from the new is the compositions of Monteverde, whose importance is explained in the article on Harmony. It was only gradually that the new leaven spread through the schools of Europe, and nearly one hundred years elapsed between the setting of Palestrina's sun and the appearance of the twin morning-stars of modern music—Bach and Handel. The time, however, was well occupied. In vocal music greater freedom in the use of established forms was gradually attained, and new forms were invented, chief among which was the Aria introduced by Alessandro Scarlatti (1659-1725). He first used the 'second part,' which, followed by a *da capo* or repetition of the first strain, summarised for vocal music the tendency which was dominating all musical development.

The French Grand Opera school, founded by the Florentine Lully (1633-87), studied the art of expressing in sound the most fleeting emotions to be found even in the ever-varying turns of thought in an operatic recitative.

Of still more importance was the progress made during the century in instrumental music. A great impetus to solo-playing in particular, and execution in general, was given by the improvement in the manufacture of violins. The centre of this industry was Cremona, where the three famous families of Stradivarius, Guarnerius, and Amati worked for three generations. Some of their instruments are to-day literally worth more than their weight in gold.

Handel and Bach.—In 1685, on the 23d of February and 18th of March respectively, were born Handel in Halle and Bach in Eisenach. From 1710 till 1739 Handel devoted all his energies and genius to writing operas after the Italian school, and most of his works have shared the fate of their contemporaries and rivals. He was then led into the path of oratorio, and a brilliant succession of well-known compositions sheds an undying radiance on the last twenty years of his active life (see ORATORIO). Bach's influence has been wider and more far-reaching even than that of his great contemporary. Indeed, no less a critical authority than Schumann has declared that music owes as much to Bach as Christianity does to its founder. By virtue of his complete and easy command of all the resources of harmony and counterpoint, his boundless originality and fertility, the invariably high level of his compositions—even when judged by his own high standard—he takes a place above all ancient and modern composers. Under his influence also the German school of composition chose the path of instrumental music, in which the voice is only one of a large orchestra of instruments, entitled to no more consideration than its limits demand. The attempt in Gluck's operas to reconcile the requirements of expressive instrumentation and the demands of the vocal school was more successful in theory than in reality (see GLUCK),

and the true central column of progress has moved up till now in Germany along instrumental lines in the hands of Bach, Mozart, Beethoven, Schumann, Wagner, Strauss, and their contemporaries.

Sonata.—The most important form of instrumental music had hitherto been the Fugue (q.v.), and in its strait and heavy harness these giants of old moved with ease, grace, and dignity. But the age of monothematic work was already past, and the old dance forms (allemande, courante, sarabande, gavotte, gigue) did not readily lend themselves to the requirements of thematic development, so necessary to instrumental music as a conception distinct from music, to which words at once give inspiration and impose limitation. Corelli, A. and D. Scarlatti, Bach, and others each strove to solve the problem in his own way, and the sum of their influences was handed from Emmanuel Bach to the 'formulator of the modern sonata,' Joseph Haydn (1732-1809).

The name 'sonata' was first used in Italy for music which was only to be played or 'sounded,' contrasted with 'cantata,' which was to be sung. The particular form, however, gradually separated itself from all other instrumental music, and when generations of earnest musicians had lavished care, thought, and experience on its development it was accepted, and is accepted, as the form *par excellence*. In its mould are cast sonatas, symphonies, quartets, concertos, &c., and even the most romantic and daring of fantasias find it necessary to recognise its broad and accommodating principles. Haydn's sonatas are still very formal; so also are Mozart's, though he had more in common with the Romantic school of the next century than the elder composer. This is shown by a comparison of their symphonies. Haydn's are beautiful and graceful, but the themes and subjects he chooses are never very deep, nor can they move the depths of the heart. He is most successful in his airy and humorous quick movements. In Mozart's symphonies a nobler and more romantic spirit breathes—sometimes with most intense passion, sometimes with a dignified melancholy. And so the way was prepared for the most powerful and the most widely honoured of all rulers in the realms of sound. In the works which are classed as his 'first period' Beethoven showed how he had studied and mastered the work of his great predecessors. In his second period he proceeded to build on the solid foundation that wonderful structure to which the vast conceptions of his third period form a fitting and glorious crown. Nothing important has been added to sonata form since Beethoven wrote the works between the *Eroica* and Choral Symphonies (1803-23); and although much has since been written, much that is new, much that is original—although a ready appreciation is granted to the passion of Schumann, the romantic power of Schubert, the poetry of Chopin, the refined elegance of Mendelssohn, the successful use of new colour shown in later works by Brahms, Dvořák, Liszt, &c.—Beethoven's sonatas and symphonies still stand unrivalled, unchallenged, whatever the 'symphonic poem' may yet develop into.

Fantasia.—A desire for some more direct, more unfettered expression of feeling not unnaturally succeeded this long striving after adequate form. But, while all great composers devoted most of their genius to its development of perfect form, the growth of the fantasia was much neglected. Only when the greatest minds turned their attention for a moment from the more important aim was anything of lasting importance produced; and that because it is only the mind trained in the strict school of form to use all available resources which can wisely enjoy a liberty so easily converted into license. The earliest attempts in

fantasia form were called 'toccatas' during the 17th century; and, notwithstanding excellent modern toccatas by Schumann, Rheinberger, and others, we may say that the history of the toccata was brought to a close by the magnificent specimens written early in the 18th century by J. S. Bach. The same composer left a freer model than the somewhat formal toccata in one of the most famous and successful fantasias in existence, and instrumental music has never attained nearer to the definiteness of articulate speech than in the great *Chromatic Fantasia*.

The strong romantic movement which naturally ensued after the perfecting of the classical school in Beethoven's hands eagerly followed out the path he so often and with such effect indicated in his works; and, although the name fantasia has lately fallen into much disrepute by reason of many unworthy and worthless compositions, it may recover its fair fame now that Schumann's and Schubert's fantasias have survived their contemporaries. In any case the endless varieties of fantasia (i.e. unfettered) form, and their adoption in rhapsodies, symphonic poems, and the like, have proved as valuable and as potent a factor in modern romantic music as the various modifications they have effected in the classical sonata form (e.g. Liszt's concertos and sonatas). Schumann adopted some very curious whimsical or poetical names for his smaller compositions—nolette, humoreske, carneval, &c.—and the idea has found great favour with many modern writers. The nocturne invented by the Irish pianist Field is more identified with Chopin's dreamy genius. The latter composer also transused the waltz and the polonaise and mazurka of his own unhappy country with such an intensity of passion, such a chivalrous nobility, and surrounded them with such a halo of poetry and romance that they are an important addition to the resources of a modern composer, and Chopin's name overshadows that of Schubert and Weber, earlier workers in the same field (*Deutsche Tänze, L'Invitation à la Valse*). Later developments in instrumental music are intense nationality in colour and thought, as shown in the works of Grieg, Dvořák, Liszt, Mackenzie, Tchaikowski, Sibelius, and a new striving after extended means of expression, as in Strauss, Debussy, Skriabin, Holst.

Vocal Music.—The progress of vocal music from its first great triumph in 16th-century counterpoint was much slower and varied than that of instrumental. The reason of this is not hard to find; for the conception of vocal writing in the contrapuntal school was sound and artistic, and it reached a point of absolute perfection in that epoch called the 'Golden Age.' Thus there was not the necessity for that advance which ever-improving instruments and the feeling for instrumental effects demanded. Indeed, in choral music exactly the same principles which formulated the rules of counterpoint in the 16th century must be recognised by composers of to-day who wish to produce the purest and grandest effects; and the rules themselves have been rather extended in scope than relaxed in meaning by Bach, the most daring choral writer, and his successors. Where the letter of the law has been modified it has been so from within, and the spirit remains the same. It will be convenient here to treat of choral and solo vocal music, leaving other obvious subdivisions to be treated in the articles ORATORIO and OPERA.

Monody.—From the invention of part-singing till the end of the 16th century (i.e. during the course of its legitimate development in the church) vocal music was entirely choral. When a solo was required, the most melodious part was selected from a choral movement, with what must have

been a most unsatisfactory and incomplete result. The first example of a piece conceived and written for one voice seems to have been *Ugolino*, a dramatic scena with viola accompaniment, written (1584) by Galilei (father of the philosopher), one of the Florence Academy. It was this invention of Monody which prepared the way for opera and made it possible. Unfortunately, the first writers in this new school, which aimed after expressive melody, were little proficient in the more solid art of counterpoint which they affected to despise; and this tendency consistently followed out has procured for Italian music its unenviable reputation of being gracefully melodious at the expense of depth and meaning. The rude recitatives of earlier composers became more and more melodious till A. Scarlatti formulated the first *Aria*—i.e. a regular strain of melody, followed by a second in contrast and complement, and thereafter repeated (*Da Capo*). Almost any of Handel's well-known songs will furnish an advanced specimen of this form, which was brought to perfection by Mozart. The more serious style required for religious works, as well as the greater skill in the science of music which was at the disposal of composers like Handel, Bach, and Mozart, saved the *Aria* from its friends, and in northern Europe it chose a slower development but a worthier end. In the schools of Bach, Gluck, Beethoven, Schumann, Wagner, and Strauss the voice is treated as only one instrument, to which indeed the important part is assigned of giving the words intended for illustration—the expression, however, being entrusted to the whole mass of instruments employed. The claims of any settled form to absolute consideration are likewise disregarded where these seem to clash with the higher demands of expression and dramatic truth. Hence the opposition offered and the accusations brought against all these composers in succession by the professional and amateur melodists of each day. None of their styles may be entirely exonerated, but their ideal is certainly the true one, and their work shows a progressive development along at least closely related lines.

Ballads.—Alongside this scientific progress there has always been the popular love of melody which has found expression in folk-song and ballads. Each nation has its characteristics strongly reflected in these, and where they have been recognised and accepted as a veritable and refreshing fount of inspiration—as in Germany, Hungary, and Norway—the gain has been great. They are of course the origin of the simple strophic song or ballad (e.g. Mendelssohn's *Es ist bestimmt*), however skillfully modern composers adorn it with graceful accompaniment (e.g. the same composer's *Auf Flügeln des Gesanges*). The Ballade, which aims at a dramatic setting of some romantic story, is the offspring of the same influence which inspired Weber's operas. In this style Loewe showed Schubert the way, and following composers have used the device very successfully. The art song tries to reflect the most delicate turn of meaning and the deepest subjectivity to be found in the words. It was to a great extent the result of Heine's poetry, and its great exponents, after Schubert, were Schumann and Brahms.

Choral Music.—The chosen home of modern choral music has been Germany and England. In the beginning of the 17th century H. Schütz left his home in Dresden to study the 'new music' of the Florentine school in Italy, and he took the weakling back with him to be reared among the great instrumental masters of Germany. The noble German choral was chosen as a foundation, and in the effort to illustrate the text no device of counterpoint, no resource of the ever-improving science of harmony, was left unused. Graun, Bach, Haydn,

Handel, Mozart, Beethoven, Mendelssohn have enriched the church with innumerable and inestimable treasures in their Passions, Oratorios, Masses, and Psalms; and it is surprising how well fitted the strict writing of all these masters has proved in their hands to convey the most elevated, the most dramatic, the most touching emotions. More modern works are such as Dvořák's *Stabat Mater*, Liszt's Masses, Brahms's *Requiem*, Elgar's *Apostles*, Holst's *Hymn of Jesus*, &c. But the same principle has always commanded the same success; whatever modern development in modern instrumentation, harmony, &c. may be added to a composer's resources, there is only one foundation, that on which the great masters have ever built when rearing their great choral works.

Formal choruses have never been an important part of operatic writing since the first rude beginnings. In plays the single characters will be rather brought together, as it were, than introduced with a distinct intention of giving each an equal part. This feeling for dramatic truth is the origin of the concerted writing in operas—duets, ensembles, finales—the treatment of which is indebted partly to solo vocal writing, partly to choral. The handling of crowds, again, and the best expression in music of their feelings requires different treatment, and it is interesting to compare how each great reformer has approached the problem. Curiously enough, it is the composers who have shown the greatest capacity for many-part writing who have most successfully given the correct impression. No two works are wider asunder than Bach's *Matthew Passion* (1729) and Wagner's *Meistersinger* (1867); and yet it is impossible to deny that the single terrible shout of the multitude 'Barabbas!' and the complicated chorus 'Let Him come down from the cross,' show that a genius in no way inferior to Wagner's, but with comparatively very limited resources, could grapple with the same problem which is so marvellously solved in the street riot scene (*Meistersinger*, act ii.). Gluck's correct feeling saw the difficulty, but his powers were not great enough to overcome it. Mozart's greater, and in this matter somewhat irresponsible, genius never troubled itself on the subject.

Orchestra.—Monteverde laid the foundation of the modern orchestra when he multiplied the stringed instruments and relegated the pianoforte (or rather its precursor the harpsichord) to a somewhat subordinate position. The latter, however, maintained its place in the orchestra till after Handel's day. Between Monteverde and Haydn many experiments were made in the arrangement and combinations of instruments; also in the manufacture of the instruments themselves. By-and-by the various forms of 'Viol' (Viol da Gamba, da Braccio, &c.) resolved themselves into the viola or tenor violin, and the violoncello (i.e. 'the little violone' or smaller double bass). The violin is of course the little viol. And these remain the foundation of our orchestra. The wind-instruments were the flute and the oboe (a compromise among various forms—Oboi d'Amore, di Caccia, &c.), to which the bassoon gave the bass. To these were added trumpets and drums for special effects. Such was the orchestra with which Haydn laid the corner-stone of modern instrumentation. Mozart added the expressive clarinet, which was at once incorporated in the band. The piccolo, or little flute, and the double bassoon (Contra Fagotto) can hardly be called additions in the sense of novelty; and from Mozart's time to Wagner's the improvement, with one important exception, has been in the direction of improvement in mechanism, and in power of variety in combinations and tone colours. The exception is the trombone, first used

with its full effect by Mozart in *Don Giovanni*, and ever becoming more important in the hands of Beethoven, Schubert, Schumann, and Wagner. Berlioz, a great master of instrumentation, embodied the result of his experience in a 'Treatise' which will ever remain one of the greatest monuments of his extraordinary genius. An enumeration of the instruments at Wagner's masterly disposal will show what limitless combinations had become possible. In *Tannhäuser*, the orchestra for which he wrote comprised, besides the usual stringed band (about 12 first violins, 12 second violins, 8 violas, 8 violoncellos, and 6 double basses), 3 flutes, 1 piccolo, 2 oboes, 2 clarinets, 1 bass clarinet, 2 bassoons, 2 horns, 2 valve horns, 3 trumpets, 3 trombones, and 1 bass tuba, with 1 pair of kettle-drums, bass drum, cymbals, triangle, tambourine, and harp; and, on the stage, 4 flutes, 2 piccolos, 4 oboes, 6 corni inglesi, 6 clarinets, 6 bassoons, 12 trumpets, 12 horns, 4 trombones, cymbals, triangle, and tambourine.

Programme Music.—Many attempts of a more or less legitimate kind have been made to illustrate by music alone a certain story, set of scenes, or progress of emotions. Probably the earliest examples which can be pronounced artistically successful are the famous Pastoral Symphony and the sonata *Les Adieux, l'Absence, et le Retour*, by Beethoven. To criticise this tendency would lead us far beyond the limits of this article, and a mere enumeration of names and compositions will suffice to show what an attraction the idea has had for almost all modern composers. Mendelssohn tried to paint Fingal's Cave in an overture, and in his Scotch Symphony he sought to convey the impressions made on him during his visit to Scotland. Schumann painted a whole set of figures and characters in his *Carneval*, and in his great *Fantasia in C* he set out with a very definite intention to convey the meaning of a verse by the poet Schlegel, though for him generally the music called up the picture, not the picture the music. Berlioz went further and proposed to set forth *Episodes in the Life of an Artist* in a symphony. Unfortunately, his morbid and rather gruesome genius chose very repulsive pictures to paint. He entrusted a certain character or sentiment to a certain phrase without words set to the music or a previous explanation. Liszt's and Saint-Saëns's *Symphonic Poems* have been followed by those of Richard Strauss, such as the *Heldenleben*, and the *Sinfonia Domestica* (dealing with a day in the composer's life), the *Don Quixote* variations and *Till Eulenspiegels Lustige Streiche*. Skriabin went further, seeking (in *Prometheus*) to give expression in music to impalpable thoughts that had never been attempted before.

Of course, descriptive music which occurs in the course of a cantata (e.g. in David's *Le Désert* or Berlioz's *Faust*) has the advantage of a definite starting-point in the words which surround and explain it, and therefore is distinct from these words mentioned which aim at dispensing with words except as an inspiration.

Whither music is tending in the 20th century it is difficult to say; but so long as the treasures left us by the great composers are as reverently and as earnestly studied as they are at present: so long as composers recognise that their genius is a call to labour and not to enjoyment: so long as criticism is honest and based upon sound knowledge, there is no fear that the heritage of the ages will be lost. On the other hand, the impulse to break with the rules of the past (as in the past), and set music upon new roads, is strong. Strauss and Reger, Debussy and Ravel have been called impressionists, and the art of Stravinsky, Skriabin, and Schönberg has been compared with that of the post-

impressionists. It is noteworthy that in almost every country in Europe a keenly national spirit is alive, which lovingly studies all available treasures of national music and melody, appreciating it with an insight and breadth only to be obtained in a school of wide and deep musical culture.

See the general histories of music by Naumann (Lond. 2 vols. 1882-86), Ritter (1880), Rockstro (1886), Rowbotham (1886), Ambros (Leip. 2d ed. 1881), Fétis, (Paris, 5 vols. 1868-76), F. Weber (1892), Parry (1894); Hullah, *Modern Music* (7th ed. 1896); Fuller Maitland, *English Music in the 19th Century* (1902); E. Walker, *A History of Music in England* (1907); F. Niecks, *Programme Music* (1907); Grove's *Dictionary of Music and Musicians* (new ed. 5 vols. 1904-5; and later American supplements); the *Oxford History of Music* (1901-5); W. S. Pratt's *New Encyclopedia of Music and Musicians* (1924); Eaglefield-Hull's *Dictionary of Modern Music and Musicians* (1924); and the *Handbuch der Musikgeschichte* (ed. Guido Adler, 1925). See also the articles on great composers and musicians, and on—

Accompaniment.	Conservatoire.	Orchestra.
Acoustics.	Cornet.	Organ.
Adagio.	Counterpoint.	Overture.
Andante.	Double Bass.	Pianoforte.
Anthem.	Drum.	Pitch.
Arrangement.	Flute.	Plainsong.
Bagpipe.	Fugue.	Rondo.
Band.	Glee.	Saxhorn.
Banjo.	Harmonics.	Scale.
Bass.	Harmony.	Solfeggio.
Bassoon.	Harp.	Song.
Bugle.	Horn.	Sound.
Catch.	Madrigal.	Symphony.
Cavatina.	National Hymns.	Temperament.
Chant.	Oboe.	Trombone.
Choirs.	Opera.	Trumpet.
Chord.	Opficleide.	Violin.
Clarinet.	Oratorio.	Violoncello.

Musical Box, a case containing a mechanism which plays tunes automatically. Teeth projecting from a barrel (as in a barrel-organ or a mechanical peal of chimes) impinge on and set vibrating the tongues cut out in *comb* or steel plate; the difference of tone being due to the greater length and breadth of the teeth. The larger and better boxes, some of which play many tunes after one winding up, can be regulated in pace by a fly regulator, with flat wings, which catch the air. The invention dates from the middle of the 18th century. Switzerland (especially Ste Croix) is the chief seat of manufacture.

Musical Glasses. See HARMONICA.

Musical Sand. See SAND.

Musk. The musk of commerce, which is an important element in very many compounded perfumes, is mainly obtained from the Musk-deer (q.v.), the best kind being that known as Chinese musk, and imported from Tonquin. Other kinds are the Indian (from the Himalayas) and the Siberian. Musk is often adulterated with dried blood, bits of leather, &c. In 1890 Bauer of Erfurt produced an artificial musk by treating butyl-toluol with a mixture of sulphuric and nitric acids, the resulting nitro-compound being purified by crystallisation from alcohol.

Musk-deer (*Moschus moschiferus*) is a ruminant Ungulate forming a special family of the Artiodactyla. According to Flower, it represents an ancestral type of the Pecora (Bovidae, Cervidae, Giraffidae), but with nearest affinities to the Deer (Cervidae). As in the Cervidae, the young is spotted, but it has no horns, and the canine teeth of the male project in the form of longish tusks; this latter fact has led to the association of *Moschus* with the Tragulidae (Chevrotains, q.v.), which is, however, not justified by its other characters. The musk-deer is an inhabitant of the mountainous regions of central Asia from the extreme north to as far south as Cochin-China and Nepal. There is only one species, with perhaps four well-marked

varieties. The musk-deer is much hunted on account of the odoriferous secretion which is found in a special gland upon the hinder-part of the abdomen of the males. This substance was first introduced into the west by the Arabs. It is spoken of in the pharmacologies of Serapion and Avicenna and by the traveller Marco Polo. The value of the substance used to be very great, as it figures among the costly objects presented by Saladin to the Greek emperor in 1189. It was used in the embalming of bodies as early as the 14th century. For an interesting account of the musk-deer (and the Chevrotains), see Milne-Edwards, *Annales des Sciences Naturelles* (1864); for the anatomy, Flower, *Proc. Zool. Soc.* 1875; also Lydekker, *The Deer of All Lands* (1898).

Muskegon, capital of Muskegon county, Michigan, is on the Muskegon River, which here (4 miles from its mouth in Lake Michigan) widens into Muskegon Lake, the best harbour on the east side of Lake Michigan. Muskegon has a great lake trade, foundries, machine-shops, and many other important industries. Pop. (1890) 22,702; (1920) 36,570.

Musket. See FIREARMS.

Musk-glands, skin-pits in mammals producing a secretion with a musky odour. They belong to a series of skin-glands, which occur in various parts of the body and with various secretions (see ANAL GLANDS). The most notable musk-glands are those of the male musk-deer and the male beaver. See BEAVER, CASTOREUM, CIVET, &c.

Musk or Muscovy Duck. See DUCK.

Musk-ox (*Ovibos moschatus*) is a member of the family Bovidae. It inhabits at present the most northern parts of the American continent north of lat. 60°. Its remains, which have been found in Quaternary deposits of England, Europe, and Siberia, indicate that it had formerly a much wider range. The hair is long, serving, of course, to protect the animal from the rigour of the climate which prevails in its habitat, and of a brownish colour. The creature measures above 5½ feet from the tip of the nose to the root of the tail, and so approaches in size the smallest Highland cattle. It is gregarious, there being only one or two males to a herd of eighty or a hundred. They browse on grass, reindeer moss, willow shoots, the Labrador tea-plant, and crowberry bushes. The flesh of the calves and cows, when in condition, is very palatable. Unlike that of many purely Arctic

from its fellows, to regain a position of safety by being able readily to detect the whereabouts of the herd than to trust to escape from carnivorous foes by a resemblance in colour to the surrounding snow.

Musk-plants. Various parts of a number of plants smell more or less strongly of musk. Among these are the common little Musk-plant (see MIMULUS) and the Musk-seed (see HIBISCUS). The musk-tree of Jamaica (*Trichilia moschata*), belonging to the Meliaceæ, emits from all parts a smell of musk. All parts of *Guarea grandifolia*, a West Indian tree of the same family, sometimes called musk-wood, also smells strongly of musk. —The drug called Musk-root or Sambul is the root of a plant of the Umbelliferae, and is brought from Persia or central Asia; it has a pure musky odour, and is used as a substitute for musk.

Musk-rat, a name applied to several distinct animals. (1) The Desman (*Myogale*), a genus of insectivorous quadrupeds of the Shrew (q.v.) family (Soricidæ), according to some more nearly allied to the Mole (q.v.) family (Talpidæ), differing from the true Shrews (*Sorex*) in having two very small teeth between the two large incisors of the lower jaw, and the upper incisors flattened and triangular. Behind these incisors are six or seven small teeth (lateral incisors or false canine teeth) and four jagged molars. The muzzle is elongated into a small flexible proboscis. The eyes are very small; there are no external ears; the fur is long, straight, and divergent; the tail long, scaly, and flattened at the sides. The feet have five toes, fully webbed; and the animals are entirely aquatic, inhabiting lakes and rivers, and making holes in the banks, the entrance being under water. *M. pyrenaica*, about 8 inches long, with tail as long as the body, is a native of the streams of the Pyrenees; a larger species (*M. moschata*), very plentiful in the rivers and



Musk-rat, or Desman (*Myogale pyrenaica*).

lakes of the south of Russia, nearly equal in size to the common hedgehog, with tail about three-fourths of the length of the body. The Russian desman is blackish above, whitish beneath; it has long silky hair, with a softer felt beneath, and its fur is held in some esteem. Desman skins, however, are chiefly valued on account of the musky odour which they long exhale, and which is derived from a fatty secretion produced by small follicles under the tail of the animal. The desman feeds on leeches, aquatic larvæ, &c., searching for them in the mud by means of its flexible proboscis. It seldom, if ever, voluntarily leaves the water, except in the interior of its burrows, which are sometimes 20 feet long. (2) The name of Musk-rat is also a common name for an Indian species of Shrew (*Sorex murinus*), in size about equal to the common brown rat, in form and colour much resembling the common shrew of Britain, but remarkable for the powerful musky odour of a secretion which proceeds from glands on its belly and flanks. (3) The name is also given to the Musquash (q.v.).



Musk-ox (*Ovibos moschatus*).

animals—e.g. the Arctic fox—the hair does not become white at the approach of winter. But it has been suggested that this protective change in coloration is not necessary, since it is an animal which lives in herds; hence it is better for an individual, which has got accidentally separated

Muslin, a fine cotton fabric somewhat resembling Gauze (q.v.) in appearance, but it is woven plain without any looping of the warp threads on the weft. A piece of the finest muslin at one time manufactured at Dacca in India, measuring 3 yards in length by 1 in breadth, weighed only the fifth part of an ounce, and cost £40; but none approaching to this in fineness is made in India now. Very fine muslin has been woven from yarn spun by machinery at Manchester, but it wanted the delicate softness of the finest Dacca. Printed muslins are made in France and England for female summer attire. In India some muslins are woven with coloured patterns; others are embroidered with silk or beetles' wings; others again are printed with gold and silver leaf. Such names as 'woven air' and 'evening dew' are given in that country to those of exquisitely fine texture.

Musquash, also called MUSK-RAT, or ONDATRA (*Fiber zibethicus*), a rodent quadruped, a native of North America, from the Rio Grande to the Arctic regions. *Fiber* (or *Neofiber*) *alleni* is a kindred species from Florida. They belong to the family Muridæ, and are allied to our voles. The shape is similar to that of the brown rat; the head and body are about 15 inches in length, the tail 10 inches. The whole body is covered with a short, downy, dark-brown fur, intermixed with longer and coarser hairs. It is a very aquatic animal, seldom wandering from the rivers, lakes, or marshes in which it makes its abode. It is chiefly a vegetable feeder, but like other Muridæ will occasionally take to animal food—e.g. the mollusc *Unio*. The fur is in demand, and forms an article of commerce, skins in large numbers being still exported from America to Britain and other European countries. The musquash burrows in the banks of streams and ponds, the entrances of its burrows being always under water. In marshes the musquash builds a kind of hut, collecting coarse grasses and mud, and raising the fabric from 2 to 4 feet above the water. The flesh of the musquash, at those seasons



Musquash (*Fiber zibethicus*).

when it is fat, is in some request among the American Indians, and is said to be not unpalatable.

Mussel, a name applied to several common bivalves or Lamellibranch molluscs. (1) The Common Sea-mussel (*Mytilus edulis*), very important for bait and not unfrequently used as food, is widely distributed in crowded 'beds' between high and low water marks. It is usually sedentary

and firmly anchored by yellowish silken 'byssus,' but it is also able to shift its quarters and even to climb by slowly extending the range of the byssal thread exuded from the 'foot.' (2) The Horse-mussel (*Modiolus modiola*) is nearly twice as large as the above, and lives a more active burrowing life below the low-water mark. It is never used for food, and is not available for bait. Both these sea-mussels are representative of large genera, and are included in one family—Mytilidæ. (3) Quite different from the above are the fresh-water mussels, Unionidæ, widely distributed in lakes and rivers, where they plough their way slowly along the bottom from one resting-place to another. As good representatives of the Unionidæ, the Pond-mussel, *Anodon cygnea*, the Painter's Mussel, *Unio pictorum*, whose shells were once used for holding water-colour paints, and the Pearl-mussel, *Margaritana margaritifera* (see PEARL), may be noted. For the structure and general characters, see BIVALVES.

The common edible mussel abounds on the Atlantic seaboard of the United States, but is used neither as food nor as bait. In England it is largely used as human food; in Scotland it is not so used, but enormous quantities are required for bait, especially by haddock fishers. The chief objection to mussels as food is that they are occasionally poisonous. Mussels especially which are unhealthy or dead are very apt to contain dangerously poisonous waste-products; care should accordingly be taken that those used for food are thoroughly fresh. A French Commission reported in 1889 that the poison is due to the presence in the mussel of a volatile alkaloid developed under the influence of a particular microbe, which is only found in mussels growing in stagnant and polluted water. Sewage fairly free from the pollution of manufactories is distinctly beneficial to mussel culture. It is said on good authority that mussels lose any poisonous properties they may have if cooked for ten minutes with carbonate of soda.

Musselburgh, an old-fashioned town of Midlothian, near the mouth of the Esk in the Firth of Forth, adjoining Edinburgh. Since 1918 it has been included in Edinburgh parliamentary burgh. The burgh of Musselburgh includes the large fishing-suburb of Fisherrow, and the pretty village of Inveresk, whose conspicuous spired church, rebuilt in 1805 by 'Jupiter' Carlyle, occupies a Roman prætorium. Musselburgh's chief features are its celebrated golf-links and racecourse, Loretto school (marking the site of a famed place of pilgrimage), Pinkie House (1613), the 'Roman' bridge, the quaint tolbooth, and a statue (1853) of David Moir. The manufactures include paper, nets, &c. Pop. (1841) 6366; (1921) 17,110.

Musset, ALFRED DE, was born in Paris, 11th December 1810, the son of an official who rose high in the War Office. He thought first of law, next of medicine, then of art, but at eighteen discovered himself to be a poet, and scarcely a year after published his *Contes d'Espagne et d'Italie*, a collection of unequal poems. A splendid and brilliant youth, of equal grace and assurance, he was warmly received into Victor Hugo's *Cénacle*, the inner shrine of militant Romanticism; was crowned with seductive flatteries by the wider world of society; and in his hunger for premature experience at once flung himself recklessly into the eager pursuit of pleasure in every form. His piece *La Nuit Vénitienne* failed at the Odéon in 1830, and thus turned him from a career in which he was yet to gain triumphs without seeking for them. In 1832 he published *Un Spectacle dans un Fantéuil*, comprising two short plays—*La Coupe et les Lévers* and *À quoi rêvent les Jeunes Filles*, as well as the

poem of *Namouna*, written hastily to eke out a slender volume. Next year followed in the pages of the *Revue des Deux Mondes* two of his very greatest works, the tragical comedies *André del Sarto* and *Les Caprices de Marianne*. It was of Marianne that her creator replied, when asked where he had found her character, 'Nowhere and everywhere; she is not a woman, she is woman.' Next followed the famous poem of *Rolla*, which has not sustained the applause with which it was received. Then came the fatal journey to Italy with George Sand. He first met her in the summer of 1833, and the intimacy quickly blossomed into love. The projected tour was at first opposed by De Musset's mother, but George Sand took the extraordinary step of calling upon her one evening, and in a moment of emotion gained her consent. They set out for Venice at the beginning of winter. About the middle of February his letters to his mother and brother ceased; for six weeks there was silence, then on the 10th April he reappeared alone, broken in health and sunk in the deepest depression of spirits. A quarter of a century later, and soon after his death, she put forth, in the guise of a novel, *Elle et Lui*, her version of the events which led to the catastrophe. Paul de Musset at once retorted with *Lui et Elle* (1859), a book which is poor as fiction, but rings like truth. His account was that she had been grossly unfaithful to De Musset, and that his discovery of this in a state of weak health had brought on an almost fatal attack of brain-fever; she, on the other hand, explained the infidelity as but a delusion of the fever itself. It is at anyrate suspicious that but one of the pair suffered deeply, while the other went on calmly writing romances, and utilising the experience at once as impulse and material. The Jacques Laurent of her story bears many a trait of the true De Musset. Despite, or, more probably, in consequence of his sufferings, the five years that followed his return were his best years of production. Another love quickly followed, only to end as unhappily; and that again was succeeded by a series of unworthy and often sordid entanglements, which distracted his heart and were followed by periods of deep depression which alcohol did little to allay. The patronage of the Duc d'Orléans, the warm friendship of a small circle of devoted friends, and his appointment in 1838 to be librarian at the Home Office did something to take him out of himself, but he was ever as capricious in character as in genius, and the feverish activity that sometimes seized him soon exhausted itself in splendid projects and unfinished poems. Even his famous *Confession d'un Enfant du Siècle* (1835), like most of his works, was begun, laid aside, and then finished under a cloud of sorrow. It is not an autobiography, though it owes its sombre colour to its author's personal experience. It is a striking study of moral pathology, full of admirable expression of cynical contempt for the world and of the misery of hopeless doubt; but, as a work of art, it breaks down pitifully at the close into weakness and platitude. When De Musset's health gave way about 1840 his literary activity began to decline also. He was already, in Heine's phrase, 'a young man who has had a splendid past;' he felt himself an old man at thirty, and to the end he was never blessed with anything of the serenity of the Olympians, nor was he even one of those artists who find consolation in their art. The success of *Un Caprice* at the Théâtre Français in 1847 recalled him for some time to life and hope, but during his last half-dozen years he wrote nothing of importance. He was elected to the Academy, but not without difficulty, in 1852, and Sainte-Beuve has told us of his coming tipsy to its sittings. 'Musset s'absente trop,' said a member on one occasion; 'Il

s'absinthe trop,' was the response. He died of heart disease, 1st May 1857.

Of De Musset's poetry the four pieces entitled *Nuits* mark the highest reach of his lyrical talent. The *Nuit de Mai* and that of *d'Octobre* are perfect and immortal. The *Ode à la Malibran* is a splendid tribute; the famous *Rhin Allemand*, a spirited retort to Nikolaus Becker. He is the poet of a certain range of personal emotions, of youthfulness, and, above all, of passion, in which respect he follows close upon Byron in power, while far surpassing him in unaffectedness and reality, if not always in finish and exquisiteness of art.

His dramatic work is unique in 19th-century literature of its kind for originality, intensity, and variety, linked to brilliant wit and real dramatic genius. It consisted of *comédies*, or regular dramas, full of tragic quality and ending with tragic abruptness, and *proverbes*, the latter short dramatic illustrations of some common saying, such as the bright and charming *Il faut qu'une Porte soit ouverte ou fermée*.

Among his brilliant and inimitable *Nouvelles*, *Le Fils du Titien* is perhaps his finest; of the Contes *Mademoiselle Mimi Pinson* is a masterpiece. His whole work fills but ten small volumes (1876), but it is not too much to say that these include some of the noblest poetry, greatest plays, and best short stories French literature has yet produced.

See the Life by his brother Paul de Musset (3d ed. 1877); studies by C. F. Oliphant (1890), 'Arvède Barine' (1893), Siché (1907), Gauthier-Ferrières (1909), Maurice Donnay (1915).

Mussolini, BENITO, born 29th July 1883 at Predappio (Forlì), organised the Fascist movement and became prime minister of Italy in 1922. See FASCISMO, ITALY (*History*). He is author of *Giovanni Huss* and other works.

Mussooree. See MASURI.

Mussorgski, or MOUSSORGSKY, MODEST PETROVICH, Russian composer, was born at Karevo, in the government of Pskov, in March 1835. He entered the army, but left it in 1857 to give himself to music, under the influence of Balakirev and Dargomijski. For a time he made a living as a government clerk. His opera, *Boris Godunov*, founded upon Pushkin's play, was produced at Petrograd in 1874, and placed him among the foremost masters of the modern Russian school. The latter part of his life was spent in poverty and ill-health; and in Petrograd he died a prey to drugs, 28th March (N.S.) 1881. Besides *Boris Godunov*, he wrote the operas *Khovantchina* (1880; completed by Rimsky-Korsakov), *The Matchmaker*, and *The Fair at Sorochinsk* (unfinished), besides songs, choral and orchestral works, of a markedly Russian character. See studies by Montagu-Nathan (1916), and Calvocoressi (1919).

Mustagh. See KARAKORUM.

Mustang. See HORSE.

Mustapha, a suburb of Algiers (q.v.).

Mustard (*Sinapis*), a genus of Cruciferae, now generally reckoned a sub-genus of Brassica. Three species, all annuals, contribute their seeds to the manufacture of mustard. (1) Black Mustard (*S.*, or *B.*, *nigra*), a native of the middle and the south of Europe, also of Britain, but rare in Scotland; a rather coarse plant, two or more feet high, having the lower leaves lyrate and usually hispid, the upper leaves linear-lanceolate, entire, and hairless. The flowers are yellow, in slender racemes. The pods rarely above half an inch in length, are closely pressed to the stem. The seeds are deep brown. (2) White Mustard (*S.*, or *B.*, *alba*), a native of southern Europe and western Asia, naturalised in the southern parts of Britain and in

Ireland, and in the United States. The whole plant is more or less hairy, the leaves pinnately lobed. The flowers are large compared with those of the preceding species; the pods nearly twice as long, with a long flattened beak, and five prominent nerves; and the seeds are pale yellow. (3) The Wild Mustard (*S. arvensis*, or *B. Sinapis*), also widely known as *Charlock*, is a weed of cultivation only too common throughout Britain and Ireland in cornfields, and in some parts of the United States. Wild mustard is reputed to have yielded the original Durham Mustard, but its seeds are now only gathered for mixing with those of the others. The black mustard is the most pungent, and is almost exclusively used on the Continent. White mustard is favoured in Britain, chiefly because the skin is more easily separated from the seed. The bulk of it is grown in the fens of Lincolnshire and Cambridgeshire, also in Kent and Essex. White mustard is sown in gardens, and used as a small salad. Much of the mustard seed imported from India is *Sarepta Mustard* (*S.*, or *B.*, *juncea*). Mustard is often adulterated (see ADULTERATION); but 'mustard condiment,' made of mustard flour and wheaten flour or starch flour, is less bitter and stinging than pure mustard, and keeps better. Both black and white mustard seed yield by expression a non-drying fixed oil, which is known as *oil of mustard*, and is free from pungency. When the residual cake, possessing in itself little pungent odour, is treated with water it immediately becomes powerfully irritating to the skin. This is due to a chemical action between an albuminous body, myrosin, an enzyme, and complex bodies differing in the two varieties of seed, which are present in the cells. These in presence of water react, giving, in the case of black mustard, a *volatile oil*, having the composition of isothiocyanate of allyl, C_3H_5SCN , while in the white seed the non-volatile sulpho-cyanate of acrynl, C_7H_7SCNO , is produced. This action is similar to that of oil of bitter almonds (see ALMONDS). It is to the formation of these vesicating substances that the pungency and activity of a mustard plaster are due. As the white seed contains more myrosin than the black, it is usual to mix the two, so as to develop fully the action of the latter. The use of boiling water is inadmissible in forming such a poultice, as it destroys the enzyme and rapidly dissipates the volatile oil, on which the virtues partly depend (see BLISTER). 'Mustard papers,' used as vesicants, are made of mustard flour deprived of its fixed oil. The cake that remains after the oil is extracted may be given to cattle as a condiment. —The Mustard-tree of the Bible has been supposed to be *Salvadora persica*, a small tree of the Salvadoraceæ, a small family of doubtful relationship; but other interpreters insist that the ordinary black mustard is meant in the proverb.

Mustelidæ, a family in the bear section of Carnivores (q.v.), somewhat arbitrarily divided into otter-like (Lutrine), badger-like (Meline), and weasel-like (Musteline) sub-families. See the articles on these and related types.

Muta Nzige. See ALBERT-EDWARD NYANZA.

Mutation. See HEREDITY, UMLAUT.

Mute, a small instrument used to modify the sound of the violin or violoncello. It is attached to the bridge by means of a slit, its three legs standing between, but clear of, the strings. The mute softens the tone and imparts to it a peculiar muffled and tremulous quality, which is sometimes very effective. Its application is indicated by the letters *c. s.*, or *con sordino*, and its discontinuance by *s. s.*, or *senza sordino*. A mute, consisting of a pear-shaped pad of leather or other material, is sometimes used for brass instruments.

It is inserted into the bell of the instrument, thereby subduing the sound and producing the effect of great distance. The fist is sometimes used as a substitute. For muffling of the drum, see DRUM. See also DEAF AND DUMB, PHONETICS.

Mutiny, as defined by British military law, is 'collective insubordination,' or the combination of two or more persons to resist or induce others to resist lawful military authority. The punishment laid down in the Army Act of 1881 for this crime and for failing when present to use the utmost effort to suppress it, or, when knowing of a mutiny or intended mutiny, failing to give notice of it to the commanding officer, is death or such less punishment as a court-martial shall award. It may be pointed out that, in view of the above legal definition, one man alone cannot be guilty of mutiny, but may be charged with 'insubordination,' a crime which, in its worst forms, is also punishable by death. On board ship the mutiny of the *Bounty* (see PITCAIRN ISLAND) in 1789 is memorable, and of that on board the *Danaë* frigate in 1800; the great naval mutiny at the Nore (q.v.) in 1797 is dealt with specially. The Indian Mutiny is a common name of the Sepoy rebellion of 1857. See INDIA.

Mutiny Act was an act passed by the British parliament from year to year, to regulate the government of the army. The navy and marines, when serving on a ship in commission, are under Naval Discipline Acts, 1861 and 1866, the successors of Articles of War first enacted under Charles II., which, unlike the Mutiny Act, remained in force for an indefinite time. By the Bill of Rights the maintenance of a standing army in time of peace, unless by consent of parliament, was declared illegal, and from that time the number of troops to be maintained, and the cost of the different branches of the service, have been regulated by an annual vote of the House of Commons. Soldiers, in time of war or rebellion, were always subject to military law; but the occurrence of a mutiny in certain Scottish regiments soon after the Revolution raised the question whether the same law could be enforced in time of peace; and it was decided that, in the absence of any statute to the contrary, a soldier in time of peace was only amenable to the common law: if he deserted, he was only liable for breach of contract; or if he struck his officer, to an indictment for assault. The authority of the legislature became indispensable to the maintenance of discipline; and parliament, from 1689 till 1879, conferred this and other powers in the Mutiny Act, limited in its duration at one time to six months, but latterly to a year. Although it was greatly changed from the form in which it first passed, the annual alterations were slight, and substantially it had a fixed form. The preamble quoting the above declaration from the Bill of Rights added that it was judged necessary that a force of specified strength should be continued, while it gave authority to the sovereign to enact Articles of War for the government of that force. The act specified the persons liable to its provisions, treated of courts-martial, crimes, and punishments, and of military prisons, furlough, Enlistment (q.v.), stoppages, billets, and the conveyance and entertainment of troops. For years prior to 1878 attention had been drawn in parliament and elsewhere to the shortcomings of the act, as well as to those of the Articles of War (q.v.) by which it was accompanied, explained, and amplified. These representations culminated in the appointment of a Parliamentary Committee, which in 1879 presented a Bill to supersede the Mutiny Act, and, like it, to be passed annually as the 'Army Discipline and

Regulation Act.' The Marine Forces when serving on shore were under the Marine Mutiny Act up to 1879; then they were brought under the 'Army Discipline and Regulation Act.' See ARMY (*Army Discipline*).

Muttra, or MATHURÁ, a town of India, in the United Provinces, is situated on the right bank of the Jumna, 30 miles above Agra. For centuries it was a centre of the Buddhist faith, and the surrounding country teems with traditions of Krishna (or Vishnu, q.v.) and his brother Balarama. There are numerous temples and mosques; the river is lined with magnificent flight of stairs, leading down to the bathing-places in the sacred river; large numbers of pilgrims resort to the city on the occasion of its religious festivals; and troops of monkeys and turtles are supported by the charity of the gentle-hearted people. The city has passed through a long series of misfortunes: it was sacked by Mahmud of Ghazni in 1017; its temples were destroyed by a native sultan in 1500, and by Aurungzebe in 1669; and it was plundered by the Afghans in 1756. In 1803 it passed into the hands of the British. Pop. 53,000.—There is another Muttra (or Matra) adjoining Muscat (q.v.).

Muyscas. See COLOMBIA.

Muzaffarnagar, a municipality in the United Provinces of India and capital of a district 80 miles NE. of Delhi by rail; pop. 24,000.

Muzaffarpur, capital of a district in Bihar, 140 miles N. of the Ganges at Patna, has an external college of Patna University; pop. 33,000.

Myall, an Australian tree (*Acacia pendula*) with ashly leaves and the habit of the weeping willow. *A. homalophylla*, whose branches do not droop, is likewise so named. Its wood, whose scent has been compared to those of raspberry jam and violets, is much used for making whip-handles and tobacco-pipes. The wilder tribes, especially in Queensland, are often called Myalls.

Mycalæ, a wooded promontory of ancient Ionia, over against Samos; in the channel between them, Leotychides the Spartan and Xanthippus the Athenian defeated the Persian fleet in 479 B.C.

Mycelium, the vegetative part of fungi which is not concerned in spore-bearing. It may consist simply of a much-elongated cell growing from the spore, or of a chain of cells, but in the majority it is a tissue of interlaced branched filaments or hyphae, loosely united in many moulds, membranous in dry-rot, compact and tuberous in mushrooms. See FUNGI.

Mycenæ, a very ancient city in the north-eastern part of Argolis, in the Peloponnesus, built upon a craggy height, and said to have been founded by Perseus. It was the capital of Agamemnon's kingdom, and was in his time the principal city in Greece. About 468 B.C. it was destroyed by the inhabitants of Argos, and never rose again to anything like its former prosperity. In Strabo's time its ruins alone remained; these are still to be seen in the neighbourhood of Kharvati, and are noble specimens of Cyclopean architecture. The most celebrated are the 'Gate of Lions,' chief entrance to the ancient Acropolis, the beehive tomb called the 'Treasury of Atreus,' the city wall, and a great rambling palace. Several other beehive tombs have been found. Excavations prosecuted at Mycenæ by Dr Schliemann brought to light in 1876 several ancient shaft-tombs, containing architectural fragments, terra-cottas, vases, weapons, gold death-masks (see MASKS) and other ornaments of thin hammered gold. These tombs are surrounded by a ring of upright slabs. Schliemann's excavations at Tiryns and Troy, the work of Tsountas and of Wace at Mycenæ,

and especially the explorations of Evans and others in Crete, have widened the meaning of 'Mycenæan culture.' Now it is understood to cover a phase of native Ægean or Mediterranean culture, culminating in the Bronze Age, and originally independent, but not untouched by Egyptian, Phœnician, and other influences (see CRETE).

Mycetoma, or MADURA FOOT, a fungoid disease of India akin to Actinomycosis (q.v.). It usually attacks the feet and legs.

Mycetozoa. See MYXOMYCETES.

Mycorrhiza (Greek *mykēs*, fungus, *rhiza*, root), a sheath of fungus threads investing the roots of many forest trees and other plants, and serving the purpose of root-hairs, which are absent where a mycorrhiza is found. The mycorrhiza may be wholly external, or ectotrophic; or it may be endotrophic, penetrating the cells of the root and surrounding the nucleus. The fungus absorbs water, salts, and organic material from the soil, passes them on to the root, and possibly receives useful materials in exchange. A mycorrhiza is most commonly found where there is much humus, and especially on plants that transpire slowly.

Myelitis (Gr. *myelos*, 'marrow') is the term employed to signify inflammation of the substance of the spinal cord. It may be either acute or chronic, but the latter is by far the more common affection. The chronic form begins usually after middle life, with disordered sensations in the extremities, and unusual fatigue after any slight exertion. After a short time paralytic symptoms appear, and slowly increase. The gait becomes uncertain and tottering, and at length the limbs fail to support the body. The paralysis finally affects the bladder and rectum, and the evacuations are discharged involuntarily; and death takes place as the result of exhaustion, or occasionally of asphyxia if the paralysis involves the cervical region of the cord. In the acute form the symptoms are the same as those of the chronic form, but they occur more rapidly and with greater severity, and death sometimes takes place in a few days. Pain may be present in the spine, or in the parts of the body whose nerves proceed from the diseased area of the spinal cord; but it is not usually a prominent symptom when the morbid process begins in the cord itself.

The most common causes of the acute form of this disease are infective disorders, chills and injuries to the back. Syphilis and severe anæmia frequently precede the chronic form, which may also be one of the degenerative signs of old age. It may also result from other diseases of the spine (as caries). The treatment is much the same as that of inflammation elsewhere. When confirmed paralysis has set in there is little to hope for, but in order to prolong life, careful nursing, the prevention of bed-sores, and avoidance of inflammation of the bladder are specially necessary.

Myers, FREDERIC WILLIAM HENRY (1843–1901), son of Frederic Myers (author of four series of *Catholic Thoughts*), was born at Keswick, and passed from Cheltenham to Trinity College, Cambridge, where he became fellow and tutor. From 1872 he was on the permanent staff of school inspectors. He wrote poems and essays, but is chiefly associated with work done in connection with the Society for Psychical Research. Particularly outstanding is his *Human Personality and its Survival of Bodily Death* (1903; abridged by S. B. and L. H. M. 1919). His *Collected Poems with Autographical and Critical Fragments* appeared in 1921, edited by his wife.—His brother ERNEST JAMES MYERS (1844–1921), born at Keswick, educated at Cheltenham and Balliol, was a fellow

of Wadham (1863-83), and was called to the bar (1874) but never practised. He was author of a prose translation of Pindar (1874) and of *Poems* (1877).

Mygale. See BIRD-CATCHING SPIDER.

Myliatta, a Babylonian goddess of fruitfulness, procreation, and birth, in whose honour, according to Herodotus, every girl had once in her life to give herself up to the embraces of a stranger.

Mylodon (Gr. 'grinder-teeth'), a genus of huge fossil sloths, whose remains are found in the Pleistocene deposits of America, associated with the Megatherium and other allied genera. A complete skeleton of the best-known species (*M. robustus*), dug up at Buenos Aires, measured 11 feet from the forepart of the skull to the end of the tail. Another species from the same region was considerably larger. The genus ranged into North America, the remains of one species (*M. Harlani*) having been found in Kentucky. Although like the modern sloth in general structure and dentition, the immense size of *Mylodon* forbids us to suppose that it could have had the same arboreal habits, and the modifications of its structure seems to have fitted it for the uprooting and prostrating of the trees, the foliage of which supplied it with food.

Mymensingh. See MAIMANSINGH.

Myna (*Acridotheres*, or *Gracula* of Cuvier), a genus of birds of the family Sturnidae, of which there are seven species ranging over the whole oriental region and Celebes. The head is more or less crested, and some have a naked space behind and under the eye; the bill is rather short, stout, and compressed; the tail is rounded; the feet are strong, the toes long, and the claws moderately curved. The Common Myna (*A. tristis*), which is found throughout India and extends into Assam and Burma, measures about 10 inches in length, and is of a glossy black colour on the head, neck, and breast; the rest of the plumage is snuff-brown, darkest on the back and wing-coverts, and lightest beneath; the wing-quills are black, with a white spot at their base, forming a conspicuous wing-spot; the tail is black, with a white tip; the bill is deep yellow; and the legs are dull yellow. It is one of the commonest birds of India, where it is found in large numbers, being eminently sociable in its habits. It feeds chiefly on insects, grain, and fruit. It makes its nest in nooks and eaves of houses and in holes in the walls of houses and ruins. The eggs, which usually number four or five, are pale bluish green in colour. It has a variety of notes, some musical and pleasing, others harsh. It is often domesticated, when it becomes pert and familiar, and a good imitator of the human voice, in this respect excelling parrots. This bird was introduced into Mauritius to destroy the grasshoppers, which it did very effectively; but in its turn, when naturalised there, it became a pest through its ravages among fruit trees.—The name Hill Mynas or Grakles (q.v.) is given to four distinct races of birds belonging to the genus *Eulabes* of Cuvier, or *Gracula* of Linnaeus, one from Southern India, another from Ceylon, a third from the Himalayas and Burma, and the last from Malaysia. They are birds of fine glossy plumage with prominent yellow wattles behind the ears. This genus comprises thirteen species found in the oriental region as far as south-west China, Hainan, and Java, and in the Australian region in Flores, New Guinea, and the Solomon Islands. The Australian Mynas or Minahs belong to the genus *Myzantha*, but the Indian Uno is also acclimatised in some Australian towns.

Myopia. See EYE.

Myosin. See GLOBULIN.

Myosotis. See FORGET-ME-NOT.

Myrica. See BOG-MYRTLE, CANDLEBERRY.

Myriopoda (Gr. 'myriad-footed'), a class of terrestrial Arthropods with numerous and very uniform segments. The head is distinct and bears a pair of antennae, while mandibles and maxillae form the true mouth-appendages. The legs themselves have six or seven joints, and end in a claw. Respiration is discharged by air-tubes or tracheae. The class includes two orders, which differ considerably: the Centipedes (Chilopoda), with flattened body, a pair of legs on each ring, the first pair behind the mouth with powerful poison-claws; and the Millipedes (Chilognatha), with cylindrical body, and two pairs of legs on most of the rings. The Centipedes are carnivorous, and their venomous 'bite' is sometimes dangerous; the Millipedes are destructively vegetarian, but otherwise harmless. Generally they avoid the light, and live in the ground, under stones, among moss, under bark, or in similar hidden habitats. Many zoologists would make separate classes of centipedes and millipedes. Fossil forms appear in Carboniferous strata. See CENTIPEDE.

Myristicaceae. See NUTMEG.

Myrmecodia, an Indo-Malayan genus of epiphytic Rubiaceae. A great tuber is formed at the base of the stem, penetrated by many cork-lined galleries and chambers connecting one with another. These are inhabited by ants. The plant seems to utilise their excreta. The kindred genus *Hydnophytum*, found in eastern Asia, New Guinea, and Fiji, is similar.

Myrmecophaga. See ANT-EATER.

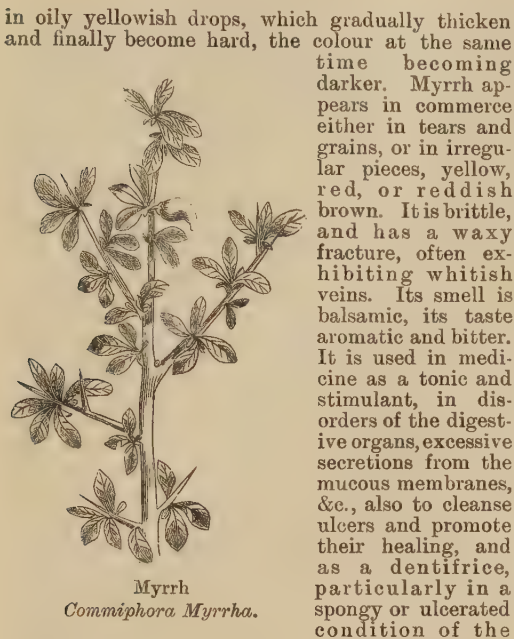
Myrmecophily. See ANT, BATSCHIA, CECROPIA, MYRMECODIA.

Myrmidons, the followers of Achilles in the Trojan war. They were an old Thessalian race who colonised the island of Ægina. According to Greek legend, Zeus peopled Thessaly by transforming the ants into men (*myrmæx* = 'an ant').

Myrobalans, the astringent fruit of certain species of Terminalia, trees of the natural order Combretaceae, natives of the mountains of India. *T. Bellerica* produces great part of the myrobalans of commerce of that name; the fruit is about the size of a nutmeg, very astringent, with bitter kernels, to which intoxicating qualities have been ascribed. The bark abounds in a gum, resembling gum-arabic, which is soluble in water and burns away in the flame of a candle. The kernel of the fruit is said to yield an oil which encourages the growth of the hair. Other forms of myrobalans are the Chebulic, the fruit of *T. Chebula*; the Citrine, the fruit of *T. citrina*; and the Indian, which are the small unripe fruits of either or all of the preceding. They are all chiefly in request by tanners, dyers, and ink-makers. Emblic myrobalans, the fruit of *Phyllanthus Emblica*, of the Euphorbiaceae, are similarly used in India-ink. For Myrobalan Plum, see PLUM.

Myron, Greek sculptor, a native of Eleutherae, flourished about 450 B.C. He was a fellow-pupil of Pheidias, and excelled in modelling athletes, animals, and figures in motion. His most celebrated works were the 'Diskobolos,' 'Ladas the Runner,' 'A Cow,' and 'Athene and the Satyr.' Copies have survived of the first and last only. Myron worked principally in bronze.

Myrrh (Heb. *mur*), a gum-resin produced by *Commiphora Myrrha*, a tree of the Burseraceae, growing in Arabia and Somaliland. It is small and scrubby, spiny, with whitish-gray bark, thinly-scattered small leaves, each consisting of three obovate leaflets with obtuse toothlets, and the fruit a smooth brown ovate drupe, somewhat larger than a pea. Myrrh exudes from the bark



gums. It was much used by the ancient Egyptians in embalming. The best myrrh is known in commerce as *Turkey Myrrh*, but practically all myrrh comes either from Aden or from Bombay. The 'myrrh' of Gen. xxxvii. 25, Heb. *lôt*, was probably *Ladanum* (q.v.). See BALSAMODENDRON, BDELLIUM.

Myrsinaceæ, a vast family of chiefly tropical trees and shrubs, the type of which is *Myrsine africana*, a shrub or low tree with some resemblance to the Myrtle, whence the name (Gr. 'myrtle'). It ranges from the Azores, across Africa, Socotra, Arabia, Afghanistan, the Himalaya, into S. China. The family comprises *Maesa*, *Ardisia*, *Embelia*, *Rapanea*, and many other genera, spread over the tropics of both hemispheres, and extending to China and Japan.

Myrtaceæ, a family of dicotyledons, trees and shrubs, natives chiefly of warm, partly of temperate, countries. The family, as defined by the greater number of botanists, includes several sub-families, which are regarded by some as distinct, particularly *Chamelauciaceæ* (in which are contained about fifty known species, mostly beautiful little bushes, often with fragrant leaves, natives of Australia and Tasmania), and *Lecythidaceæ* (two hundred species). Even as restricted, by the separation of these, the order contains about 3000 known species. The leaves are entire, usually with pellucid dots, and a vein running parallel to and near their margin.—Some of the species are gigantic trees, as the *Eucalypti* or Gum Trees of Australia, and different species of *Metrosideros*, of which one is found as far south as the Auckland Islands, in 50½° lat. The timber is generally compact.—Astringency seems to be rather a prevalent property in the order, and the leaves or other parts of some species are used in medicine as astringents and tonics. A fragrant or pungent volatile oil is often present in considerable quantity, of which Oil of *Cajeput* and Oil of *Cloves* are examples. *Cloves* and *Pimento* are amongst the best-known products of the order. The berries of several species are occasionally used as spices in the same way as the true *Pimento*. A considerable number yield pleasant edible fruits, among which are the *Pomegranate*, the *Guava*, species of the genus *Eugenia*, and some species of *myrtle*.

Myrtle (*Myrtus*), a genus of Myrtaceæ, the characteristics of which are well illustrated in the accompanying figure. The Common Myrtle (*M. communis*) is well known as a beautiful evergreen shrub, or a tree of moderate size, with white flowers. It is a native of all the countries around the Mediterranean Sea, and of the temperate parts of Asia, often forming thickets, which sometimes occur even within the reach of the sea-spray. The leaves are ovate or lanceolate, varying much in breadth. They are astringent and aromatic, contain a volatile oil, and were used in medicine by the ancients as a stimulant. The berries are also



Myrtle (*Myrtus communis*):
a, branch in flower; b, vertical section of flower.

aromatic, and are used in medicine in Greece and India. A myrtle wine is also made. Myrtle-bark is used for tanning in many parts of the south of Europe. Among the ancient Greeks the myrtle was sacred to Venus, as the symbol of youth and beauty, was much used in festivals, and was, as it still is, often mentioned in poetry. The myrtle en-

dures the winters of Britain only in the mildest situations in the south. The Small-leaved Myrtle of Peru (*M. microphylla*) has red berries of the size of a pea, of a pleasant flavour and sugary sweetness. Those of the *Luma* (*M. Luma*) are also palatable, and are eaten in Chile. A very humble species of myrtle (*M. nummularia*) spreads over the ground in the Falkland Islands, as thyme does in Britain.

Myrtle-wax. See CANDLEBERRY, WAX.

Mysia, a district of ancient Asia Minor, having the Propontis (Sea of Marmora) on the N., the Ægean on the W., Lydia on the S., and Bithynia and Phrygia on the E. The Troad (see TROY) was one of its subdivisions.

Mysis, a genus of podophthalmous (stalk-eyed) crustaceans, of the order Stomatopoda, much resembling the common shrimps in form.

Mysore, or MAISUR, a state of Southern India, is almost surrounded by districts of the Madras Presidency. The area is 29,500 sq. m. Pop. (1881) 4,186,188; (1921) 5,978,892. Mysore is an extensive tableland much broken by hill-ranges and deep ravines, and is divided into two portions, a little north of 13° N. lat., by the watershed between the Kistna and the Kaveri rivers. Numerous isolated rocks (*drugs*) rising to 4000 or 5000 feet, are a peculiarity of the country, and have been mostly converted into hill-fortresses. The rivers are used for irrigation purposes, but are not navigable. The climate of the higher districts is during a great portion of the year healthy and pleasant. The exports are betel nut and leaves, coffee, ragi, gram, cotton, piece-goods, cardamoms, rice, silk, and sugar. The imports consist mainly of piece-goods, cloth, wheat, silver, gold, cotton,

rice, silk, betel-leaves, and pepper. Gold, a little manganese, and chrome-ore are got. The ruinous misgovernment of the native prince led the British to assume the administration in 1831; but in 1881 Mysore was restored to the native dynasty. The famine years (1876-78) told with great severity on that state. The British headquarters were at Bangalore (q.v.). For history, see HYDER ALI, TIPPOO SAHIB, and INDIA.

The capital of the state, MYSORE, is situated amid picturesque scenery on a declivity formed by two parallel ranges running north and south, 245 miles WSW. of Madras. A prosperous, well-built town, it has broad, regular streets, and substantial houses and public buildings. On the south side stands the fort, which encloses the maharaja's palace; its chief object of interest is a magnificent chair or throne of fig-wood, overlaid with ivory and gold. Pop. (1891) 74,048; (1921) 83,951. The university of Mysore, founded in 1916, has two of its constituent colleges (Maharaja's, Maharani's Women's) in Mysore and two in Bangalore.

Mystagogue (Gr. *mystēs*, 'an initiated person,' and *agō*, 'I lead'), the name in the Greek religious system of the priest whose duty it was to direct the preparations of the candidates for initiation in the several mysteries, as well as to conduct the ceremonial of initiation. The same name is applied in the Christian church as early as the 4th and 5th centuries to the catechists or other clergy who prepared candidates for the Christian *mysteries*, or sacraments, of baptism, confirmation, and the eucharist, especially the last.

Mysteries (Gr. from *myō*, 'I close the lips or eyes'), also called *Teletai*, *Orgia*, or, in Latin, *Initia*, designate certain rites and ceremonies in ancient, chiefly Greek and Roman, religions, only known to, and practised by, congregations of certain initiated men and women, at appointed seasons, and in strict seclusion. The origin, as well as the real purport of these mysteries, which take no unimportant place among the religious festivals of the classical period, and which, in their ever-changing nature, designate various phases of religious development in the antique world, is all but unknown. It does seem, indeed, as if the vague speculations of modern times on the subject were an echo of the manifold interpretations of the various acts of the mysteries given by the priests to the inquiring disciple—according to the lights of the former or the latter. Some investigators, themselves not entirely free from certain mystic influences (like Creuzer and others), have held them to have been a kind of misty orb around a kernel of pure light, the bright rays of which were too strong for the eyes of the multitude; that, in fact, they hid under an outward garb of mummerly a certain portion of the real and eternal truth of religion, the knowledge of which had been derived from some primeval or, perhaps, the Mosaic revelation; if it could not be traced to certain (or uncertain) Egyptian, Indian, or generally eastern sources. To this kind of hazy talk, however (which we only mention because it is still repeated every now and then), the real and thorough investigations begun by Lobeck, and still pursued by many competent scholars in our own day, have, or ought to have, put an end. There cannot be anything more alien to the whole spirit of Greek and Roman antiquity than a hiding of abstract truths and occult wisdom under rites and formulas, songs and dances; and, in fact, the mysteries were anything but exclusive, either with respect to sex, age, or rank, in point of initiation. It was only the speculative tendency of later times, when Polytheism was on the wane, that tried to symbolise and allegorise these obscure ceremonies. The very fact of their having to be put down in

later days as public nuisances in Rome herself speaks volumes against the occult wisdom inculcated in secret assemblies of men and women.

How it was that in the best times of Greece these mysteries had such a hold on such large numbers of people is a point about which there need be no mystery. It is perfectly plain. God has at no time left himself without a witness. The Greeks were men; and being men found it impossible to believe that with the death of the body man's life was at an end, or that the sufferings of the innocent met with no reward, the triumph of the wicked with no requital. But the Greeks had no revealed religion, no authoritative teaching on this point. Yet the religious sentiment required some external support for this aspiration, craved some confirmation of this hope. And at the celebration of the mysteries the man or woman whose thoughts were fixed upon the next world found his or her faltering hope strengthened by the sympathy of thousands who were present from the same motives and in the same faith. That this is the secret of the mysteries is indicated partly by the fact that it was the resurrection of various gods which was most prominently set before the eyes of the initiated; and still more by such expressions as that of Pindar, 'Blessed is he who has seen them before he goes below ground;' or of Sophocles, 'Thrice happy they who have been initiated before they die, for theirs is the lot of life, and evil is it with the others;' or of the chorus of the initiated in Aristophanes (*Ran.* 455), 'We alone enjoy the holy light, we, who were initiated and led a life of godliness toward both kin and stranger;' or of the stone record (*Ephem. arch.* 1883), 'To the initiated death is not an evil: it is a gain.'

The mysteries, as such, consisted of purifications, sacrificial offerings, processions, songs, dances, dramatic performances, and the like. The mystic formulas (*Deiknoumena*, *Drōmena*, *Legomena*, the latter including the Liturgies, &c.) were held deep secrets, and could only be communicated to those who had passed the last stage of preparation at the mystagogue's hand. The hold which the nightly secrecy of these meetings, together with their extraordinary worship, must naturally have taken upon minds more fresh and childlike than our advanced ages can boast of was increased by all the mechanical contrivances of the effects of light and sound which the priests could command. Mysterious voices were heard singing, whispering, and sighing all around, lights gleamed in manifold colours from above and below, figures appeared and disappeared; the mimic, the tonic, the plastic—all the arts, in fact, were taxed to their very utmost to make these performances (the nearest approach to which, in this country, is furnished by transformation-scenes, or sensation-dramas in general) as attractive and profitable (to the priests) as could be. As far as we have any knowledge of the plots of these Mysteries as scenic representations, they generally brought the stories of the special gods or goddesses before the spectator—their births, sufferings, deaths, and specially their resurrections. Many were the outward symbols used, of which such as the Phallus, the Thyrsus, Flower Baskets, Mystic Boxes, in connection with special deities, told more or less their own tale, although the meanings supplied by later ages, from the Neoplatonists to our own day, are various, and often very amazing. The most important Mysteries were, in historical times, those of Eleusis and the Thesmophorian, both representing—each from a different point of view—the rape of Persephone, and Demeter's search for her: the Thesmophorian mysteries being also in a manner connected with the Dionysian worship. There were further those

of Zeus of Crete (derived from a very remote period), of Bacchus himself, of Cybele, and Aphrodite—the two latter with reference to the Mystery of Procreation, but celebrated in diametrically opposed ways, the former culminating in the self-mutilation of the worshipper, the latter in prostitution. Further, there were the Mysteries of Orpheus, who in a certain degree was considered the founder of all mysteries. Nor were the other gods and goddesses forgotten: Hera, Minerva, Diana, Hecate, nay, foreign gods like Mithra (q.v.) and the like, had their due secret solemnities all over the classical soil, and whithersoever Greek (and partly Roman) colonists took their Lares and Penates all over the antique world. The Eleusinian mysteries can be traced back to the 7th century B.C. (cf. *Homeric Hymn to Demeter*, l. 473 ff.). In the time of Herodotus as many as 30,000 people attended them (viii. 65); and between 480 and 430 B.C., the period of Athens' highest power and of the Eleusinian mysteries' greatest fame, the number must have been much greater. When, towards the end of the classical periods, the mysteries were no longer secret, but public orgies of the most shameless kind, their days were numbered. The most subtle metaphysicians, allegorise and symbolise as they might, failed in restoring them to primeval dignity. Their influence on St Paul's doctrines and the views of his disciples as to sacraments have attracted attention from theologians.

See Lobeck, *Aglaophamus* (1829); Farnell, *Cults of the Greek States* (iii. 1906); Dyer, *The Gods of Greece* (1891); works on the Eleusinian mysteries by Foucart (1900-14) and Goblet d'Alviella (1903); Jevons, *Introduction to the Study of Religion*; A. B. Cook, *Zeus* (1914).

Mysteries and Miracle-plays were dramas founded on the historical parts of the Old and New Testaments, and the lives of the saints, performed during the middle ages, first in churches, and afterwards in the streets on fixed or movable stages. Mysteries were properly taken from biblical and miracle-plays from legendary subjects, but this distinction in nomenclature was not always strictly adhered to. We have an extant specimen of the religious play of a date prior to the beginning of the middle ages in the *Christos Paschôn*, assigned, somewhat questionably, to Gregory Nazianzen, and written in 4th-century Greek. Next come six Latin plays on subjects connected with the lives of the saints, by Hroswitha (c. 920-968), a nun of Gandersheim, in Saxony, which, though not very artistically constructed, possess considerable dramatic power and interest; they were discovered by Konrad Celtes and by him first published in 1501 at Nuremberg. The performers were at first the clergy and choristers; afterwards any layman might participate. The earliest record of the performance of a miracle-play in England is found in Matthew Paris, who relates that Geoffrey, afterwards Abbot of St Albans, while a secular, exhibited at Dunstable in 1110 the miracle-play of *St Catherine*, and borrowed costs from St Albans to dress his characters. Fitzstephen, in his *Life of Thomas à Becket* (1183), describes with approval the representation in London of the sufferings of the saints and miracles of the confessors. On the establishment of the Corpus Christi festival by Pope Urban IV. in 1264 miracle-plays became one of its adjuncts, and every considerable town had a fraternity for their performance. A 14th-century scrap of a nativity play in French and English survives. Throughout the 15th and following centuries they continued in full force in England, and are mentioned, sometimes approvingly, sometimes disapprovingly, by contemporary writers. Designed at first as a means of religious instruction for the people, they had long before the

Reformation so far departed from their original character as to be mixed up in many instances with buffoonery and irreverence, intentional or unintentional, and to be the means of inducing contempt rather than respect for the church and religion. An example of the degradation of the Mysteries may be seen in the folk-book of Till Eulenspiegel (q.v.). They lingered on after the Reformation, *The Three Kings of Cologne* being performed at Newcastle so late even as 1599. Remarkable collections are the Towneley Mysteries (Surtees Soc. 1836; E.E.T.S. 1897), the Coventry Mysteries (Shak. Soc. 1841), the Chester Plays (Shak. Soc. 1843; E.E.T.S. 1893), and the York Plays (Clar. Press, 1885).

Out of the mysteries and miracle-plays sprang a third class of religious plays, called *Moralities*, in which allegorical personifications of the Virtues and Vices were introduced as *dramatis personæ*. These personages at first took part in the play along with the scriptural or legendary characters, but afterwards entirely superseded them. The oldest known English compositions of this kind are of the time of Henry VI.; they are more elaborate and less interesting than the miracle-plays. Moralities continued in fashion till Elizabeth's time, and were the immediate precursors of the regular drama.

Miracle-plays and mysteries were as popular in France, Germany, Spain, and Italy as in England; and indeed some of the *pastorales* still acted among the Basques (q.v.) are mere survivals. A piece of the kind yet extant, composed in France in the 11th century, is entitled the *Mystery of the Wise and Foolish Virgins*, written partly in Provençal, partly in Latin. A celebrated fraternity, the Confrérie de la Passion, founded in Paris in 1350, had a monopoly for the performance of mysteries and miracle-plays, the exhibition of each of which took several days. Many of these are still extant.

It is a mistake to suppose that the hostility of the Reformers was what suppressed these exhibitions. The fathers of the Reformation showed no unfriendly feeling towards them. Luther is reported to have said that they often did more good and produced more impression than sermons; and Bishop Bale's *Brefe Comedy of Johan Baptyste* (1538) is an onslaught on the friars. The most direct encouragement was given to such plays by the founders of the Swedish Protestant Church, and by the earlier Lutheran bishops, Swedish and Danish. The authorship of one drama of the kind is assigned to Grotius. In England the greatest check they received was from the rise of the secular drama; yet they continued to be occasionally performed in the times of James I. and Charles I., and it is well known that the first sketch of Milton's *Paradise Lost* was a sacred drama, where the opening speech was Satan's Address to the Sun. A degenerate relic of the miracle-play may yet be traced in some remote districts of England, where the story of St George, the dragon, and Beelzebub is rudely represented by the peasantry. Strange to say, it was in the Catholic south of Germany, where these miracle-plays and mysteries had preserved most of their old religious character, that the severest blow was levelled against them. In 1779 a manifesto was issued by the Prince-archbishop of Salzburg, condemning them, and prohibiting their performance, on the ground of their ludicrous mixture of the sacred and the profane, the frequent bad acting in the serious parts, the distraction of the lower orders from more edifying modes of instruction, and the scandal arising from the exposure of sacred subjects to the ridicule of freethinkers. This ecclesiastical denunciation was followed by vigorous measures on the part of the civil authorities in Austria and Bavaria. One exception was made to the general suppression. In 1633 the villagers of

Oberammergau (q.v.), in the Bavarian highlands, on the cessation of a plague which desolated the surrounding country, had vowed to perform every tenth year the Passion of Our Saviour, out of gratitude, and as a means of religious instruction; a vow which had ever since been regularly observed. The pleading of a deputation of Ammergau peasants with Maximilian of Bavaria saved their mystery from the general condemnation, on condition of everything that could offend good taste being expunged. It was then and afterwards somewhat remodelled, and still takes place every ten years. The inhabitants of this secluded village, long noted for their skill in carving in wood and ivory, have a rare union of artistic cultivation with perfect simplicity; the spectacle seems still to be looked on with feelings much like those with which it was originally conceived; the players take part in an act of religious worship; and though swarms of tourists now join themselves to the peasantry of the neighbourhood, the spectacle is largely a solemnity. The players, some 700 in number, are exclusively the villagers, who act their parts with no little dramatic power, and a delicate appreciation of character. The New Testament narrative is closely adhered to; and the acts alternate with *tableaux* from the Old Testament and choral odes. Less elaborate passion plays take place at Köstenberg near Klagenfurt, and at some other places in Germany and Switzerland (e.g. Erl).

See Petit de Julleville, *Histoire du Théâtre en France* (1880-86); A. W. Pollard, *English Miracle-plays, Moralities, and Interludes* (1890; new ed. 1923); E. K. Chambers, *The Medieval Stage* (1903); Creizenach, *Geschichte des Neueren Dramas*; Gayley, *Plays of our Forefathers* (1909); and the books on the Oberammergau passion-play.

Mysticism is not so much a definite system of thought as a tendency of religious feeling, cherished more or less at different periods in most religions by individuals or groups: the essential element being the effort to attain to direct and immediate communion with God or the divine. The tendency appears in the Mysteries (q.v.) of the Greeks, but is more marked in Buddhism, in various Hindu sects, in Sufism, and is the most prominent feature in Neoplatonism and some of the Gnostic systems. But it is more especially to Christian writers of the middle ages that the name of mystics is wont to be given, one of the earliest being Dionysius the Areopagite, followed by Scotus Erigena; and this mode of thought or mood of mind developed itself in opposition both to scholastic intellectualism and exaggerated 'institutionalism.' Among the great Catholic mystics are Bernard of Clairvaux; his contemporaries the Victorines—Hugo, Richard, and Walter of St Victor near Paris; Bonaventura; John of Chur (died 1380); and Thomas à Kempis. The German mystics are specially Meister Eckhart, Suso, Tauler, Ruysbroeck. Aberrant or fanatical forms are found amongst the Fraticelli, Beghards, Beguines, the Brethren of the Free Spirit, the Brethren of the Common Life (to whom Thomas à Kempis belonged), and the Anabaptists. Less theological and more philosophical are Paracelsus, Bruno, Campanella, Jacob Boehme, Schelling, and Swedenborg. In England William Law is a conspicuous example; and some of the Cambridge Platonists like Henry More were to some extent mystical in their religious teaching. Millenarianism has produced several types; from Jansenism sprang the Convulsionaries. In modern Catholicism St Theresa, Fénelon, Madame Guyon, Molinos, the Quietists, and Bourignon may be specially mentioned. Most of the types and representatives of mysticism are discussed in separate articles. The Quaker doctrine of the 'inner light' tends to mysticism;

and the modernist Tyrrell said, The 'Christianity of the future will be mysticism and charity.'

See BOEHME, ECKHART, ST VICTOR, TAULER; also CABBALA, PHILO, PLOTINUS, FLUDD, ILLUMINATI, QUIETISM, ROSICRUCIANS, THEOSOPHY; Vaughan's *Hours with the Mystics* (1856), Inge's *Christian Mysticism* (1900) and *Studies of English Mystics* (1906); Rufus M. Jones, *Studies in Mystical Religion* (1909); Miss Underhill's *Christian Mysticism* (1911), *The Mystic Way* (1913), *Practical Mysticism* (1914), &c.; Mrs Herman, *The Meaning and Value of Mysticism* (1915); W. K. Fleming, *Mysticism in Christianity* (1913); Rudolf Meiner, *Mystics of the Renaissance* (1911); and the Baron von Hügel's work on Catherine of Genoa; German works by Görres (1846), Helfferich (1842), Noack (1853), Preger (1874-93); and for the influence of the Pagan mysteries on the Christian Church, and the Eucharist as a drama of redemption, works by Aurich, Rohde, and Reitzenstein.

Mythology. A myth is a story told about gods or heroes. Mythology is a term sometimes applied to the collected myths of a nation, sometimes to the scientific study of myths. Mythology in the latter sense of the term has for its object not to ascertain why men believe in gods—that is rather the business of the science of religion—but, granted the belief, why men tell these (sometimes extraordinary) stories about them. The first nation to busy itself with this enquiry was the nation whose mythology had the most luxuriant development, the Greeks. From very early times they started their enquiry with the assumption that there must be something behind the myths as known to them—that there was some meaning in a myth. Thus far, they were as regards most myths quite right. The mistake, however, which the Greek philosophers who undertook to recover the original meaning of various myths made was that they imagined the authors of these myths to be, like themselves, philosophers. In other words, they imagined that not only was there a meaning concealed behind myths, but that that meaning had been intentionally concealed, and that myths were the vehicles by which philosophical teaching had been originally conveyed, and in which it might still be detected. Myth was identified with allegory. The particular branch of philosophy supposed to be veiled by mythology depended on the taste of the particular mythologist. Anaxagoras discovered psychological teaching behind the veil; Empedocles found his own theory of the four elements capable of being stated in terms of mythology (see EMPEDOCLES), and he thus effected the first reconciliation between science and religion. And speaking generally, we may say that from that day to this the magic mirror of mythology has never failed to show to every enquirer that which he wished to see in it. The next attempt at interpretation, which also proceeded from Greece, was to strip myth of all that was supernatural and affirm the residuum to be history (see EUHEMERISM, to which article it is only necessary here to add that in the opinion of Gruppe, in *Die griechischen Culte und Mythen* (vol. i. 1887), the work of Euhemerus was not intended as an explanation of mythology, though it was subsequently regarded as such, but was a romance of much the same character as some of Lucian's work or *Gulliver's Travels*). It is interesting to note that in India an independent attempt was made by the Aitihasika school to explain the mythology of the Vedas as history clothed in the garb of the supernatural. The two modes of interpretation already described—the allegorical and the Euhemeristic—continued to be the only methods applied throughout Roman and Christian times to the 19th century, nor can they be said to be wholly extinct even now. At Rome the Stoics, developing systematically what had been rather suggested than definitely formulated by Empedocles, endeavor-

oured to explain all myths as but allegorical descriptions of physical facts. They failed, however, to explain just those myths which most required explanation, the immoral, brutal, and bestial myths, for examples of which we may refer to GREECE (*Ancient Religion*). Their failure was the more remarkable inasmuch as in India the same key had been applied by the native grammarians with considerable apparent success: but we must remember that the science of grammar had been already carried to great perfection in India, and that some of the mythological figures in the Vedas have names which are much more obviously names of nature-powers than is the case in Greek mythology. Inadequate as was the allegorical interpretation of myth, it continued to enjoy an undisputed mastery of the field of investigation in Europe for many centuries. But, as it was sterile to the end, we need here only mention the fact that the latest and most learned form in which it appeared was the *Symbolik und Mythologie der alten Völker* of Creuzer (q.v.), published 1810-12. The effect of the publication of this work was to overthrow the mode of interpretation which it was designed to prove and illustrate. It led to a thorough investigation of the assumptions on which the allegory theory was based; and an era in the history of mythology as a science is marked by the demonstration given by Lobeck in his *Aglaophamus* (1829), of the utter untenability of these assumptions. What is implied in any theory which explains myths as truths conveyed in the form of allegories is the existence of a caste or class of priests or philosophers, possessing a recondite knowledge and teaching it by means of parables. Now the existence of such a class or caste is a matter which requires to be proved, and of which the proof must satisfy the canons of historical criticism. And it may safely be said that there is absolutely no evidence whatever to show that such a class ever existed amongst the Greeks or any other Indo-Germanic nation.

The establishment of this negative conclusion by Lobeck paved the way for the next step forward in the science of mythology. Scholars had hitherto assumed that the authors of myths were men of learning, philosophers. After the exposure of this error, the next step was to recognise the necessity not only of throwing aside our modern, civilised, artificial ideas, but also of endeavouring to see the myths in 'the light in which they presented themselves to the Homeric or Hesiodic audience.' The conviction of this necessity manifests itself, after the time of Lobeck, in Grote, from whom the quotation in the last sentence is made, *Lehrs (Gott, Götter, und Dämonen)*, and Renan (*Études de l'Histoire Religieuse*). Now, if we try to see myths as primitive man saw them, we can hardly doubt that to the Greek of Homer's time or Hesiod's Aphrodite must have presented herself as the ideal of female beauty, Demeter as the perfect type of motherhood, and so on. Thus far it was thought, by Grote and others, possible to go in the way of interpretation: the Greek was at all times characteristically given to anthropomorphism. But to go further and try to explain not only the individual figures of the gods, but the relations in which those figures are represented by myth as standing to each other, was, by a natural reaction against the exploded system of allegorical interpretation, considered to be futile. Primitive man is but a child; he lives in a world of dreams and fancies which are to him as real as the waking world of facts. As for coherence or meaning in what he chose to dream about his gods, you may as well undertake to decide what shapes the clouds have or what words the bells say. The imagination knows no law, or

at the most is subject only to the laws of poetical and æsthetic consistency. It is vain to endeavour to go beyond the myth, or behind it. It is like the curtain of Zeuxis, which was itself the picture. There is nothing behind it. This, as we have said, was a natural reaction, but the pendulum swung too far. No one at the present day would think of denying that in many cases there is something behind the veil—that most myths have a meaning of some kind. Nor would any one now admit that myths possess poetic or æsthetic consistency; on the contrary, one of the problems of scientific mythology is to explain the inconsistency of feeling which is to be found in myths relating to the same subject, to explain, for instance, the repulsive origin attributed by mythology to Aphrodite, the type of feminine beauty, or the amour carried on by Demeter, the ideal of motherhood, in the shape of a mare, with Poseidon.

A partial solution of this problem was afforded by the brothers Grimm (q.v.), whose labours mark a new era in mythology. While collecting their famous fairy tales from the mouths of the people, they were forced to the conclusion that many a tale which had hitherto only been known in a literary form had existed orally long before it had been put on paper or shaped into verse, and the further inference from this became the wide-reaching conclusion that mythology was not, as the allegory theory had falsely taught, the work of the superior few, but the production of the people. It was the way in which the many expressed their religious feeling. It was their only mode of expression, and it was theirs exclusively. The current of mythology, on this theory, flows from the lower strata of society to the upper. Here we have an explanation of the incongruity existing in the myths told of Aphrodite or Demeter, for instance; for myths could not be perpetually retold in one generation after another without being reshaped to suit the changing modes of thought of different generations. But it will be also noticed that, granting that the current of mythology is upwards from below, we are no nearer an answer to the question, Why do men tell the extraordinary stories they do tell about their gods? The quarter, however, in which an answer to this question might be looked for was indicated by Grimm.

One and the same myth may be found, in different forms, amongst different Aryan peoples (see ARYANS, &c.), and although some such myths may have been borrowed by one people from another, just as one language may borrow words from another, still the resemblances between the myths of different Aryan peoples could, like the resemblance between their languages, be only properly accounted for on the supposition that they had been handed down by each separate people from a time when the forefathers of all were united in one home, one tongue, one faith. In fine, the solution of the problem was to be sought in the application of the comparative method to the study of mythology, and in the creation of a comparative mythology of the Aryan peoples. The verification of this hypothesis was supposed to have been effected when it was discovered that the literature of Sanskrit threw the same light on the structure of myths as the language of Sanskrit had thrown on the structure of the Aryan tongues. Comparative mythology may fairly be said to be the creation of two scholars—in Germany Adalbert Kuhn (1812-81), and in England Max-Müller (q.v.). The object of the school founded by them is to trace myths back to Aryan times, to determine their original forms, and, having done this, to show what was their original meaning, and any changes that may have subsequently come over that meaning. Their guiding principle is that in

the Vedas (q.v.) we see Aryan myths in their earliest form—indeed, that we see them in process of making. The conclusion to which they come is that, owing to the defects of language in its earliest stage, the primitive Aryan could only speak of natural objects as living things, and that in consequence he came to believe that all nature was possessed of life. Again, as in language we can only predicate of a subject something which the subject is not, so in myth, primitive man could only express a phenomenon of nature by comparing it with something which it was not—in fact, could only express it by a simile. When in course of time, and owing to the ‘disease of language,’ the meaning of the simile came to be forgotten, what had originally been a very innocent comparison might become a very repulsive myth. For instance, the sun’s relation to the dawn may be likened to that of a husband to his wife, or of a son to his mother; and a myth of incest may be the result.

The reaction against the allegory theory, which was strongest in the time of Grote, had ceased by the time of Max-Müller. According to the comparative mythologists, there is, after all, something behind myth; not, however, an intentionally veiled meaning, but an unintentionally forgotten substratum, a simile originally descriptive of some natural phenomenon. But this school maintaining that myths have a meaning, and that in some cases the meaning is to be found in a metaphorical description of the sun, the dawn, the wind, &c., pushed its mode of interpretation to extremes that caused a revolt amongst mythologists. The earliest insurgent, Mannhardt (1831–89), was content to turn from the Vedas to popular beliefs and folk-tales as the earliest stratum accessible to the comparative mythologist; but a later revoler, Gruppe, rejected the comparative method altogether, and undertook to demonstrate in his second and following volumes that myths have been borrowed by one nation from another, not handed down from the common ancestors of the separate peoples. It seems indeed impossible to deny that, with regard to the importance of Sanskrit, the same mistake has been made by comparative mythologists as was at first made by comparative philologists. The myths of the Vedas form a literary mythology which is nothing like so near to the myth-making stage in the history of a people as are many of the popular traditions of the peasantry of Europe. On the other hand, although Max-Müller and his school were guilty of many offences against the canons of comparative philology in their desire to identify the names of mythological figures, Gruppe undoubtedly went too far in asserting that comparative philology lends no support whatever to the belief that the Aryans possessed any gods at all. Zeus, Aurora, and Agni may safely be said to have been known to the Aryans, and to have been worshipped as deities.

Another series of attacks have been made upon the Kuhn and Müller school on the ground that, if the comparative method is to be applied, it should be applied to the whole of the facts, and not to one particular section of them. In other words, we must not confine ourselves to Aryan myths, but must open our eyes to the fact that nearly every Aryan myth can be paralleled by similar tales from the remotest quarters of the globe. No explanation which explains only a part of the phenomena and leaves other exactly similar phenomena unexplained can possibly be the right explanation. Obviously, therefore, it is impossible to find the key to all the mythologies in any peculiarity of language, for such peculiarity or ‘disease’ would only affect the mythology of the nations speaking that language or family of languages. The mythologist has not only to answer the question why men tell their

extraordinary tales about the gods, but also the question why do they all tell the same sort of story, no matter what race or clime they belong to. The theory that all myths are derived from a common centre, from which they spread in all directions over the face of the earth by borrowing, would explain the similarity in the myths; but, pending the full elaboration of that theory, the field was held by a theory of mythology of which the most distinguished champion in England was Andrew Lang (q.v.). It is, briefly, that myths are survivals from a primitive stage of culture through which all races pass, and in which they much resemble each other. *Ex eisdem eadem.* Primitive man, whether of the Stone Age on this side of the world or on the other, chipped his flint implements in much the same way; and no one, it was argued, thinks of accounting for the resemblance between the implements thus manufactured by any theory of borrowing or of common descent. It is obvious that the same causes acting on the same organisms produce similar results, and this is as true of mental and moral culture as of material culture. Here, too, we have the explanation of the strange nature of many myths; what seems brutal to us does not seem brutal to the savage. There is therefore nothing surprising in the fact that the gods and heroes of the savage are, like himself, savages. Above all, the same problems presented themselves to primitive peoples in all parts of the world, and were solved by the aid of the same analogies. What was the origin of man? of the world? What causes rain? Why does the wind blow? Why does the sun behave as he does? Why are certain customs observed? The answers which commended themselves to primitive man constitute mythology. At the same time there is no reason to believe that primitive man was not as fond of hearing and telling stories as civilised man is of reading novels. And though most myths may be the explanations which were invented to explain what seemed to primitive man to need explanation, some myths probably were from the beginning designed solely for the gratification of the imagination.

Once more, however, the pendulum is swinging. Dr W. H. R. Rivers’s studies in the diffusion of culture have set Professor Elliot Smith, Dr W. J. Perry, and other ethnologists to trace its path. For this school well-nigh everything in the world’s cultures has come from Egypt. Gold-miners, pearl-fishers, and other seekers for ‘Givers of Life’ (see MAGIC), have carried ‘the archaic civilisation’ step by step from land to land across Asia, from island to island across the Pacific, till even the Indians of Ohio practise meaningless rites and tell irrational tales that once had meaning and reason for Egyptians. Myths, it is claimed, arose out of history, out of actual concrete experience, and in their long course drifted away from reality. Thus we come back to something not far removed from Euhemerism.

In addition to the works of Creuzer, Lobeck, Grote, Lehrs, Renan, Grimm, and Gruppe already referred to, see Max-Müller’s various works, and particularly his *Science of Mythology*; Mannhardt, *Wald und Feldkulte*; Schrader, *Prehistoric Antiquities*; E. B. Tylor, *Early History of Mankind and Primitive Culture*; A. Lang, *Myth, Ritual, and Religion*, and *The Making of Religion*; J. G. Frazer, *The Golden Bough*; Chantepie de la Saussaye, *Religionsgeschichte*; C. Petersen, article ‘Mythologie’ in Ersch and Gruber; L. Preller, *Griechische Mythologie*; P. Decharme, *Mythologie de la Grèce antique*; Roscher’s *Lexikon der Mythologie*; Farnell, *Cults of the Greek States* and other works; various studies by Rendel Harris; W. H. R. Rivers, *Dreams and Primitive Culture* (1917); Jane Harrison, *Mythology* (1925). See also the articles in this work on such mythologists as

Euhemerus, Cox, Gubernatis, Lang, Max-Müller; those on the several gods; and the following:

Ancestor-worship.	Dreams.	Religion.
Animal-worship.	Egypt (religion).	Rome (religion).
Animism.	Folklore.	Scandinavian
Auguries.	Greece (religion).	Mythology.
Beast-fables.	Hesiod.	Serpent-worship.
Bidpai.	Homer.	Sun-cult.
Cosmogony.	India.	Totemism.
Demonology.	Magie.	Witchcraft.
Divination.	Mysteries.	

Mytilene, or MITYLENE. See LESBOS.

Myxœde'ma is the name given to a diseased condition first described by Sir William Gull in 1873. It occurs in adults, generally females, and is characterised by a thickening of the subcutaneous tissue, most noticeable in the face (which becomes enlarged, swollen-looking, and expressionless) and the hands, with a simultaneous dulling of all the faculties and slowing of the movements of the body. A precisely similar condition occurs in many cases where the thyroid gland has been removed for disease. Myxœdema is very slow in its progress. It greatly resembles cretinism, though the mental condition is much less affected. In 1890-91 Horsley and others treated cases successfully by grafting in the thyroid gland of a calf, or by injecting the juice of animal thyroids. Since then remarkable success has been attained by administering to patients the extract of thyroid gland

of calves or sheep by the mouth. The improvement, which is swift and marvellous, lasts only so long as the sufferers continue to take the remedy, which must therefore become a regular article of diet in small quantities.

Myxomycetes, or MYCETOZOA, a class of very simple fungi, living on damp surfaces exposed to air, especially on rotting wood, and feeding on organic debris. They form composite masses or *plasmodia*, in which numerous units are fused, or in rare cases simply combined in close contact. On the margins of such a mass amœboid processes of living matter flow in and out, with streaming internal movement, and the plasmodium spreads towards moisture, food, and warmth, or away from the light. Draught, cold, or scarcity of food produces a dormant encysted stage. At other times part of the plasmodium divides into spores, each enclosed in a coat, which bursts and liberates a swarm spore, sometimes flagellate, always eventually like a little amœba. A number of these minute amœbæ unite to form the plasmodium from which we started. See FUNGI, PROTOZOA; monographs by Lister (1894; revised 1925), Sir Edward and Agnes Fry (1899).

Mzensk, or MTZENSK, a town in the Russian government of Orel, 31 miles NE. of Orel; pop. 10,000.

N



the fourteenth letter of the modern English alphabet, descends from the fourteenth letter of the ancient Semitic alphabet. The name of this letter was *nūn* (preserved unchanged in Hebrew, Syriac, and Arabic, and altered by the Greeks into *nū*), which probably means 'fish,' as the word

has that sense in Syriac. The earliest known form is . The conjecture that the character was

originally a representation of a fish is not wholly impossible, but finds no support in the extant form, which may perhaps be merely a modification of the preceding letter (see M).

The earliest form of the letter in Greek inscriptions was , which by the reversal of the direction of the writing became , afterwards modified

into N. This form was adopted by the Romans, and is preserved in our ordinary printed capital. Our minuscule n and the black-letter capital descend from the Roman cursive form, in which the upper angle was rounded, and the second upright stroke disappeared. In many mediæval MSS., including some that are carefully written, the minuscule *n* and *u* are often indistinguishable, so that the reader has to interpret the ambiguous symbol by the light of the context. The horizontal stroke over a letter, which was originally used to denote the omission of a following *m*, afterwards came to be employed also for *n*. In English it was used for *n* in printed books as late as the second quarter of the 17th century.

The sound normally expressed by the letter has always been the voiced point-nasal consonant, as in *no*. In Latin it was used also for the back or 'guttural' nasal (as in *sing*), which occurred only before the *k* and *g* sounds. It is similarly used in the modern languages written in Roman letters (except French, where the back nasal is wanting). In the later stages of the Germanic languages (including English), a *g* following a nasal in the same syllable ceased to be pronounced, so that *ng* at the end of a syllable now represents the simple back nasal consonant. Thus while this consonant is expressed by *n* in *think*, and also *longer*, *finger* (where the *g* belongs to the second syllable), it is rendered by *ng* in *sing*, *singer*. The front or 'palatal' nasal, which does not exist in English, but somewhat resembles *n* + *y*, is written in Spanish *Ñ*, *ñ*, in Portuguese *nh*, and in French and Italian *gn*. In French and Portuguese the letter *n* is added to a vowel-letter or a vowel-digraph to form a complex symbol for a nasal vowel.

The Roman name of the letter *en* (formed like *ef*: see the article on F) is preserved in the modern languages, but has become disyllabic in Italian (*enne*) and in Spanish (*ene*). The character *Ñ*, *ñ*, which is counted a separate letter in the Spanish alphabet, is named *ene*.

Nabataeans, an Arab people, already known in the 7th century B.C., and possibly identical with the Ishmaelite tribe of Nebaioth. They took possession of the country once known as Edom (q.v.); and in the beginning of the 3d century B.C. they were one of the most powerful amongst the Arab tribes, warlike, with a force of 10,000 fighting men, puritanical (eschewing settled life and wine), nomadic, and busy carriers of merchandise between the East and the West. In 312 B.C. Antigonos, the general of Alexander, made an attack, unsuccessful, upon their desert fastness of Sela or Petra (q.v.). By the 1st century B.C. they had shaped their power into a kingdom. In the time of St Paul their king Aretas IV. Philopatris, who died in 40 A.D. after a reign of forty-eight years, was master of Damascus and Coele-Syria. They were then at the height of their power, and their merchants travelled as far as Puteoli in Italy. They were in antagonism successively to the Syrian monarchs, the Maccabæan rulers of Judea, and the Romans, but eventually acknowledged the supremacy of these last. Nevertheless Trajan, in 105 A.D., captured their stronghold and put an end to their kingdom. Their chief remains are at Petra (the centre of the cult of their god Dusares), and at Hejra in Arabia. The language of their coins and inscriptions is Aramaic. See SEMITES.

Nabha, a Sikh principality under the political control of the Punjab, Cis-Sutlej, to the E. of Patiala and S. of Ludiana; area, 928 sq. m.; pop. 263,000.

Nablus, corrupted from the Greek *Neapolis*, the ancient *Shechem*, a town of Palestine, stands on the highest part of the pass, between Mounts Ebal and Gerizim, that leads from the Mediterranean to the Jordan. In the same valley or gap are Jacob's Well, the Tree of the Sanctuary, and Joseph's grave. At first a Canaanite city, it was destroyed by Abimelech, a son of Gideon the Judge. Here Rehoboam was crowned king of Israel. The place became the religious centre of the Samaritans (q.v.). The Greek city gave birth to Justin Martyr, and suffered much during the Crusades. See Baedeker.

Nabonassar, Nabopolassar, &c. See BABYLONIA.

Nachtigal, GUSTAV (1834-85), German traveller, was born at Eichstedt, between Magdeburg and Wittenberg, studied medicine, and served as army surgeon until 1863, when he went to North Africa, suffering from a chest disease. In 1868, through the influence of Rohlfis, he was selected to carry presents from the king of Prussia to the sultan of Bornu. Starting from Tripoli in 1869, he travelled by way of Fezzan and Tibesti to Bornu, made excursions into Borgu and Bagirmi, and returned by Wadai, Dar-Fûr, Kordofan, and Cairo (1874). This long and successful journey, in the course of which he visited, the first of Europeans, the native states of Tibesti, Borgu, and Wadai, put him in the forefront of modern travellers. His vast collection of most valuable information

was written down in *Sahara und Sudan* (1879-89). In 1884 Nachtigal was commissioned to annex for Germany Togoland, Cameroons, and Lüderitzland. He died on the return journey off Cape Palmas.

Nacre. See PEARL (MOTHER OF).

Nadir (Arabic *nazir*), that point in the heavens which is diametrically opposite to the Zenith (q.v.), so that the zenith, nadir, and centre of the earth are in one straight line. The zenith and nadir form the poles of the Horizon (q.v.).

Nadir Shah of Persia, the Conqueror, belonged to a Turkish tribe, and was born in Khorasan in 1688. He entered the service of the governor of Khorasan, and soon obtained high promotion; but, having been degraded for some offence, he betook himself to a lawless life, and for several years was the daring leader of a band of 3000 robbers, and gradually extended his territorial authority. Persia was at this time ruled by Ashraf, an Afghan, whose grinding tyranny and cruelty produced in the mind of every Persian a deadly hatred of the very name Afghan. Nadir having avowed his intention of expelling the hated race from the country and restoring the old dynasty, numbers flocked to his standard, and Meshed, Herat, and all Khorassan were speedily reduced. Ashraf, signally defeated in several engagements, fled before the avenger, who, with a celerity only equalled by its thoroughness, purged Persia of even the semblance of Afghan domination. The rightful heir, Tamasp, then ascended the throne, and Nadir received for his services the government of the provinces of Khorassan, Mazanderan, Seistan, and Kerman. He was sent against the Turks in 1731, and defeated them at Hamadan; but his sovereign having engaged unsuccessfully the same enemy, Nadir caused him to be put in prison, and elevated his infant son, Abbas III., to the throne in 1732. The death of this puppet, in 1736, opened the way for the elevation of Nadir himself, who was crowned as *Nadir Shah*. He resumed the war with the Turks, and, though totally defeated in the first two battles, turned the tide of fortune in the subsequent campaign. He also conquered Afghanistan, and drove back the invading Uzbeks. Difficulties arose with the Great Mogul, and, his envoy having been murdered at Jelalabad, Nadir ravaged the North-west Provinces, and took Delhi, which he pillaged. With booty to the amount, it was said, of £20,000,000, including the Koh-i-nûr (see DIAMOND), he returned to the west bank of the Indus. He next reduced Bokhara and Khaurezm, restoring to Persia her limits under the golden reign of the Sassanides. From this period his character underwent a sudden change; he became suspicious, avaricious, and tyrannical, and was assassinated 20th June 1747. See H. Maynard's *Nadir Shah* (Stanhope Essay, 1885).

Nadiya, capital of a district in Bengal, on the Bhagirathi River, 63 miles N. of Calcutta; pop. 12,500. It was the residence of the last independent Hindu king of Bengal (till 1203).

Nævius, GNAEUS, with the exception of Livius Andronicus, the earliest of the creators of Latin literature, was born, probably in Campania, about 265 B.C. In his youth he served in the first Punic war, made his first appearance at Rome as a dramatic writer in 235, and continued his activity for thirty years. Of his life we know little, save that he was very decidedly attached to the plebeian party, and in his plays satirised and lampooned the Roman nobles with all the virulence and indiscretion of a hot-blooded impetuous Campanian—that Gascon of ancient Italy. He incurred the especial hostility of the Metelli, and was imprisoned at

their instance, as we learn from a passage in the *Miles Gloriosus* of Plautus. He was ultimately obliged to retire to Utica in Africa, where he died after 204. Besides his dramatic writings, comprising both tragedies and comedies, he wrote an epic poem, *De Bello Punico*, in the old Saturnian metre. His work bore the stamp of the national genius, and its vigour and invention gave pleasure to Cicero and to Horace. Only a few very unimportant fragments are extant, which may be found in editions more or less complete by Vahlen (1854) and Ribbeck, *Scenicae Poesis Romanorum Fragmenta* (2d ed. 1871-73). See also Sellar's *Poets of the Roman Republic*, and Ribbeck, *Die Römische Tragödie* (1875).

Nævus (Lat., 'a mole;' known popularly as *mother-spot* or *birth-mark*) is a congenital mark or growth strictly on a part of the skin. The most frequent form is the *pigmentary nævus*, or *mole*. This may be simply a darker pigmentation of a circumscribed portion of skin; or the pigmented skin may be thickened and rough as well, and is often thickly covered with hair. Moles do not tend to increase, and do not need to be treated unless for the sake of appearance. In that case, removal by cutting out is the most satisfactory method of treatment.

When the name is used without qualification, a *vascular nævus* or overgrowth of capillary blood-vessels is generally meant, and the term is used of such abnormal growths in whatever organ or tissue they occur. The slightest form is sometimes called *port-wine stain*, and is sufficiently described by the name: there is just so much overgrowth as to produce a deep red discoloration, without appreciable swelling of the part affected. Frequently the abnormal tissue forms a distinct tumour, either in the skin, when it is of a dark red colour, or beneath it, when it may sometimes be recognised by a blue or purplish tinge. The most frequent situations of these vascular nævi are the skin and subcutaneous cellular tissue of the face and head; but they may occur elsewhere. The popular belief is that they are caused by the longing of the mother during her pregnancy for a lobster, or strawberry or raspberry, or some other red-coloured article of food, and that the influence of her mind has impressed upon the foetus a more or less vivid image of the thing she longed for; and hence the name of *mother-spot*. Sometimes these tumours waste away spontaneously, and give no trouble; but frequently they increase rapidly, invade the adjacent tissues, and ulcerate or slough, and thus become dangerous to life by hæmorrhage. When these tumours do not show a tendency to increase no treatment is necessary, except to remove the disfigurement. When treatment is desirable many different methods may be employed, according to the form and situation of the tumour: e.g. removal by knife or ligature; coagulation of the contained blood by electrolysis; production of inflammation by application of caustics or, in infants, by vaccination upon the nævus.

Naga is, in Hindu Mythology, the name of deified serpents. Their king is Sesha, the sacred serpent of Vishnu.

Naga Hills, a district of British India, the south-eastern extremity of Assam, with an approximate area of 3000 sq. m. and a pop. of 158,000. It consists of a mountainous region, covered with jungle and forest, the haunt of various wild animals, and is inhabited by the aboriginal Nagas and other semi-savage people, whose incessant raids into the more orderly British provinces occasioned much trouble from 1832 down to 1881. See books on the Nagas by Hodson, Hutton, Mills, and Smith.

Nagana, a cattle disease transmitted by the *Tsetse* (q.v.).

Nagar. See BEDNOR.

Nagasaki, a leading seaport of Kyūshū, Japan, and for more than two centuries the only gate of communication for that empire with the outer world. Its harbour, famous for its beauty, is a narrow inlet about 3 miles in length. Near its head, beside the native town, is the low, fan-shaped island of Deshima, where the Dutch factory was situated. From 1637 to 1859 the Dutch traders were immured in this prison of 250 × 80 yards, the monotony of their lives being varied by the arrival of the yearly ship from Batavia, and the annual journey to Yedo, when presents were made to the Shōgun. Chinese traders were also permitted to carry on a limited trade. In 1859 Nagasaki became one of the five open ports. The great Takashima coal-mine, situated on an island 8 miles seaward of the entrance to the harbour, serves to give importance to Nagasaki as a coaling-station. Nagasaki also possesses a fine dockyard and patent slip. The foreign settlement is situated on the flat land at the east side of the harbour. At the mouth of the harbour is the small island of Pappenberg (Takaboko), from which 300 Christians were said to have been hurled in the frightful persecutions of the 17th century. Pop. 176,000.

Nagina, a town in the United Provinces of India, 48 miles NW. of Moradabad; pop. 19,000.

Nagoya, a city of Honshū Island, Japan, 90 miles by rail ENE. of Kyōto, has a fine castle and a beautiful Buddhist temple. It is one of the most important porcelain centres in Japan, and also manufactures lacquer ware, cotton, silk embroideries, &c. Pop. 430,000.

Nagpur, a city of British India, the seat of administration for the Central Provinces, 520 miles from Bombay by rail. It lies embosomed in trees, has several handsome tanks, gardens, and temples, and extensive suburbs, but is not a healthy city, the mean temperature being 78·7° F. Fine cloth fabrics are woven, and there is an active trade in wheat, salt, spices, and European goods. A university was founded in 1923. Here, on the 26th and 27th November 1817, a British force of 1350 men, commanded by Colonel Scott, defeated a Mahratta army of 18,000 men. Pop. 145,000.—The district of Nagpur has an area of 3834 sq. m. and a pop. of 792,500; the division, 22,700 sq. m. and a pop. of 3,146,000.—Chota Nagpore (q.v.) is a division of Bihar and Orissa.

Nag's Head Consecration, a calumnious legend first circulated by Roman Catholics forty years after the event about the consecration of Archbishop Parker (q.v., 1559) in the most irregular manner in the Nag's Head Tavern, Cheapside.

Nagy Szeben. See HERMANNSTADT.

Nagy Várad. See GROSSWARDEIN.

Nahant, a summer-resort on a small, rocky peninsula of Massachusetts Bay, 12 miles NE. of Boston.

Nahum. The seventh of the twelve minor prophetic books of the Old Testament is inscribed: 'The burden of Nineveh. The book of the vision of Nahum the Elkoshite.' The opening verses speak (i. 2-8) in general terms of the certainty and awfulness of the divine judgment against the enemies of God, and of his unfailing goodness to those who put their trust in him; these principles are then applied (i. 9-15) on the one hand to some power, not yet named, 'that imagineth evil against the Lord;' and, on the other, to Judah (i. 15), who, though now afflicted, is to be afflicted no more. The second chapter

opens with a rapid sketch of a military armament—the red shields, scarlet uniforms, flashing chariots, brandished spears—hurriedly summoned for defensive war; then Nineveh, first named in ii. 8, is seen as a ruined site which an inundation has swept bare, and the great spoil of the 'dwelling of the lions' is indicated rather than described. The subject is continued in the concluding chapter, which predicts for the bloody city, full as it is of lies and rapine, the same fate as has already overtaken 'populous No' (iii. 8) or No-ammon, the Egyptian Thebes. The date of the prophecy must thus be placed somewhere between the fall of Thebes—i.e. not earlier than 663 B.C., and that of Nineveh—i.e. not later than 612 B.C. The explanation of i. 11 as a current allusion to Sennacherib is thus excluded; but most critics, with Wellhausen, translate as a reference to the past ('did not one come forth . . .') the point lying in Sennacherib's miserable failure. The prophecy is written in classical Hebrew, and is characterised by a bold and vivid originality of style, if also by a conciseness sometimes bordering on obscurity; in more than one expression it has been thought that the writer betrays personal acquaintance with Ninevite affairs, and it is conjectured that he may have been either an Israelite of the northern kingdom who in early youth had been deported after the fall of Samaria, or a Judean who had been carried captive along with Manasseh. Of his personal history nothing is actually known; the name, which is not a very common one, reappears in Luke, iii. 25, and in the name of the Galilean Capernaum ('village of Nahum'). He is described as a native of Elkosh, by which perhaps is to be understood the modern El-Kauseh, near Ramah in Upper Galilee, though others think of Al-Kōsh near Mosul, on the left bank of the Tigris, where the grave of the prophet has been shown since the 16th century. Chap. i. shows traces of an acrostic. See further J. M. P. Smith (*Internat. Crit. Comm.*, 1912), with full bibliography, and works mentioned under HOSEA.

Naiadaceæ, a family of Monocotyledons (q.v.) consisting of Aquatic Plants (q.v.), and including at least the genus *Naias*, in which the male flower is simply a single anther, the female a single carpel. Grass-wrack (q.v.) and other Potamogetonaceæ, Aponogetonaceæ, and Juncaginaceæ are by some united with this order.

Naiads. See NYMPHS.

Naihati, a town of Bengal, 23½ miles NW. of Calcutta by rail; pop. 23,000.

Nails are flattened, elastic, horny plates, which are placed as protective coverings on the dorsal surface of the terminal phalanges of the fingers and toes. Each nail consists of a *root*, or part concealed within a fold of the skin; a *body*, or exposed part attached to the surface of the skin; and a free anterior extremity called the *edge*. The skin below the root and body of the nail is termed the *matrix*, from its being the part from which the nail is produced. This is thick, and covered with highly vascular papillæ, and its colour is seen through the transparent horny tissue. Near the root the papillæ are smaller and less vascular; hence the portion of nail corresponding to this part is of a whiter colour; from its form, this portion is termed the *lunula*. It is by the successive growth of new cells at the root and under the body of the nail that it advances forwards, and maintains a due thickness, whilst at the same time its growth in a proper direction is ensured. The chemical composition of the nails is given in the article HORN, to which class of structures they belong. The finger-nails grow at the rate of about two-fifths of a line in a week, while the toe-nails grow more slowly. When a

nail has been removed by violence, or has been thrown off in consequence of the formation of matter (pus) beneath it, a new nail is speedily formed, provided the matrix has not been seriously injured.

There is a very common and troublesome affection popularly known as *ingrowing nail*. Its most usual seat is by the side of the great toe. It does not in reality arise from any alteration of the nail, but from the adjacent soft parts being constantly pressed by the use of tight shoes against its edge. These parts become swollen and inflamed; supuration ensues, and an intensely sensitive ulcer is formed, in which the nail is imbedded. At an early stage the ulcer may be healed by packing strands of lint under the edge of the nail and wearing wide boots to avoid further compression. In obstinate cases it is not unfrequently necessary to remove a portion of the nail.

Nails. The making of nails by hand has been an established manufacture in the Birmingham district for 300 years. Before the successful (but very gradual) introduction of machine-made nails, men, women, and children, to the number of 60,000, were engaged in the industry. They all worked, as nailers who forge nails by hand still do, in small shops or sheds attached to their houses. In 1861, when the number employed at this work had dwindled down to 26,000, nearly one-half were females. After the introduction of slitting mills earlier in the century, which supplied nail-rod of the proper section to nail-makers, the trade became localised in the seats that it thenceforward occupied, and gradually prospered. Iron plates are cut up into nail-rods by a pair of slitting rolls with square grooves on their surface.

In making nails by hand, the nailer heats the end of the nail-rod at his small forge, and brings it into the form of the spike of a nail by a few strokes of his hammer on the anvil. It is then cut to whatever length is wanted on a chisel, leaving it still attached to the rod. Dropping it next into one of two holes in a 'bolster,' and detaching it from the rod, the nailer forms the head from the projecting end by a few more strokes of his hammer, and then the nail is finished. Dies or 'swages' are required for the heads of ornamental nails.

Nail-making machines, used in America since the latter part of the 18th century, are complicated and varied. From a strip of rolled iron plate, which has a single or double ridge along its edge, one form of machine, for example, cuts the nails cross-wise and partially forms the head of each from the ridge at right angles to the spike. These cut pieces or blanks are moulded to the required form between suitable dies, and then other tools come into play to shape and finish the heads. In this process the nails are formed while the iron is heated.

Cut nails are made from strips of cold iron the breadth of which corresponds to the length of the nail, and the fibre of which runs the long way of the nail. In cut nails the production of shank and point is done at the same time, but an

of these is superior to most of the old wrought iron nails.

Cast nails are made for boots and other purposes. When annealed they are almost as tough as wrought nails. Cast nails are also made in brass.

Wire nails, which are of French origin, are made by a machine in which the end of a reel of wire, while held for a moment by cam grippers, receives a blow from a punch to form the head. The wire is then pushed forward the length of a nail and two punches advance to form the point, when a 'knocker-off' throws out the finished nail.

Nails can be made from pieces of tinplate scrap folded fanwise or rolled up. The cutting, crushing, gripping, and heading operations are done by one machine.

Naini Tal, the summer-resort of the lieutenant-governor of the United Provinces of Agra and Oudh, nestles between spurs of the Himalaya, beside a beautiful lake 6350 feet above sea-level, 70 miles N. of Bareilly. By a disastrous landslide here in 1880, 150 lives were lost. There is a military convalescent depot. Pop. (1921) 11,230, but about 6000 more in the season (September).

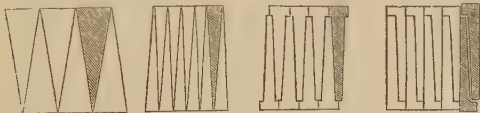
Nair, a Hindu caste, in Malabar, who have given name to a peculiar system of polygamy. See FAMILY.

Nairn, county town of Nairnshire, and a summer-resort, stands on the west bank of the river Nairn at its mouth in the Moray Firth, 16 miles ENE. of Inverness. Grant the African traveller was a native. Pop. 4500.

Nairne, CAROLINA OLIPHANT, BARONESS, song-writer, was born 16th August 1766 at the 'auld house' of Gask in Perthshire, the third daughter of its Jacobite laird. In 1806 she married her second cousin, Major William Murray Nairne (1757-1830), who in 1824, by reversal of attainder, became the sixth Lord Nairne, and to whom she bore one son, William (1808-37). They settled at Edinburgh, and after her husband's death she lived for three years in Ireland, then for nine on the Continent, returning at last to the new house of Gask—the old one had been pulled down in 1801. There she died, 27th October 1845. Her eighty-seven songs appeared first under the pseudonym 'Mrs Bogan of Bogan' or 'B.B.' in *The Scottish Minstrel* (1821-24), and posthumously as *Lays from Strathearn*. Not a few of them are mere Bowdlerisations of 'indelicate' favourites; but four at least live, and shall live, with the airs to which they are wedded—the exquisite 'Land o' the Leal' (c. 1798), and 'Call'er Herrin', 'The Laird o' Cockpen,' and 'The Auld House.'

See Charles Rogers's *Life and Songs of Lady Nairne* (1869); T. L. Kingston Oliphant's *Jacobite Lairds of Gask* (1870); G. Henderson, *Lady Nairne*.

Nairnshire, the fourth smallest county of Scotland, is washed on the north for 10 miles by the Moray Firth, and elsewhere bounded by Elgin and Inverness shires. Till 1891 it consisted of a main body, with a maximum length of 18 miles, a mean breadth of 11, and an area of 169 sq. m., and also of five detached portions situated in Elgin, Inverness, and Ross shires, which, having a total area of 31 sq. m., were annexed to Nairnshire in 1476, but disjoined therefrom by the Boundary Commissioners in 1891. The chief rivers are the Nairn and the Findhorn, the former rising in Inverness-shire, and flowing 38 miles north-eastward to the Moray Firth. The surface has a generally southward ascent from the fertile and well-wooded 'laich of Moray' near the coast, till at Carn Glas on the southern boundary it attains 2162 feet. Loch Loy ($1\frac{1}{2}$ by $\frac{1}{4}$ mile) is the largest of seven small lakes.



additional operation is necessary if they require to be headed. The annexed diagram shows how these nails are made without waste of material.

Horseshoe-nails, which are formed of the best charcoal iron, proved the most difficult to make by machinery, and hand-made nails still find a market. A very large proportion of cut nails, as well as other kinds, are now made from steel, and the quality

Less than one-fifth of the entire area is in cultivation, more attention being paid to stock than to crops. The chief antiquities are Kilravock (1400) and Cawdor Castle. Pop. (1881) 10,455; (1921) 8790.

Nairobi, capital of the province of Ukamba and of the colony of Kenya, 350 miles inland from Mombasa, on the so-called Uganda railway, is a growing trade centre; pop. 25,000 (3000 Europeans, 8000 Indians).

Naivasha, a town in the colony of Kenya, named from the shallow lake Naivasha, 80 miles E. of Victoria Nyanza, 6500 feet above the sea, but in the same geological 'rift' in which Baringo lies.

Najaf, a holy city of the Shias in Iraq, near the Euphrates, 33 miles SSW. of Hilla. Catacombs occupy about half of the city. Thousands of corpses are sent thither from Persia.

Nakhichevan, an ancient Armenian town in a fertile region near the Aras, 83 miles SE. of Erivan, is said to have been built by Noah's family on emerging from the ark; pop. 9000. The district has been made an autonomous republic within the republic of Azerbaijan.—NAKHITCHEVAN-ON-THE-DON, near Rostof, founded in the province of the Don Cossacks about 1780 by an Armenian colony, has cloth manufactures and a large trade; pop. 55,000.

Nala is a legendary king of ancient India, whose love for Damayanti forms an episode of the Mahābhārata (q.v.).

Namaquas, the principal Hottentot tribe, a pastoral people with predatory habits, partly in Great Namaqualand, north of the Orange River, and partly south of it. Great Namaqualand, or Namaland, extends from the Orange River to Damaraland (q.v.) northwards, and inland to British Bechuanaland. From 1885 a German possession, with the exception of the small British coast territory of Walvisch Bay (q.v.), it has an area estimated at 460,000 sq. m., and forms part of South-West Africa now administered under mandate of the League of Nations by the Union of South Africa. It is mainly a most sterile and barren region, and along a coast-line of upwards of 400 miles does not present a single running stream; but a few little bays along the coast, such as Angra-Pequena (q.v.), Sandwich Harbour, and Walvisch Bay, afford safe anchorages. There has often been war between Namaquas and Hereros (see DAMARALAND). LITTLE NAMAQUALAND is a barren district of the Cape Province south of the Lower Orange River. Much copper is mined here.

Namcha Barwa a mountain (25,445 feet) in Assam, at the base of which the Brahmaputra cuts across the Himalayas.

Names. The systems of name-giving, whether to persons or places, have varied so widely among different peoples and in different ages that it is impossible within the limits of an article to deal satisfactorily with the methods of nomenclature which have from time to time prevailed even among those peoples who have most widely influenced the history of our race. Perhaps this does not matter much in the case of the place-names, for, though we are often curiously interested in the meaning of the names of places which we know personally, there is seldom any such interest in the meaning of place-names of foreign origin, however famous they may be in history. In personal names we are perhaps a little more interested, and no one can study Roman history without speculating why Romans as a rule bear three names, e.g. *Gaius Julius Caesar*, in which the first name, commonly known as the *prænomen*, corresponds roughly to our Christian name, the second or *nomen* to our

surname (more precisely it is the name of the *gens* to which the man belonged), and the third or *cognomen* to our 'additional' or nickname. When the problem is so large and the range of linguistic knowledge required for its illustration is so wide, the most satisfactory method of dealing with it seems to be to make an intensive study of the names derived from one's native language and its immediate cognates, and then, on the foundation of that study, to refer those who wish to deal with other languages to specialist works upon them. That is the plan upon which this article is built, and in the Bibliographies below specialist works upon the Celtic languages are mentioned. For Greek and Latin the best book is Felix Solmsen's *Indogermanische Eigennamen*.

Personal Names.—The general rule in early days was that persons were given but one name. The elements of such names were originally significant, but their significance was soon lost sight of. Many names contain a first element denoting some divine or supernatural power, and were doubtless given in order to secure the protection of those powers for their bearers, e.g. the *Os-* in *Oswald*, a word ultimately identical with the *As-* in the Scandinavian *Asgard*; the *Regin-* or *Reyn-* in *Reginald* and *Reynolds*, with which may be compared *Ragna-* in the Scandinavian *Ragnarök*, 'twilight of the gods'; and *Alf-* in *Alfred*, which is our word *elf*. Animal names are used by themselves and in compounds, and are either of totemistic origin, or were given in the hope that the bearer might have the qualities of the animal in question, e.g. *Wulfheard*, *Eofof* (= boar). Names were, however, usually given for reasons other than their significance. The popularity of great figures in history or heroic story played an important part, as in the use of the names *Offa*, *Hengest*, *Sigemund* (father of the better known *Siegfried*), or *Alfred*. Royal and noble families showed a preference for names containing some particular element, or beginning with some particular letter; thus the West Saxon kings from Cerdic to Cenred bore names alliterating in *c*, while those of the same line from Aethelwulf to Aethelred the Unready alliterate on a vowel, and the first element in the names of all the last-mentioned group is either *Aethel-* or *Ead-*. Sometimes a name was compounded from one element of the father's name and one of the mother's, thus a certain *Wulfstan* was so called because his mother was called *Wulfgyfu* and his father *Eatstan*. That the significance of names was soon lost sight of is clear from the formation of such names, in which the meaning of the elements was quite a matter of chance, and from the existence of a good number of names to which it is impossible to give any satisfactory meaning, e.g. *Botwulf*, literally 'compensation-wolf.' Practically any two recognised name-elements can be put together to form a name, the only important limitation being that the second element of a man or woman's name must be of the masculine or feminine gender according to the sex of the person. Thus no woman's name ends in *-weald*, and no man's in *-thryth*.

Most of the names so far dealt with are di-thematic, and that is the type most common in early days among the Teutonic peoples generally, but there are a number of monothematic ones also, often of obscure origin, e.g. *Drdda*, *Cissa*. Many of these names are of the hypocoristic type, that is, they are shortened forms of other names, used originally as pet-names, but ultimately raised to the rank of full personal names. They are formed in various ways. Thus the first element of a compound name may be taken in almost unchanged form, as in *Ecga* from the names in *Ecg-*, or the

medial consonant of the first element may be doubled, as in *Sigga*, a pet form for *Sigefrith*, or its medial consonants assimilated, as in *Eoppa* from names in *Eorþ*, such as *Eorþwine*, or a new name developed with the final consonant of the first element and the initial consonant of the second, as in *Ulke* from *Ulf-ketill*. Other pet-forms are developed by the use of diminutive suffixes such as *-ic*, *-oc*, *-uc*, *-el*, which may at times cause mutation of the stem vowel, e.g. from *Dudda* we have *Duddel*, *Dudeca*, *Duduc*, *Dyddel*. Occasionally the patronymic suffix *-ing* is used to form fresh names, as in *Lutting* from *Lutt*. There is a much greater wealth of personal names generally in early times than there is of Christian names in our own days, and in Old English the names, so far as they consist of significant words, are entirely of a dignified character.

The Viking settlements from the 9th century onwards brought a large influx of fresh names, many of which were of the same general types as those already described, but they brought in an important new type, viz. the nickname. This is by origin an *eke*- or additional name, descriptive of a person's physical characteristics, character, &c., as in Harold *Fairhair*, Sigrid *the Proud*, and is often abusive, as in Thrand *Squint-eye*, Atti *the Fool*; but in course of time these additional names came to be used as personal names themselves, and it is undoubtedly largely owing to Scandinavian influence that so many names like *Hræfn* (=raven), *Gamel* (=old, our *Gamble*), were in use at the time of the Norman Conquest as personal names. The Vikings also had their share in developing the use of a second name, destined ultimately to develop into the family or surname. We have seen that they often employed a second name of the nickname type. They also freely used second names of the patronymic type, e.g. Harold *Gormson*. In Old English such were very rarely used, and it is only in the 10th century that we begin to get such names as *Byrhsige Dyrincg*, i.e. Byrhsige son of Dyre, or, on the Scandinavian model, *Leafsi Dud-desum*. It must be clearly understood, however, that these second names, whether nicknames, as in *Eadric Streona*, i.e. Eadric the Grasper, or patronymics, were not as yet family or surnames. Each successive generation would have a new patronymic or a new nickname to suit the particular person in question. Such is the history of all patronymics in their early stage, whether the ones just indicated, or the Irish *O'*, the Scottish *Mac*, the Welsh *Ap*, or the French *Fitz*.

The Norman settlement affected English nomenclature yet more deeply. With it developed the common use of saints' names as Christian names, and these names, such as *John*, *Peter*, *Simon*, and other common Norman and French names, such as *Henry*, *Roger*, *Ralph*, rapidly ousted most of the English names in popularity. The range of names under the new rulers was not, however, nearly as wide a one as that found in Old English itself, and this has had an important consequence in developing the need for a second name, so as to distinguish from one another the large number of persons bearing the same name with whom one might be in daily contact. The Normans continued the Viking practice of using nicknames as second names, e.g. *Foljambe*, *Pettigrew*, i.e. *pieu de grue*. They brought in a new patronymic type, viz. *Fitz* (from *fil*), as in *Fitzjohn*, but most important was their influence in developing the practice whereby a man was distinguished from others of the same name by giving his place of birth or dwelling, e.g. *William de Feugers* (from Fougères in Brittany), *John de Aylesbury*. Such forms are very common from 1100 onwards, and are used of noble and peasant alike. The presence among one's ancestors

of some one with a name of this type is no certain criterion that he was of noble family, a lord of the manor, or anything of that kind.

At first such names were merely descriptive, as we have seen, of the man's place of birth or dwelling, but in course of time a man might move elsewhere and carry his name with him. This was specially common with clerics and civil servants. Thus John de *Kirkeby* may be parson of *Warton*, John de *Evesham* escheator of Wiltshire. The place of origin of these names is now often difficult to recognise, as they have sometimes survived in forms representing a local pronunciation which may now be lost, thus *Wyndham* is from *Wyndham*, *Esam* is from *Evesham*, *Wosnam* from *Wolstenholme*, or may have been thrown off at an earlier stage in the history of the name, thus *Kinwelmarsh* is from an earlier form of *Killa-marsh*.

A large number of other second names of local origin were formed, not from place-names, but from some landmark or physical feature of a larger place. Generally this is associated with the first name by the use of *atte(n)* (=at the), e.g. John *atten ashe* or *oke* (whence ultimately *Nash*, *Oak(s)*, *Nokes*), *atte townesende* (cf. *Townshend*), *atte stile* (cf. *Stiles*), *atte water* (becoming *Attwater*), *atte strete* (cf. *Street*). Some such names are derived from the sign which was found in those days on many houses besides inns; hence such names as *atte Crowne*, *Sterre* (cf. *Star(r)*), *Fleece*. Occasionally we have other prepositions, as in *Sim bythewatre* (cf. *Bywater*), *Peter underwode*. These belong more or less definitely to persons of non-noble origin. The fact that they are not common until the latter half of the 13th century may be due to the paucity of documents of an earlier date in which such persons would be likely to appear. Of almost equal importance with these second names of local origin are those denoting a man's occupation, e.g. Robert *le Parker*, John *le Hayward*, Philip *le Forester* (cf. *Foster*), *le Milnere* (cf. *Milner*, *Miller*), *le Mawere* (north country form of *mower*). Many represent forgotten trades, or are so disguised as to be unrecognisable, e.g. *Bo(w)yer*, *Fletcher* (=arrow-maker), *Bullinger* (Fr. *boulangier*, cf. *Baker*, *Baxter*). The use of nicknames developed to an extraordinary extent in the late 13th century, and continued for about a hundred years, though it may be that lack of satisfactory evidence (*v. supra*) is chiefly responsible for the apparent suddenness of the outburst. Examples are *Fallinthewell*, *Makepeace*, *Ca(t)chmaid*, *Stroklady*, *Loveday*, *Armstrong*, *Cruickshank*, *Lawless*, *Greensleeve*, *Ba(i)rnfather*. They cover a wide range of physical and mental peculiarities, habits, moral and immoral, tricks of speech, dress, &c. Many of them are incredibly primitive in their suggestion, and only a small proportion have survived as present-day surnames.

Certain types of second names readily became family or surnames. At least the eldest son in each successive generation of a feudal family would bear the same second name, derived from his estate, and so the second name would soon in effect become a family name. Good examples of this type are to be seen in such families as the Hampdens of Hampden, the Riddleys of Ridley. In a less degree the names of the *Oak*, *Ash*, *Stock*, *Bywater*-type would tend to become hereditary, in fact if not in law, so far as descendants of the first man so distinguished continued to live by the same landmark. Trades and professions tended to be hereditary, and names derived from them would be borne by successive generations. Nicknames would be very slow in becoming family names, and patronymics do not lend themselves readily to this process. It would seem to be in the latter half of

the 14th century that these second names began rapidly to develop into proper surnames, i.e. names borne by successive generations of a family regardless of the actual place of birth, abode, occupation, physical or mental qualities or parentage of the particular individual. Outward signs of the change are the dropping of the *de* or *atte* from names of local origin, and of the *le* from those of occupational origin, and the appearance of such names as Anne Simpson. A good illustration of the transition from one type to the other is found in two documents of 1332, in which *Thos. de Raan* and *John de Raan* are called alternatively *Thos.* (and *John*) son of *Walter Raans*. It is clear that they might also be called *Thos.* and *John Raans*, and that *Raan(s)* had now become a true surname. Incidentally it may be noted that this name illustrates another common feature of the new surnames, viz. that an *s* was often added to the name when it thus became hereditary. *Groves* replaces *atte Grove*, *Sims* and *Johns* are now as common as were *Simpson* and *Johnson*. While the use of the surname had become general by the end of the 14th century, it was by no means universal, and traces of older methods of nomenclature, though they may not be legally recognised, still linger in remote districts. One may notice specially the use in some parts of Yorkshire and Lancashire of such names as *John o' Mary's*, *Dick o' Bob's*, or even *John o' Tom o' Mary's*. The habit of calling a farmer by the name of his farm rather than by his actual surname is a common practice in Scotland to this day.

Lastly, in tracing out the history of a family-name in Modern English, it is well to bear in mind two points. First, a name as now used may go back to more than one quite different name in earlier days. *Simpson* may be *Sim's* son or come from *Simpson* (Bucks); *Wood(s)* may have had an ancestor who was *wode*, i.e. 'mad,' or have lived by a 'wood'; a *Chaucer* may be a *chauser*, 'maker of leather hose,' or a *chauffe-cire*, i.e. 'heat-wax,' a nickname given to a chancery clerk; *Woodhouse* may come from one of the numerous Midland *Wood-houses*, or it may be from *wodehouse*, i.e. 'wild man of the woods.' Secondly, names which are now carefully differentiated by the spelling may really be identical. *Smiths*, *Smyths*, *Smythes*, *Smijths* may well be all of the same family, though they insist on spelling their names differently. In M.E. all alike would be good spellings of the same name, and the spelling has no bearing on the age of the family. Similarly, the forms *Ffiennes* and *Ffoulkes* are due to ignorant misunderstanding of the names *Fiennes* and *Foulkes*, as written by mediaeval scribes with *ff* for *F*, a common orthographic device.

BIBLIOGRAPHY.—The chief Anglo-Saxon names will be found in Searle, *Onomasticon Saxonicum*, an invaluable collection, which needs, however, to be used with caution. Special studies of particular types of name are to be found in Redin, *Uncompounded Names in O.E.*; Forssner, *Continental Germanic Personal Names in England*; Björkman, *Nordische Personennamen in England und Zur Altenglischen Namenkunde*, all of them excellent contributions to the subject. Max Förster, *Keltisches Wortgut im Englischen* contains a full study of Celtic names in O.E. For M.E. and Modern English surnames the best books are Bardsley, *Dictionary of English and Welsh Surnames*; Harrison, *Surnames of the United Kingdom*; Weekley, *The Romance of Names and Surnames*. Weekley is the best, but by no means the fullest writer on this subject. All alike suffer from the fact that the mass of material is too vast for any single man to compass it, and this is specially true of the names which are derived from place-names, for we are only at the beginning of the work which can alone lead to their satisfactory interpretation (*v. infra*). A good summary of the most recent views upon Old and Middle English personal names, and the problems arising from them, will be found in a chapter by Stenton on 'Personal Names in

Place-names' in the *Introduction to the Survey of English Place-names*. For the study of Celtic names we may note Hogan, *Onomasticon Goidelicum*; for Frisian names, many of which are closely allied to English, Winkler, *Friesche naamlijst*; for German, Förstemann, *Alteutsches Namenbuch*; Heintze, *Die Deutschen Familien-namen*; Socin, *Mittelhochdeutsches Namenbuch*; for Manx, Moore, *Manx Surnames*. Lind, *Norsk-Islandska dopnamn* and *Norsk-Islandska Person-binamn* throw much light on Norse and Icelandic names; and Lundgren-Brate, *Personnamnen från medeltiden* on Swedish ones.

Place-names.—Place-names, like personal names, consist as a rule of two elements, one of which we may call the main element and the other the defining one, and the usual English order is to put the main element last, e.g. *New-ton*, *Roddles-worth*. The reverse order is common in Celtic, as in Welsh *Llanddewi*, 'church of Dewi or David,' Scottish *Dunkeld*, 'hill of the Caledonians,' Irish *Ath-cliaith*, 'ford of the hurdles,' the old name for Dublin, and Ekwall has shown us that traces of this method may be found in north-west England in names such as *Aspatria*, 'ash-Patrick,' *Setmarthy*, 'sætr (i.e. shealing) Murdoch,' which are due to Norse settlers familiar with Gaelic methods of place-nomenclature.

The main element may be descriptive of the situation, or it may have relation to the manner of the settlement. Apart from certain easily recognised words, such as *ford*, *hill*, the commonest elements of the former type, in their Modern English dress, are as follows: *beare*, 'swine-pasture,' *-borough*, *-berg(h)*, *-barrow*, from O.E. *beorg* or O.N. *berg*, 'hill,' *-den*, 'valley,' from O.E. *denu* or, chiefly in Kent and Sussex, 'swine-pasture,' from O.E. *denn*, *-don*, 'hill,' *-ey*, 'island,' *-hale*, 'nook, corner,' *-ham* (from O.E. *hamm*), 'enclosure,' often by water, *-law* *-low*, 'rounded hill, natural or artificial,' *-ho(e)*, 'spur of projecting land,' *-holm*, 'island' (Scand. in origin), *-hope*, 'small enclosed valley,' *-hurst*, 'wood or hill,' *-moor*, 'swamp,' *-shaw*, 'thicket,' *-ste(a)d*, 'place, site,' *-stoke*, *id.*, *-stow*, *id.*, but generally with a religious association, *-well*, *-wall*, 'spring.' Of the latter we may note *-bold*, *-bottle*, 'building,' *-bury*, *-borough*, *-burgh*, 'fort, fortified manor-house, borough, &c.,' *-chester*, *-caster*, *-cester*, 'fortified place of Roman or pre-Roman origin,' *-field*, 'open space, not enclosed area, as nowadays,' *-ham* (from O.E. *hām*), 'homestead, settlement, manor,' *-ley*, *-lee*, 'clearing,' *-ton*, *lit.* enclosure, then 'farm, manor, never 'town,' *-wick*, *-wich*, 'dwelling,' *-worth*, *-worthy*, *-wardine* (the last two being derivatives of the first) denoting primarily an enclosure. These are of English origin, but important also are *-by*, 'farm, village,' *-er*, *-erg*, *-arg(h)*, 'shealing,' *-scale*, *id.*, *-thwaite*, 'clearing,' all of Scandinavian origin, and *thorp(e)*, which can be either English or Scandinavian. When English it is usually found in disguised form as *-drop*, *-throp*, *-trap*, &c.

The defining elements may be best grouped according as they are (a) descriptive, (b) denote the owner or inhabitant(s) of the place. Of the descriptive type we may note (1) river or (rarely) hill-names, e.g. *Doncaster* on the *Don*, *Itchington* on the *Itchen*, *Whorlton* (Yorks) at the foot of the *Whorl*, or, less easily recognised, *Davenham* and *Davenport* on the *Dane*, *Dilston* on the *Devil's Water*, *Panfield* on a river once called the *Panta*, but now known as the *Blackwater*; (2) descriptive adjectives, e.g. *high*, as in *Higham*, *Healey*, *Heanton*, *Hanley*, *Henley*; *new*, as in *Newton*, *Newnham*, *Newington*, *Navinton*; the points of the compass, as in *Aston*, *Sutton*, *Sudbury*, *Nor(th)am*; reference to (3) the soil, e.g. *great*, *ceosel*, 'gravel,' as in *Girton*, *Chiselhampton*; (4) crops, e.g. *wheat*, in *Wheatley*, *Whatton*; *wood* in *Wadley*, *Woodhill*; (5) trees, plants, e.g. *Birkenside*, *Thornhill*, *Bromley*,

Hebden Bridge (O.E. *heope*, 'dog-rose'), *Farnham* (O.E. *fearn*, 'fern'); (6) animals and birds, e.g. *fox* in *Foxton*, *Foscott*, *goat* in *Gatton*, or in *Oxford*, *goose* in *Gosford*; but as most animal-names have at one time or another in their history been used also as personal names (*v. supra*), it is often not possible to be sure whether these names really belong here at all.

The descriptive defining element is the type most commonly found among the Celtic peoples, but among the Teutonic peoples it is less common than the use of the name of the owner, tenant, or inhabitant. This last was at first normally put in the genitive case, but all traces of the genitive inflexion may now be lost. The personal names are usually of English or Scandinavian origin, very rarely of French origin, as in *Bassettisbury*, while the only Celtic ones commonly found are those which had been adopted by Viking settlers, e.g. *Kiartan* in *Cartington*, *Maclmor* in *Melmerby*. Sometimes, as in *Bretton*, 'farm of the Britons,' we have reference to one or other of the various peoples that have gone to the making of our nation, but in such names as *Normanton*, *Irby*, it is as a rule impossible to say whether we have reference to a group of Norsemen or Irishmen (i.e. Norse settlers from Ireland) or to an individual person nicknamed 'Norseman' or 'Irishman.' In *Charlton*, *Walton*, and a few others of the same type, we have reference to some particular social class—in these cases to groups of *ceorls* or freemen, and *Welsh* (i.e. British) serfs.

Names of one element alone consist, as a rule, of one of the words commonly used as a main element, accompanied by no defining one, e.g. *Ford*, *Bridge*, *Minster*, *Hale*, *Bury*. These names, like others, were in actual speech usage often preceded by the preposition *at*, followed by the definite article, which was specially necessary, as there was no other defining word. *At then* (masc.) and *at ther* (fem.) became *atten*, *att(her)*, but later these forms were often misunderstood, and *atten Ash* was taken to be *atte Nash*, and a new place-name *Nash* evolved; *atter Ee*, 'at the river,' was taken to be *atte Re*, and the common river-name *Rea*, *Ree*, was thus coined; while, by a still more curious misunderstanding, *atther Lye*, 'at the clearing,' was taken to be *at Therlye*, and so arose the name *Thurleigh*, still pronounced *Thurly*. A type of somewhat similar origin is that found in *Byfleet*, lit. 'near the estuary,' *Bythorn*, 'near the thorn-bush,' and *Benwell*, earlier *binnanwealle*, i.e. 'within wall.' Comparatively rare are those names in which the defining element is used alone, either owing to actual loss of the main element or to the ease with which it may be mentally supplied, e.g. *Beccles*, i.e. *Beccel's* farm, *Bigods*, i.e. *Bigod's* manor.

Names which end in *-ing* and in *-ingham*, *-ington*, *-ingley*, &c., are very common, and call for a word of explanation. So far as these names are genuine, and not corruptions of other types (e.g. *Swarling* should really end in *-lynch*, *Bledington* should be *Bladinton*, for it is on the river *Bladen*, the old name for the *Evenlode*), they all contain an element *-ing*, commonly described as a patronymic suffix, but really of much wider application. In its plural form *-ingas* it could be added to a river-name, as in *Afeningas*, now *Avening*, to denote the people living on its banks, or to a personal name, as in *Mæccingas*, now *Matching*, to denote the people who had to do with *Mæcca*, his family, his servants, &c. In *-ingham*, earlier *-ingaham*, we have the gen. pl. of an *-ingas* name, and *Eglingham* denotes the 'homestead of Egwulf and his people.' In *-ington*, &c., we may have the gen. pl., as in *-ingham*, or we may have only *-ing* added to some personal name, e.g. a place once called *Wighelm-*

estun, i.e. *Wighelm's* farm, may come to be called *Wighelmington*, i.e. *Wighelm-farm*, in which we no longer have the idea of actual possession or tenancy on *Wighelm's* part, but only a vague suggestion of association of *Wighelm* with the farm at some stage in its history.

Many place-names and types of such can only be understood if we remember that in actual speech-usage they are very often preceded by a preposition, and that in early days that preposition would be followed by an inflected dative (or locative) form. Hence we may have pairs of forms, one derived from the nominative and the other from the dative, e.g. *-bergh* and *-barrow*, *-borough*; *-burgh* and *-bury*; *-haugh* and *-hale*; *-heugh* and *-ho(e)*; *-mead* and *-meadow*; *-leaze* and *-leasowe*. So also a good many elements may tend to be used in the plural, e.g. *barn* in *Barnes*, *byre* in *Byers Green*, and if these come to be used in the dat., at an early stage in their history they take the dat. pl. suffix in *-um*, which may appear later in various forms, e.g. *Eryholme*, *Arkholme*, dat. pl. of *ergh*, 'shealing,' *Ayresome*, *Newsham*, *Newsholme*, containing the dat. pl. of *hus*, 'house,' *Fenham*, dat. pl. of *fenn*, *Acomb*, dat. pl. of *ac*, 'oak.'

The names so far dealt with have been those of inhabited places. The names of natural features—rivers, hills, &c.—are of similar formation, though usually of Celtic origin rather than English, and may consist of one element or two, e.g. *Thames*, *Ouse*, *Swale*, on the one hand, *Greta* (Norse, 'gravel river'), *Divelish* (Celtic, 'deep stream'), on the other. These river-names are often used to name places on their banks. When the simple river-name is used, e.g. *Colne*, *Frome*, a practice that is specially common in the West and South-west, different places on the same stream have to be distinguished in various ways, e.g. by adjectives, as in *Upavon* and *Netheravon*, *Northill* and *Southill* (in which *-ill* represents the river *Ivel*), or, more commonly, by the name of the feudal tenant, as in *Earls Colne*, *Wakes Colne*, or by adding, presumably at a comparatively late date, some other name for the small settlement, as in *Winterbourne Zelston*, *Frome Vauchurch*. We have already seen how a river-name can be used as the defining element in a place-name. The existence of such comparatively easily recognised compounds, as have already been noted, or as *Ribchester* on the *Ribble*, *Bliford* on the *Blithe*, has often led to a wrong analysis of other names whose origin is obscure or difficult, and for which a ready solution may be found by this process. The rivers on which stand places such as *Chesham*, *Arundel*, *Cambridge*, have been given new names, *Chess*, *Arun*, *Cam*, technically known as back-formations, to fit the imagined etymology of the place-names in question. As a matter of fact *Chesham* is in early days *Cestresham*, 'homestead of or by the chester,' *Cambridge* is originally *Grantabrycg*, 'bridge over the Granta (the original name of the Cam),' while *Arundel* is probably 'hoarhound dell,' the name of the river flowing through it being really *Tarente*. These 'back-formations' are a source of much difficulty in place-name etymology. River-names are comparatively rarely mentioned in early documents, and in the absence of early evidence it is almost impossible to tell whether a place-name is derived from the name of the river on which the place itself stands, or whether the river-name is a comparatively modern formation from the place-name.

Of other types of place-name we need only note those in which two or more places of the same name are distinguished: (1) by some particular epithet, generally prefixed, or (2) by the addition of the name of their feudal owners. Under (1) we have the common use of *High*, *Low*, *Great*, *Little*, *Magna*, *Parva*, *Much*, or such names as *Steeple*

Bumpstead, Stratton Strawless, Kirby Muxloe (lit. muckless), *Fenny Drayton*, or names like *Poulton-le-Fylde, Chester-le-Street*, in which Norman scribes have shown their relationship to some distinguishing object by the use of the article *le*. Under (2) we may note *Helion Bumpstead*, from a Breton lord named *Helion, Monks Risborough, Ashby de la Zouche, Theydon Garnon, Ashby Puerorum* (the income of the manor being used for the endowment of the boys of Lincoln Cathedral).

In any study of place-names it is of cardinal importance to realise that it is impossible to come to any satisfactory conclusion as to their meaning and interpretation if we are dependent on the modern form alone. Place-names have, like ordinary words, only to a greater degree, changed in the process of transmission from one generation to another. In ordinary words these processes are to a large extent checked by the existence of the written or printed word, but place-names, especially those of the smaller places, are not often thus brought before one's eyes, and can undergo rapid and unnoticed changes. They soon lose any significance that they may have in themselves, and change of form is not checked by the desire to secure continuity of significance. Some of the causes, processes, and results of these changes may be illustrated. (1) Place-names belonging originally to one language have been taken over by people using a different language, and, in adapting them to their own methods of speaking or writing, they have often completely transformed them. *Esk, Eve, Aze, Usl, Wiske*, are the variant forms in which the same Celtic word for water appears in river-names in different parts of England. Norman lords found a difficulty in pronouncing English names, and Norman scribes a difficulty in transcribing them. The modern forms of many names bear witness to this, as in *Durham* (N. Fr. *Dur-esme*) for earlier *Dunholm*, *Turnworth* for *Thornworth*, the *-cester* of *Worcester, Cirencester* in contrast to the usual *-chester*. English peasants had difficulty with Norman names, and N. Fr. *beau repair*, 'beautiful retreat,' appears as *Belper, Bear Park, Beurepaire*. Viking settlers transformed English names into allied Scandinavian forms; thus O.E. *Eoforwic* becomes *Jorvik*, later *York*. (2) Place-names consist as a rule of more than one syllable, and are specially affected by the laws of English accent, whereby the vowels of weak or unstressed syllables are weakened or lost, at least in pronunciation, though not always in spelling: thus *Cantwarabyrig* becomes *Canterbury*, and *Knowsley* is from *Cenulfesleah*. This is of special importance as affecting the form of the second or main element in a place-name. It falls in a weak-stressed position, and as a result confusion may arise; thus unstressed *beorg*, 'hill,' and *burh*, 'fort,' *dun*, 'hill,' and *denu*, 'valley,' *-hale*, 'nook,' *-hill* and *-hall*, *-lund* (Norse, 'grove') and *-land* are so alike in pronunciation that a great many *hale*-names are written as if they ended in *-hall* or *-hill*, *don*-names as *den*-names. Most of the *-borough* names in Southern England are not *burhs* at all, but *beorgs*, &c. Further misunderstandings may arise owing to common sound developments, e.g. *-don*, after a defining element such as *Hart* or *Heath*, may appear as *-ton*, as in *Hayton* and *Hetton*. Places in the gen. sing. of a personal name + *-ey* (=island) once ended in *-sey*; association with water has now led to their often being spelt with *-sea*, and no one would suspect the true origin of *Mersea*. Similarly, names in *-stan*, later *-ston*, may be misunderstood, and taken to be from a personal name in the gen. + *-ton*, or names in a gen. + *-ton* may come to be written with *-stone*, e.g. *Knighstone* (Dev.) is a *-ton* name. (3) Dialectal differences may obscure true identity of origin.

Caistor is a dialect variant of *Chester*; *Rodge, Rudge* (and at times *Reach*) of *Ridge*; *Hull* (occasionally) of *Hill*. These relations may at times be further obscured by the replacing of the true dialect form by the Standard English one. *Hythe* in Kent should be *Hethe*, but the Midland and S. Eng. form *hithe* (= 'landing-place') has ousted the local one. (4) The modern map is full of perverted forms. Some are due to folk-etymology—i.e. the attempt to give some significance to a name by suggesting its etymology—e.g. *Devils Brook* for *Divelish Brook*, in which we really have a Celtic river-name (*v. supra*), others to attempts at the picturesque, e.g. *Eaglescliffe* for *Egglescliffe*, others to sheer blunders, e.g. *Hankham* in the Pevensy Levels, is now written *Hancombe*, when there is not a vestige of a *combe*, and the suffix *-ham* can be traced right back to the 10th century.

The value of place-names for the reconstruction of the past history of a country, especially where it has been subject to successive waves of invasion by peoples of different nationality, has long been recognised, and in recent years we have had from Ekwall and other scholars examples of the scientific application of this study to such questions as the survival of the Celtic population in Britain at the time of the English Conquest, the extent and character of the Scandinavian settlements in England.

The problem of pronouncing English place-names correctly is notoriously a difficult one, for again and again the spelling is no guide to the local pronunciation—e.g. *Daventry* for *Daintry, Beaconsfield* for *Beckonsfield, Tideswell* for *Tidza, Chagford* for *Chaggyford*. Again and again the written record has failed to keep pace with the actual development of the pronunciation, or has (as we have just seen) been deliberately changed for ulterior purposes. Unfortunately, with the growth of the power of the written word, consequent upon printing and education, these spelling pronunciations are gradually ousting the local ones, which are at the same time the only truly correct ones.

BIBLIOGRAPHY.—Johnston, *Place-names of England and Wales*, deals with a good number of names in the countries named, but the time is hardly ripe for a book of so wide and general a character. Monographs upon the place-names of various English counties have appeared as follows: Alexander (*Oxfordshire*), Baddeley (*Gloucestershire*), Bowcock (*Shropshire*), Bannister (*Herefordshire*), Duignan (*Staffordshire, Warwickshire, Worcestershire*), Ekblom (*Wiltshire*), Ekwall (*Lancashire*), Goodall (*South-west Yorkshire*), Gover (*Middlesex*), Mawer (*Northumberland and Durham*), Moorman (*West Riding*), Mutschmann (*Nottinghamshire*), Skeat (*Bedfordshire, Cambridgeshire, Berkshire, Hertfordshire, Suffolk*), Stenton (*Berkshire*), Walker (*Derbyshire*), Wyld (*Lancashire*). Of these, the only one that is entirely satisfactory and adequate is Ekwall's *Lancashire*. Ekwall's *Scandinavians and Celts in N.W. England* and his *English Place-names in -ing*, and Lindkvist's *Middle English Place-names of Scandinavian Origin*, are excellent studies of particular problems. With the approval and encouragement of the British Academy a Survey of English Place-names has now been undertaken, and the results of that work are being published under the auspices of the English Place-name Society. The first volume, in the form of an *Introduction to the Survey of English Place-names*, was recently published. Johnston has written a book on the *Place-names of Scotland* as a whole, and volumes upon those of various counties have also appeared, but they are of widely varying quality. Some material for Wales will be found in Morgan's *Place-names of Wales*. For France, the best book is Longnon, *Les Noms de Lieu de la France*; for Germany, Förstemann, *Altdeutsches Namenbuch*. Norway has completed a survey of its place-names—*Norske Gaardnavne*, ed. Rygh and others; Sweden is in process of publishing such a survey under the auspices of a national committee (Kungl. Örtannskomitee), and work upon the provinces of Alvsborg and Värmland has

already appeared; Denmark has commenced one, and the first volume upon the place-names of the island of Samsø (*Danmarks Stednavne*, No. 1) appeared in 1922. For the Netherlands we have *Nomina Geographica Neerlandica*. Joyce has issued three volumes on the *Place-names of Ireland*, and there is one by Moore on those of the Isle of Man.

Namur (Flem. *Namen*), a city of Belgium, at the confluence of the Sambre with the Meuse, 35 miles by rail SE. of Brussels. The greater part of the picturesque citadel (1784) is transformed into a pleasure-ground; and the other old fortifications have been razed since 1866. The town itself has suffered so much by war that it offers little of interest—the cathedral, completed in 1772, with the grave of Don John of Austria; the Jesuit church of St Loup (1653), a large military school, an antiquarian museum, monuments of Leopold I. and the geologist Omalius d'Hallo (1783–1875), &c. Namur is noted for its cutlery, and also manufactures firearms, leather, paper, and tobacco. Pop. 30,000. Namur was captured by Louis XIV. in 1692, but recaptured in 1695, after a ten weeks' siege, by William III. and 'my uncle Toby'; and taken in 1914 by the Germans.

The province of Namur, on the French frontier, lying between Hainault and Luxembourg, has an area of 1414 sq. m. Fertile and rich in minerals, it is watered by the Meuse, Sambre, and Lesse, and traversed by wooded spurs of the Ardennes (2000 feet). Pop. 350,000.

Nanaimo, a town on the east coast of Vancouver Island, 74 miles by rail NNW. of Victoria. There are large coal-mines in the district, and the town is the chief seat of this trade. Pop. 9000.

Nana Sahib, the name under which Dundhu Panth, adopted son of the ex-peshwa of the Mahrattas, became known as the leader of the Indian Mutiny in 1857. Born about 1821, the son of a Brahmin in the Deccan, and educated as a Hindu nobleman, he was bitterly disappointed that when the peshwa died in 1851 the latter's pension was not continued to himself; and, industrious in fanning discontent with the English rule, on the outbreak of the Mutiny he was proclaimed peshwa. After the suppression of the rebellion he escaped into Nepal. The date of his death is not known.

Nancy, a beautiful French town, capital of the department of Meurthe-et-Moselle, lies on the left bank of the river Meurthe, at the foot of wooded and vine-clad hills, 220 miles by rail E. of Paris and 94 W. of Strasburg. It comprises, besides several suburbs, the old and new towns (the former with narrow irregular streets, the latter open and handsome). It contains many fine squares and imposing edifices, and owes much of its architectural adornment to Stanislas Leszczynski, who, after abdicating the crown of Poland in 1735, continued to reside here as Duke of Lorraine till his death in 1766. His statue (1831) stands in the Place Stanislas, the principal square, which is surrounded by important public buildings, as the hôtel-de-ville, the bishop's palace, and the theatre. Other noteworthy features are the cathedral (1742); the churches Des Cordeliers and Notre Dame de Bon Secours (1738), both with interesting monuments; St Epvre (1875); the 16th-century ducal palace, with the Lorraine museum; statues of General Drouot (1853) and Thiers (1879); and half-a-dozen gates, looking more like triumphal arches. The institutions include a university, whose library was destroyed by bombardment just before the armistice of 1918. It has been the main centre of research into the therapeutic value of hypnotism. Nancy, which grew much in importance after the German annexation of Alsace-Lorraine, has manufactures of cotton and woollen goods, artificial flowers, iron, tobacco, &c.; but its staple industry

is embroidery on cambric and muslin. Pop. (1872) 52,565; (1911) 119,949; (1921) 113,226. Nancy, dating from the 12th century, was the capital of the duchy of Lorraine (q.v.). It was the scene of the death of Charles the Bold (1477).

Nanda Devi. See HIMALAYA.

Nandu. See RHEA.

Nanking, officially KIANGNING, capital of Kiangsu, till the 15th century the capital of China, on the Yangtsze River, 130 miles from its mouth. From 1853 to 1864 it was the capital of the Taipings (q.v.), and it has never recovered from the desolation then caused; memorable buildings destroyed were the Porcelain Tower (see CHINA; also PAGODA), the summer palace, and the tombs of the kings. It suffered again in the revolutionary war. The walls were 30 miles around, in places 70 feet high. There is here an arsenal on the European model. In 1842 Nanking was captured by the British and a treaty signed. By the treaty of Tientsin (1858) it was nominally opened to foreign trade. It has a university and other colleges. Pop. 400,000.

Nansen, FRIDTIOF, Arctic voyager, was born, the son of an official, 10th October 1861, near Christiania (Oslo), and studied there, as well as later at Naples. In 1882 he made a voyage into the Arctic regions in the sealer *Viking*, and on his return was made keeper of the natural history department of the museum at Bergen. In the summer of 1888 he made an adventurous journey, accompanied by two Norwegians and three Lapps, across Greenland from east to west. He described the voyage in *The First Crossing of Greenland* (trans. 1890). But his great achievement was the partial accomplishment of his scheme for reaching the North Pole by letting himself and his ship get frozen into the ice north of Siberia and drift with a current setting towards Greenland. He actually started in the *Fram*, built for the purpose, in August 1893, reached the New Siberian islands in September, made fast to an ice-floe, and gradually drifted north to 84° 4' on 3d March 1895. There, accompanied by Johansen, he left the *Fram* and pushed across the ice, reaching the highest latitude till then attained, 86° 14' N., on 7th April. The two wintered in Franz Josef Land, and in June 1896 met the Jackson-Harmsworth expedition there. Nansen arrived in August in Norway, followed by the *Fram*, *viâ* Spitsbergen. In 1897 he became professor of Zoology, in 1908 of Oceanography, and in 1918 rector magnificus at Christiania, and in 1905–8 he was Norwegian ambassador in London. He did much work in connection with the League of Nations, repatriation of prisoners of war, relief of Russian and Anatolian refugees and of Russian famine-sufferers. See his *Farthest North* (1897) and *Scientific Results* (1900 *et seq.*); his *Life* (trans. 1896); *In Northern Mists* (an early Arctic exploration, 1911); *Through Siberia* (1914); *Hunting and Adventure in the Arctic* (1925).

Nantes, the sixth in size of the cities of France, capital of the department of Loire-Inférieure, lies on the right bank of the tidal Loire (here 2000 yards wide), 35 miles from the sea, and 248 by rail SW. of Paris. The natural beauties of the site have been much improved by art, and, the old town having been demolished between 1865 and 1870, Nantes is one of the handsomest cities in all France, with its noble river, quays, bridges, shady boulevards, squares, and statues. The unfinished cathedral (1434–1852) contains Colomb's splendid monument (1507) to the last Duke and Duchess of Brittany, and another (1879) to General Lamoricière. The ducal castle, founded in 938, and rebuilt in 1466, was the occasional residence of Charles VIII. and most of his successors, the

prison of Cardinal de Retz and Fouquet, and the place where on 15th April 1598 Henry IV. signed the famous Edict of Nantes, which gave freedom of religion to the Huguenots (q.v.), and whose revocation by Louis XIV. on 18th October 1685 drove 400,000 French into exile. Other noteworthy buildings are the splendid church of St Nicholas (1854), the palais de justice (1853), the theatre (1787), and the post-office, besides a museum, a picture-gallery, and a library. In the 19th and 20th centuries great sums have been expended on harbour-works, but the rise since 1845 of the port of St Nazaire (q.v.), near the mouth of the Loire, and increasing difficulty in the navigation of the river, combined with depression of trade to reduce the commercial importance of Nantes; to restore which was the object of the ship-canal (1891) between the two places. The chief exports are cereals, iron ores, building material, sugar, and preserved provisions, the chief imports sugar, iron, coal, phosphate, timber, wood-pulp, nitrate of soda, and wines. Shipbuilding has greatly fallen off, but is still one of the leading industries, together with the preparation of sardines, and the manufacture of thread, sugar, leather, iron, nets, soap, machinery, &c.; whilst 10 miles below Nantes is the vast government steam-engine factory of Indret, familiar to every reader of Daudet's *Jack*. Pop. of Nantes (1872) 112,947; (1921) 183,704. The *Portus Namnetum* of the Romans, and the former capital of Brittany—a rank it disputed with Rennes—Nantes has witnessed the marriage of Anne of Brittany to Louis XII. (1499), the embarkation of the Young Pretender (1745), the 'noyades' of the execrable Carrier (q.v.), the fall of the Vendéan leader Cathelineau (1793), and the arrest of the Duchess of Berri (1832). Fouché was a native.

Nantucket, an island (15 miles long) off the south-east coast of Massachusetts. On the north shore is Nantucket town (pop. 3000), with a nearly landlocked harbour. It was formerly a great seat of the whale-fishery, but is now mainly noted as a summer-resort.

Nantwich, a market-town of Cheshire, on the Weaver, 4 miles SW. of Crewe. It has some quaint old timber houses; a fine cruciform parish church, Early English to Perpendicular in style, with a central octagonal tower, 110 feet high; a Gothic town-hall (1858); a market-hall (1867); a grammar-school (1611); and brine-baths (1883). The *Halen Gwyn* ('white salt town') of the Welsh, Nantwich was once the second largest town in Cheshire, the seat of 300 salt-works in Leland's day, a number reduced to 100 through the discovery of better brine-pits in other parts of the Weaver's valley in 1624, since which date the industry has gradually quite died out. Ready-made clothing and tanning are now the principal industries. A great fire (1583), and its siege by the royalists under Lord Byron (1644), are the chief events in its history. Pop. (1851) 5424; (1881) 7495; (1921) 7296.

Napata. See ETHIOPIA.

Naphtha is derived from the Persian word *nafata*, 'to exude,' and was originally applied to liquid hydrocarbons which exude from the ground in the neighbourhood of the Caspian Sea; in like manner it was applied to the natural oils found more or less plentifully in nearly all countries of the world, and also to the oil distilled from Bog-head mineral in Scotland. But the inconvenience and danger of classing all these oils indiscriminately as naphthas became apparent after the Scottish paraffin and the American petroleum refined oils began to be used for domestic illumination. The word naphtha is still used in a very general and vague sense, and has no specific application

either scientifically or commercially to any particular liquid; but since the more general application of the words paraffin and petroleum to mineral oils the sense in which the word naphtha is used has been narrowed considerably. The various British Petroleum Acts since 1862 have also aided in the interest of public safety in emphasising the wise distinction now made between the heavier and safe hydrocarbon oils on the one hand, and the volatile and unsafe hydrocarbon spirits or naphthas on the other.

Commercially, naphtha is now understood to apply to the inflammable distillates of crude mineral oils and coal-tar. For trade convenience the volatile distillates of petroleum and shale oil are known respectively as petroleum spirit and shale spirit, to distinguish each from the other, and both from coal-tar naphtha. The term naphtha also embraces distillates of india-rubber, bones, peat, and wood, the last of these being known as wood-spirit or methyl alcohol. A few words with regard to each of these naphthas may serve to indicate more particularly the nature and method of production, and also the uses to which they are applied.

Petroleum spirit is obtained from crude petroleum in the process of refinement by distillation. The first or lightest portion of the oil which passes over from the still, being highly inflammable, is not allowed to mix with the burning oil, but is run into a separate or naphtha tank. American crude petroleum yields from 15 to 20 per cent. of crude naphtha, which in some of the refineries is separated into gasoline, sp. gr. '640 to '650; benzine, sp. gr. '670 to '710; and benzoline or deodorised spirit, sp. gr. '710 to '730. Russian crude petroleum yields a comparatively small proportion of naphtha, about 5 or 6 per cent., which is separated into light benzine and heavy benzine, varying in sp. gr. from '730 to '775. Shale spirit is a product of the crude oil distilled from shale, which is one of the important mining and chemical industries of Scotland. This crude oil contains 4 to 5 per cent. of naphtha, having a sp. gr. of '715 to '740; but some of the shale-oil works produce a small quantity of gasoline with a sp. gr. of '640 to '680. Coal-tar naphtha is distilled from the tar obtained from coal in gas-works. The production of tar is 10 to 12 gallons per ton of coal put through the retorts. This tar on distillation yields from 5 to 20 per cent. of naphtha according to the quality of coal used. Gas-tar from Newcastle coal gives only 5 per cent. of naphtha, while the tar from some cannel coals yields as much as 20 per cent. Coal-tar naphtha has a sp. gr. varying from '850 to '950, and is thus much heavier than the naphthas obtained from crude mineral oils. Coal-tar naphtha may be fractionated into a variety of hydrocarbons with boiling-points ranging from 175° to 350°; but the two of the greatest commercial importance are benzole and ordinary naphtha. Caoutchine is a naphtha obtained by the destructive distillation of caoutchouc or india-rubber. It also may be fractionated into a number of hydrocarbons of different densities and boiling-points. Bone-naphtha is obtained by the distillation of bones in the manufacture of animal charcoal. It is known also as bone-oil, or Dippel's animal oil. Owing to some neutral or nitrogenous substance as yet unknown, it possesses a peculiarly offensive smell, and until some easy means is discovered of removing this very objectionable feature bone-oil can never become of much use as a naphtha. The crude naphthas obtained from these various sources are all refined or purified by similar processes—viz. simple redistillation by means of steam, as in America, for the lightest fractions; but for the heavier spirits a treatment with sulphuric acid

and then with caustic soda, and a subsequent washing with water are necessary previous to redistillation.

The uses to which in the industrial arts the different qualities of naphtha are applied are very numerous. The lighter spirits, such as benzole and benzine, being solvents of grease and oil, are used for detergent purposes. Benzoline was for some years burned pretty generally by the poorer classes in cheap benzoline or sponge lamps; but its use in this way has happily been greatly restricted, if not quite superseded, by the low price at which petroleum and paraffin oils have for some years been obtainable. The light naphthas are also used for extracting the perfumes of flowers and plants, and the oil from various seeds. The bulk of the coal-tar naphtha, and much of the shale and petroleum spirit, are employed as solvents in the manufacture of india-rubber and gutta-percha goods. They are also solvents of wax, and fatty and resinous bodies generally, and are so used in refining the best qualities of paraffin wax. Large quantities are consumed in naphtha, torch, and other flaring lamps for outside use. They are also used as a substitute for turpentine in the preparation of paints; and in Scotland the solvent action of shale spirit is turned to account in the preparation of an anti-damp or stone- and timber-preserving fluid called Alexinoton. A considerable percentage of paraffin wax is dissolved and held in solution by the spirit; and if this liquid be applied to freestone, brick, or wood, it passes into the pores of the material, and the spirit rapidly evaporating leaves the wax permanently in the stone or wood, so that water cannot be absorbed by it.

Naphthalene, $C_{10}H_8$, is a solid substance obtained from Coal-tar (q.v.). It forms thin, transparent, brilliant plates with a pearly lustre and unctuous to the touch. It melts at $176^{\circ} F.$ ($80^{\circ} C.$) and boils at $422^{\circ} F.$ ($217^{\circ} C.$), but it readily sublimates at a much lower temperature. It has antiseptic properties. It is used in the manufacture of indigo and a number of azo dyes. Naphthalene is of most importance from a scientific standpoint. Its molecule of $C_{10}H_8$ may be regarded as made up of two aromatic nuclei, having two atoms of carbon in common; but for further information on this point, see AROMATIC SERIES. Naphthalene forms an extensive series of derivatives in which one or more atoms of hydrogen are replaced by NO_2 , chlorine, bromine, &c.

Napier, the chief port and city of the provincial district of Hawke's Bay, New Zealand, on the east coast of the North Island. Port Ahuriri (or Seinde Island), where most of the wholesale stores are situated, is within the municipal boundary. The harbour has been deepened in order to accommodate large vessels. There is a considerable export of wool, also tinned and frozen meat, and timber. Napier is the seat of the bishop of Waiapu. A fine cathedral was built in 1888. Pop. 17,000.

Napier, SIR CHARLES, English admiral, was cousin to the hero of Sind and the historian of the Peninsular war, and was born 6th March 1786 at Merchiston Hall, near Falkirk. At thirteen he went to sea as a naval volunteer. In 1808 he received the command of the *Recruit*, 18 guns, and had his thigh broken by a bullet. He kept up a running fight in the West Indies with a French line-of-battle ship, and assisted in her capture. This obtained him a post-captaincy; but being thrown out of active service, he served ashore as a volunteer in the Peninsular army, and was wounded at Busaco. Commanding the *Thames* in 1811, he inflicted an incredible amount of damage upon the enemy in the Mediterranean. In 1814 he led the way in the hazardous ascent and descent

of the Potomac; and he took an active part in the operations against Baltimore. In 1829 he received the command of the *Galatea*, a 42-gun frigate, and was employed 'on particular service' on the coast of Portugal. Becoming acquainted with the leaders of the Constitutional party, he accepted the command of the fleet of the young queen; and by defeating the Miguelite fleet he concluded the war, and placed Donna Maria on the throne. He was made admiral-in-chief of the Portuguese navy, and attempted to remodel it; but official and corrupt influence was too strong for him, and he returned to England. In the war between the Porte and Mehemet Ali he organised a land force, with which he stormed Sidon and defeated Ibrahim Pasha among the heights of Mount Lebanon. He took part in the naval attack on Acre, blockaded Alexandria, and concluded a convention with Mehemet Ali. In 1847, now a K.C.B., he received the command of the Channel fleet. When the Russian war broke out he was sent out to command the Baltic fleet; but the capture of Bomarsund failed to realise the high expectations formed, and he was deprived of his command. He twice sat in parliament, for Marylebone and Southwark, and, until his death at his Hampshire seat, Merchiston Hall, November 6, 1860, he laboured to reform the naval administration. See his *Life and Correspondence* (1862), and his *Life and Letters* by H. N. Williams (1917).

Napier, SIR CHARLES JAMES, the conqueror of Sind, was great-grandson of the fifth Lord Napier and a descendant of Napier of Merchiston. He was born at Westminster, 10th August 1782, and, having received a commission in his twelfth year, served in Ireland during the rebellion. He commanded the 50th Foot during the retreat on Coruña; and at the fatal battle in which Sir John Moore fell he was wounded in five places and made prisoner. Marshal Ney dismissed him, with permission to go to England, where he engaged in literary work, and even wrote an historical romance. In 1811 he returned to the Peninsula. At Coa, where he fought as a volunteer, he had two horses shot under him. At Busaco he was shot in the face, having his jaw broken and his eye injured. He recovered in time to be present at the battle of Fuentes d'Oñoro and the second siege of Badajoz. He took part in a fighting cruise off the Chesapeake, capturing American vessels, and making frequent descents upon the coasts. He did not return to Europe soon enough for Waterloo, but was engaged in the storming of Cambrai, and accompanied the army to Paris. After the peace he was, in 1818, made governor of the island of Cephalonia, the affairs of which he administered with great energy and intelligence; but, being of an excessively combative disposition, he became embroiled with the authorities at home. In 1838 he was made a K.C.B., and in 1841 was ordered to India to assume the command of the army of Bombay against the amirs of Sind. His destruction of a fortification called Emaun Ghur, in 1843, was a most remarkable military feat. The fearful battle of Meeanee (q.v.), on 17th February, followed, where Napier, with 8000 English and sepoy, defeated 22,000 Baluchis, strongly posted. The amirs surrendered, except Shere Mohammed, who brought 25,000 men into line of battle at Hyderabad. Napier had only 5000 men, but in three hours his little army gained a decisive victory. A few days afterwards Napier was in the palace of the amirs, and master of Sind; and after the annexation Lord Ellenborough made him governor of Sind. He gained the respect and reverence of the inhabitants, but soon became engaged in an acrimonious war of despatches with the British authorities. In 1847 he returned to England.

After attending a series of festivals in his honour, he lived in retirement until the disasters of the Sikh war caused the eyes of his countrymen to be turned to the hero of Sind. He went to India, but found on his arrival that the Sikhs had been routed. He now turned his attention, as commander-in-chief of the army in India, to the subject of military reform, and quarrelled with Lord Dalhousie. He bade a final adieu to the East in 1851, and returned to his native country, where he resided until his death, which took place at his seat, at Oaklands, near Portsmouth, on 29th August 1853. He had then attained the rank of lieutenant-general, was G.C.B., and colonel of the 22d Foot. It must be remembered to his honour that he was the first English general who ever recorded in his despatches the names of private soldiers who had distinguished themselves, side by side with those of officers. Brave to rashness, ready alike with tongue, pen, and sword, quarrelsome with his superiors, but beloved by his soldiers, and, to crown all, of wild yet noble and striking appearance, Napier was one of the most remarkable men of his time. See *Lives* by his brother (4 vols. 1857), W. Napier Bruce (1885), Sir W. Butler (1890), and T. Rice Holmes (1925).

His brother, SIR WILLIAM FRANCIS PATRICK NAPIER, K.C.B., was born 17th December 1785, served in the Peninsular campaign, and became lieutenant-general. Besides his famous *History of the War in the Peninsula* (6 vols. 1828-40), he published *The Conquest of Scinde* (1845), and the *Life of his brother Sir Charles* (1857). He died at Clapham, 12th February 1860. See his *Life* by H. A. Bruce (1864).

Napier, JOHN, Laird of Merchiston, was born at Merchiston Castle, near Edinburgh, in 1550. He matriculated at St Andrews in 1563, and travelled for some time on the Continent, returning to his native country highly informed and cultivated; but, declining all civil employments, he preferred the seclusion of a life devoted to literary and scientific study. In 1593, however, he was one of a deputation of six to the king regarding the punishment of the 'Popish Rebels,' and in the same year he published his *Plaine Discovery* (or 'Interpretation') of the whole Revelation of Saint John (revised ed. 1611; 5th ed. 4to, 1645). In the dedication to King James VI. he gave his majesty some very plain advice regarding the propriety of reforming his 'house, family, and court;' and the work went through numerous editions in English, Dutch, French, and German. In July 1594 he made a contract with Logan of Restalrig for the discovery of treasure in Fast Castle. About this time he seems to have devoted much of his time to the invention of warlike machines for the defence of the country against Philip of Spain, and a list of the same exists at Lambeth Palace, dated 1596. Like other eminent men of the time, Napier, though a strict Presbyterian, seems to have been a believer in astrology and divination. In 1596 he proposed the use of salt as a fertiliser of land. In 1614 he first gave to the world his famous invention of Logarithms (q.v.), in a treatise entitled *Mirifici Logarithmorum Canonis Descriptio* (trans. Wright, 1616). Napier's next work was *Rabdologie seu Numerationis per Virgulas libri duo* (1617), detailing an invention for simplifying and shortening the processes of multiplication and division mechanically by means of the device subsequently known as *Napier's Bones*—an arrangement of narrow slips of bone, ivory, metal, or pasteboard, inscribed with figures. This ingenious contrivance, however, was superseded by his logarithms. He also prepared a second work on logarithms, showing their mode of construction and application, with an appendix

containing several propositions of spherical trigonometry, and those formulæ which are now known by his name. This work was published after his death (4th April 1617) by his son Robert in 1619. There is an English translation by W. R. Macdonald, *The Construction of the Wonderful Canon of Logarithms*, with a catalogue of the various editions of Napier's works (1889). Napier's eldest son, Archibald, was raised to the peerage as the first Lord Napier by Charles I. in 1627.

See *Lives* by Lord Buchan (1787) and by Mark Napier (1834), who also edited *Ars Logistica*, 'The Baron of Merchiston his booke of Arithmeticke and Algebra' (1839), from a manuscript copy for the Bannatyne Club. This work had been transcribed from Napier's notes by his son Robert. See the *Napier Tercentenary Volume*, ed. C. G. Knott (1915), and Hume Brown, *Surveys of Scottish History* (1919).

Napier, MACVEY, born at Glasgow, 11th April 1776, was educated there and in Edinburgh, and in 1799 became a writer to the Signet, in 1805 Signet Librarian (which post he retained till 1837), and in 1824 first professor of Conveyancing. He edited the supplement to the fifth edition of the *Encyclopædia Britannica* (6 vols. 1816-24), and in 1829 succeeded Jeffrey as editor of the *Edinburgh Review* (q.v.). Among his contributors were Macaulay, Carlyle, J. S. Mill, Sir William Hamilton, and (alas for the editor!) Brougham. He died 11th February 1847. See his interesting *Correspondence* (1879).

Napier of Magdala, LORD. Robert Cornelius Napier was born in Ceylon, 6th December 1810, and was educated at the Military College at Addiscombe. He entered the Bengal Engineers in 1826, served in the Sutlej campaign, was wounded while acting as chief-engineer at the siege of Multan, and had a prominent share in the battle of Gujrat. As chief-engineer of the Punjab, with the rank of colonel, he greatly developed the resources of the country. During the Indian Mutiny he was chief-engineer in Sir Colin Campbell's army, and especially distinguished himself at the siege of Lucknow, and was made K.C.B. He received the thanks of parliament for his services in the Chinese war of 1858. As commander of the expedition in Abyssinia (q.v.) in 1868, he achieved a brilliant success, both by his whole management of the short campaign and in the storming of Magdala, which ended it. On his return he received the thanks of parliament, an annuity of £2000, was made G.C.B., and created Baron Napier of Magdala. In 1870 he was appointed Commander-in-chief of the forces in India, and nominated a member of the Indian Council. In 1876-82 he was governor of Gibraltar, and on resigning was made Field-marshal, in 1886 Constable of the Tower. He died 14th January 1890.

Naples owed its foundation to a body of Greek colonists, two settlements, Palæopolis and Neapolis, existing for many years side by side as one community, Parthenope. In 328 B.C. both were subdued by Rome; from that time Palæopolis disappears, whilst its neighbour was made an ally of Rome. It resisted Pyrrhus, deterred Hannibal, but fell through treachery into the hands of Sulla's partisans (82 B.C.), who massacred the people. Under the empire it was a favourite place of residence for the emperors and the upper classes of Rome, and of the poets Virgil, Statius, Silius Italicus, luxury and pleasure, and its beautiful climate, being the sources of attraction. After Rome fell, it sided with the Goths, but was seized by Belisarius (536), and six years later by Totila. Narses recovered it soon after for the Byzantine emperors, who made it the head of a duchy. This in the beginning of the 8th century asserted its independence, and retained it until the whole country was subdued by the Normans in the

11th century. To the Norman dynasty succeeded that of the Hohenstaufen. But their arch-enemies, the popes, conferred the sovereignty of Naples upon Charles of Anjou, who in the battle of Benevento (1266) annihilated the power of the imperial (Ghibelline) party. The predominance of the papal (Guelph) party during the reign of Robert I., who was the patron of Dante and Boccaccio, the depraved libertinism of his heiress and granddaughter Joanna, the ravages committed by German mercenaries and by the plague, futile attempts to recover Sicily, and the feuds of rival claimants to the throne, are the leading features during the rule of the Angevine dynasty, which expired with the profligate Joanna II. in 1435. It was succeeded by that of Aragon, which had ruled Sicily from the time of the Sicilian Vespers (1282). During the tenure of the Aragon line, various unsuccessful attempts were made by the House of Anjou to recover their lost sovereignty; and the country, especially near the seacoast, was repeatedly ravaged by the Turks. Between 1494 and 1504 the French and Spanish disputed between them the possession of Naples, and victory inclined to the latter. Naples was united with Sicily, forming the kingdom of the Two Sicilies, and was governed by viceroys of Spain down to 1707. The most striking episode during this period was the revolt of Masaniello (q.v.). During the war of the Spanish Succession (q.v.), Naples was wrested from Spain by Austria (1707); but in 1735 was given to Don Carlos, third son of Philip V. of Spain, who

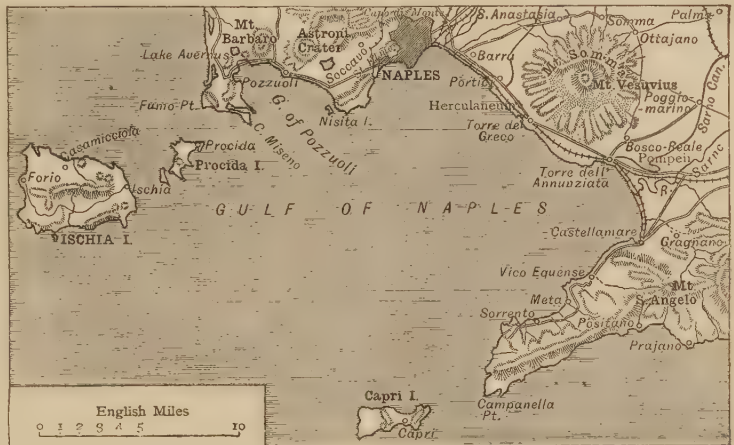
founded the Bourbon dynasty. In 1799 the troops of the French Republic invaded Naples and converted it into the Parthenopean Republic. For Nelson's share in Neapolitan politics at this time, see NELSON. A second invasion by Napoleon (1806) ended in the proclamation of his brother Joseph as king of Naples; and, when Joseph assumed the Spanish crown in 1808, that of Naples was awarded to Joachim Murat. On the defeat and execution of Murat in 1815 the Bourbon monarch, Ferdinand IV., was restored. The insurrectionary movements of 1821 and 1848 were the forerunners of the overthrow of the Bourbon rule by Garibaldi (q.v.) and the Sardinians, and the incorporation of Naples in the kingdom of Italy (1861).

See Colletta, *History of the Kingdom of Naples* (1734-1825; Eng. trans. by S. Horner, 2 vols. Edin. 1858); Croce, *Storia del Regno di Napoli* (1924); Constance Giglioli, *Naples in 1799* (1903); and see also ITALY, SICILY, and FERDINAND I. and II.

Naples (Gr. and Lat. *Neapolis*, Ital. *Napoli*), till 1860 the capital of the kingdom of Naples (q.v.), and now chief town of Naples province (area, 350 sq. m.; pop. 1,500,000), is the largest city in Italy, and perhaps the most beautifully situated in Europe. It lies 161 miles by rail SE. of Rome. It is the seat of an archbishop. Pop. (1881) 463,172; (1921) 772,405. Naples is a naval base. Extensive improvements have been carried out in the harbour. As a port Naples has no rival in Italy except Genoa. The chief exports consist of live animals and animal products, manufactured hemp and flax, macaroni, cereals and fruits. The chief imports are cereals, metals, cottons, woollens, earthenware and glass, animals and animal foods, groceries and

chemicals. Naples has many employments but before the 20th century had few industries, and these insignificant, consisting mainly of woollen, silk, and linen manufactures, gloves, soap, perfumery, jewellery, earthenware, hats, and carriages. There were ironworks and shipbuilding-yards in other towns in the bay. New industries have since sprung up and the old have developed. The neighbourhood is the market-garden of Italy.

Its attractiveness, due not only to its site, but to its tonic and bracing climate, specially delightful in autumn and winter, and, thanks to the sea-breeze, quite tolerable in the summer-heat, has inspired the well-known proverb, 'See Naples and die.' Its charms have remained proof against innumerable sanitary drawbacks, defective drainage, impure water-supply, and the fever preserves of its poorer quarters with their subterranean dens, in course of removal since 1889. The impetus to this work was given by the fearful cholera



outbreak of September 1884, when in one night nearly 2000 people were attacked, and about 1000 of them died. Drainage-works carry the sewage to Cumæ, thus relieving the sea-margin, under the principal hotels, of the liquid poison that used to stain the water black hard-by the most frequented marine-baths, and infect the oysters moored in baskets near the shore. An aqueduct opened in 1885 furnishes pure drinking-water to every part of the city. Along the quay considerable improvements have been made—a new harbour, solid embankments, and commodious promenades following up the handsome squares, planted with trees and parterres, new streets cut through the more populous quarters, a fine embankment carried along the sea-front, and the Corso Vittorio Emanuele, a road traversing all the heights above the city.

Naples occupies the base and flanks of a hill-range rising, amphitheatre-wise, from the sea, and divided into two unequal parts by the Capodimonte, S. Elmo, and Pizzofalcone heights, the latter ending in the small island crowned by the Castel dell'Ovo. The most ancient and populous part of the city lies in the eastern crescent, and is intersected from north to south by the Via Toledo (now Via di Roma), the main historic street of Naples, more densely peopled than any other of equal space in Europe. Numerous broad streets have been built on this side of the city. A fine quay extends eastward to the Castel del Carmine. To the back of this lies the poorest and most populous quarter, now being dismantled. Westward runs the less ancient city, smaller in extent, but freer as to air and prospect, and frequented by

the more favoured classes, resident and migratory. Along the sea-margin extend public gardens and the Riviera di Chiaja, the lower boundary of the comparatively new quarters built against the slope. On the Vomero Hill, in the north-west, an extensive quarter sprang up to accommodate the inhabitants of the dismantled 'rookeries' near the harbour, for whom dwellings were also built beyond the railway station to the east of the city. Naples has a modern look, but in spite of external change still presents the same noisy, vivacious, mercurial life so astonishing and ere long so oppressive in its monotony to the new-comer from the north. From the precocious street arab to the gray-haired and vociferous mendicant, with a whole army of importunate pedlars, cabmen, newsvendors, flower-girls, and touts between, there is no pause night or day—that 'Naples never goes to bed' is indeed a scarcely exaggerated saying. The historic interest of the suburban quarters along the shore is greater than that of the city. But its poverty in Græco-Roman antiquities is made up for by its National Museum, rich in archaeological treasure-trove from Pompeii, while its splendid aquarium teems with typical specimens of the flora and fauna of the Mediterranean, and forms the exhibition-room of its Zoological Station. Of architectural interest Naples has little. Besides her five forts and four gates of mediæval construction, she has upwards of 300 churches, including the cathedral (1272-1316) of St Januarius (q.v.), whose blood is said to liquefy in the phials containing it on three yearly festivals. The university (1224), the royal palace, the catacombs, and, still more, the law-courts are worth visiting. Naples is excellently equipped with libraries: the National Library (1804), the University Library (1812), the Brancacciana (1673), are all rich in printed books and MSS. The San Carlo Theatre (chiefly for opera) is one of the largest in Italy, though much less popular than the San Carlino, sacred to 'Pulcinella' (the Italian Punch) until the picture-house drove Punch into the streets. In fine art Naples is poor—her music, in spite of her devotion to opera, adding nothing to the European repertory except *Pagliacci*; but the plaintive songs of her fishermen are as truly Mediterranean as the Venetian *barcaruole* are Adriatic.

See books by Miss Clement (1895), A. and S. Fitzgerald (illustrated, 1904), A. H. Norway, L. Collison-Morley (1925).

Napoleon I., emperor of the French. Napoleon Bonaparte, the second son of Charles Bonaparte and his wife Letizia de Ramolino, was born at Ajaccio, in Corsica, on the 15th August 1769. In 1779 he entered the Royal Military School of Brienne le Château; there he remained till the autumn of 1784, when he was transferred to the Military School of Paris, according to the usual routine. An official report on him by the Inspector of Military Schools in this year speaks highly of his conduct, and notifies his great proficiency in mathematics and fair knowledge of history and geography, but says he is not well up in ornamental studies or in Latin, and, curiously enough, adds that he will make an excellent sailor. Napoleon lost his father in 1785, and the same year he was commissioned as second-lieutenant of artillery, in which capacity he served at Valence and other garrisons. He spent his periods of leave in Corsica, and appears to have wished to play the leading part in the history of his native island, showing the first signs of his ambitious and energetic character. During the critical times following the first French Revolution, he at first joined the moderate party of Paoli; but, trying for military power, though by untiring activity and

reckless audacity he succeeded in being elected lieutenant-colonel of the National Volunteers of Ajaccio, he failed in an attempt to seize that town and was obliged to return to France. Although he had forfeited his French commission by overstaying his leave, the second Revolution of 1792 was now in progress, and the new government could not spare the few trained officers whom emigration had left, and his rank was restored to him. He returned to Corsica and accompanied an expedition which unsuccessfully tried to get possession of Sardinia. The French government soon made an endeavour to crush Paoli and do away with Corsican privileges, and the islanders rallied round the patriot. Napoleon now turned against him and attempted to seize the citadel of Ajaccio for the French; but failing again, with all his relatives he fled a second time to France.

From this time onwards Napoleon looked to France for his career. The narrow horizon of his native island was no longer wide enough for him, but from its bracing mountain air and from the quick blood of his race he drew a magnetic force which imparted to his decisions and actions a rapidity and energy that carried all before them, while at the same time a power of calm calculation, of industry, and of self-control enabled him to employ his genius to the best advantage. The force of his personality was so overwhelming that in considering his career the regret must ever be present that the only principle that remained steadfast with him, and is the key to his conduct throughout, should have been the care for his own advancement, glory, and power. Napoleon now joined the army under Carteaux, which acted against the Marseillais who had declared against the National Convention and occupied Avignon. At this time he became attached to the younger Robespierre, who was a commissioner with the army, and embraced his Jacobin principles. He was shortly promoted Chef de Bataillon, and commanded the artillery at the siege of Toulon, where he highly distinguished himself, and is generally believed to have been the author of the plan of attack which led to the fall of the place. He was then promoted general of brigade.

On the fall of the Robespierres, Napoleon incurred serious danger, but was saved by powerful influence enlisted in his favour. He was, however, ordered to take command of an infantry brigade in the Army of the West. This he considered would stifle his military career, and neglecting to obey the order, he was in consequence removed from the list of employed general officers. Disgusted with his apparent lack of prospects, he was now anxious to be sent to Turkey to reorganise the Turkish artillery. But on the eve of the 13th Vendémiaire (5th October 1795) he was appointed second in command of the Army of the Interior under Barras, and did the National Convention good service next day in repelling the attack of the Sections of Paris. Influenced partly by fear and partly by appreciation of his talents, the Directory appointed General Bonaparte to the command of the Army of Italy on 23d February 1796. On 9th March he married Joséphine Tascher de la Pagerie, widow of General Vicomte Alexandre de Beauharnais, and left Paris for Italy two days later.

On joining the army Bonaparte inaugurated a new era in the wars of the Republic. Previously the leading motives had been pure patriotism and love of liberty; Bonaparte for the first time, in his proclamation on taking command, invoked the spirit of self-interest and plunder, which was to dominate the whole policy of France for the next twenty years. Evil as were the passions which he

aroused, Napoleon's great military genius flashed forth in its full brilliancy in this his first campaign. His power lay in the rapidity and boldness of his decisions, and in the untiring energy with which he carried them out, confounding his enemies by the suddenness and lightning rapidity of his blows, which never gave them time to recover. He found the French army about 36,000 strong, distributed along the crests of the mountains from Nice to Savona, and opposing 20,000 Piedmontese under Colli and 38,000 Austrians under Beaulieu. These two generals had, however, differing interests: Colli's main object was to protect Piedmont, Beaulieu's to cover Lombardy. Hence, if Bonaparte could penetrate the point of junction of the two armies, it was probable they would separate in their retreat, and could be beaten singly. He therefore attacked the centre of the allied line, and, driving back the Austrians from Montenotte on the 12th April, turned against the Piedmontese and defeated them at Millesimo the next day. Losing no time he left a division under Augereau to keep the Piedmontese in check, and led the bulk of his army against the Austrians, defeating them heavily at Dego on the 14th. The allied armies then retreated in diverging directions as expected, and Bonaparte, following the Piedmontese, beat them at Ceva and Mondovì, and forced the king of Sardinia to sign the armistice of Cherasco, leaving him free to deal with the Austrians. He crossed the Po at Piacenza on the 7th May, and obliged the Austrians to retreat to the Adda. Following them he forced the bridge of Lodi on the 11th May, and entered Milan amid the rejoicings of the people on the 15th. But his ill-omened proclamation had done its work; violence and pillage were rampant in the French army, and he could do little to restrain them. Indeed, he himself showed an example of plundering, though under more organised forms. Heavy contributions were exacted, curiosities and works of art were demanded wholesale and despatched to France; and the Directory, demoralised by the unaccustomed wealth that flowed in upon them, became fully as eager as Napoleon for fresh conquests and their accruing spoils. Insurrections followed at Pavia and in the Milanese, but were ruthlessly put down, and on the 27th May the army left Milan to follow Beaulieu to the Mincio. The Austrians defended the whole line of this river, but Napoleon, drawing the bulk of their forces northward by a feint, broke through their centre at Borghetto, and Beaulieu retreated into Tyrol, leaving the line of the Adige to Napoleon. This he at once occupied, taking Verona and Legnago from the neutral republic of Venice, whom he frightened into submission.

The Austrians still held Mantua, which Napoleon now besieged, occupying himself at the same time in consolidating his conquests. The Austrians made strenuous efforts to save the fortress. They had about 20,000 men in Mantua, and Wurmser advanced through Tyrol with 50,000 more, while the French were only some 45,000 strong including the siege corps. Wurmser moved in three columns: one descended the Adige and threatened Verona, another moving between the Adige and the Lake of Garda drove Joubert and Masséna from Rivoli and Corona, while the third under Quasdanovich moved west of the Lake of Garda and seized Brescia, threatening the French communications. Napoleon's position was very critical, but he made a rapid decision, raised the siege of Mantua, spiking his guns and destroying his stores, moved all the force he could collect against Quasdanovich, and defeated him at Lonato on the 31st July. Wurmser moving on Mantua found no enemy there, and missed being at the decisive point at the right time. Napoleon, leaving a small force

to watch Quasdanovich, turned rapidly back against the other two Austrian columns which were not yet fully united, and beat their most advanced troops at Lonato again on the 3d August and Wurmser himself at Castiglione on the 5th, driving him back into Tyrol with the loss of half his army. Mantua was again invested, but, the siege-artillery having been lost, the operations against it were reduced to a blockade. In the beginning of September Napoleon took the offensive against Wurmser, and passing boldly behind him defeated him at Bassano, cut off his retreat, and forced him to take refuge in Mantua on the 15th September. Again, at the end of October, an Austrian army of 50,000, but mostly recruits, advanced under Alvinzi. Napoleon could now dispose of from 38,000 to 40,000 men, having in the meantime formed the Cispadane Republic and raised an Italian legion which set free most of his garrisons. Alvinzi arrived before Verona, while a column under Davidovich moved by the eastern shore of the Lake of Garda. Napoleon hastily caused the positions of Rivoli and Corona to be reoccupied to check Davidovich, and moved himself by night from Verona down the right bank of the Adige, crossed it at Ronco, and came upon Alvinzi's rear. Then followed the three days' battle of Arcola, during which Napoleon had a very narrow escape, but which ended in Alvinzi's defeat and retreat on Tyrol. From Arcola Napoleon dated his firm belief in his own fortune. Once again, in January 1797, Alvinzi tried to relieve Mantua. Feinting against Legnago to deceive Napoleon, he intended to make his main advance between the Adige and the lake. But Napoleon was too skilful to take decided action without full knowledge, and keeping his reserve half-way between Rivoli and Legnago waited for more certain news. When he ascertained the direction of the real attack, he moved in full force on Rivoli and won a decisive battle there on January 14, the Austrian detachment on the Lower Adige having to lay down their arms next day at Roverbella. Wurmser capitulated at Mantua on the 2d February, Napoleon treating him with generosity. This first Italian campaign was perhaps the most skilful of all those of Napoleon. Everything was done accurately and rapidly, and without throwing away chances. Some of his later campaigns, though equally brilliant, show him acting more with the gambler's spirit, running unnecessary risks with almost a blind reliance upon his star, in the hope of obtaining results which should dazzle the world.

In political matters during this time Napoleon was acting less as a servant of the French Directory than as an independent ruler. He entirely ignored the instructions he received from Paris, levying contributions, entering into negotiations and deposing princes at his own will, and writing that he is not fighting 'for those rascals of lawyers.' His policy was in fact regulated in accordance with his own ambitious schemes; and we find him adopting a conciliatory attitude towards Rome with an eye to the future support of the church.

When his position in Italy was secured by the fall of Mantua, and by treaties with Rome and Sardinia, he prepared to advance through Carinthia and Styria on Vienna. He pushed back the Archduke Charles from the Tagliamento, and advanced till he reached Leoben in Styria on the 7th April 1797. Then Austria sued for peace, and the preliminaries of Leoben were signed on the 18th April pending the conclusion of a definite peace. But further negotiations dragged on, as Austria thought a revolution might be impending in France from which she could obtain advantage. In fact a

party was rising against the Directory, consisting mainly of moderates who were eager only for a respectable government, but containing also a few royalists. Their inclusion was fatal to the party. It gave a pretext for raising the cry that the Republic was in danger, and Angereau, sent by Napoleon to Paris, aided the Directory to carry out the *coup d'état* of the 18th Fructidor, when the Corps Législatif was surrounded by troops and the obnoxious representatives arrested. This strengthened the Directory for the moment, but was a step towards military despotism under Napoleon. Austria, seeing the Directory again firmly seated in power, became more eager for peace, the negotiations were hastened, and on 17th October 1797 the treaty of Campo-Formio was signed. By this France obtained Belgium and the Ionian Islands, Austria also acknowledging the Cisalpine Republic, and ceding to it Lombardy, and engaging to try and get the left bank of the Rhine for France from the Germanic body. As an indemnity Austria obtained Istria, Dalmatia, and the territory of the Venetian Republic, with whom, although neutral, Napoleon had managed to pick a quarrel with this end in view.

Napoleon returned to Paris on the 5th December 1797. The Directory, fearing his ambition, thought they could only keep him quiet by employing him, and gave him command of the so-called Army of England. But he was bent on the conquest of Egypt. He appears to have had something visionary in his temperament, and to have dreamed of founding a mighty empire from the standpoint of the East, the glow and glamour of which seem always to have had a certain fascination for him. He therefore employed the resources of the Army of England to prepare for an expedition to Egypt, and the Directory yielded to his wishes, partly no doubt through the desire of getting him away from France. But their aggressive policy was at the same time fast bringing on another European war. The expedition sailed from Toulon on the 19th May 1798, captured Malta from the Knights of St John by treachery, and, escaping by great luck from the British fleet under Nelson, arrived at Alexandria on the 30th June. The army was disembarked in haste, for fear lest Nelson should arrive, and on the 8th July Napoleon marched on Cairo. He defeated the Mamelukes at Chebreiss and the Pyramids, and entered Cairo on the 24th July. He then occupied himself with organising the government of Egypt, but his position was rendered very hazardous by the destruction of the French fleet on the 1st August by Nelson at the battle of the Nile, and he saw that his dream of founding an empire in the East could not be realised. He thought, however, that he might create a revolution in Syria, by the aid of which he might overthrow the Turkish power and march in triumph back to Europe through Asia Minor and Constantinople. He accordingly entered Syria in February 1799 with 12,000 men, but was brought to a standstill before St Jean d'Acre. Failing to capture that fortress, supported as it was by the British squadron under Sir Sidney Smith, in spite of the most desperate efforts, he was obliged to return to Egypt. The killing in cold blood of 2500 prisoners at Jaffa has been execrated and defended—most of them had already broken their parole; but there seems to be some doubt about the truth of the story that in his retreat Napoleon caused the sick he could not transport to be poisoned. After his return to Egypt, Napoleon defeated a Turkish army which had landed at Aboukir, but learning the reverses that had been suffered by the French arms in Europe, he resolved to leave Egypt and return to France. He embarked secretly on the 22d August, leaving a letter placing Kléber in

command of the Army of Egypt, and landed in France six weeks later.

He found matters at home in great confusion. The wars had been mismanaged, Italy was almost lost, and the government in consequence was in very bad odour. Sieyès, one of the Directors, meditated a *coup d'état*, but was at a loss for a man of action to take the lead. At this juncture Bonaparte arrived, and, though for some time there was no *rapprochement* between him and Sieyès (the latter fearing Bonaparte's masterful character, and Bonaparte uncertain what party it would be most to his advantage to join), they at length coalesced, and the revolution of the 18th Brumaire followed (9th November 1799), when the legislature was forcibly closed and a provisional executive of three consuls, Sieyès, Roger-Ducos, and Bonaparte, formed to draw up a new constitution. This was promulgated on the 13th December; the executive was vested in three consuls, Bonaparte, Cambacérès, and Lebrun, of whom Bonaparte was nominated First Consul for ten years. He was practically paramount, the two remaining consuls being ciphers, and the other institutions being so organised as to concentrate power in the executive. Sieyès became president of the senate. The governmental crisis being settled, energetic steps were taken with regard to the civil war in the west. A proclamation was issued promising religious toleration at the same time that decided military action was taken, and these measures were so successful that all was quiet at home by the end of February 1800. Then Napoleon turned his attention abroad. He made overtures for peace to England and Austria, now the only belligerents, as he wished to lull suspicion by posing as the friend of peace, not as a military ruler; but he inwardly rejoiced when they rejected his overtures.

The situation of the belligerents on the Continent was this: the Army of the Rhine under Moreau, more than 100,000 strong, was distributed along the Rhine from the Lake of Constance to Alsace, opposed to Kray, whose headquarters were at Donaueschingen in Baden; while Masséna with the Army of Italy was on the Riviera and at Genoa, opposed to an Austrian army under Melas. Napoleon intended to gain himself the chief glory of the campaign; so, giving Moreau orders to cross the Rhine but not to advance beyond a certain limit, and leaving Masséna to make head as best he could against Melas, with the result that he was besieged in Genoa and reduced to the last extremity, he prepared secretly an army of reserve near the Swiss frontier, to the command of which Berthier was ostensibly appointed. Outside and even inside France this army of reserve was looked upon as a chimera. Moreau crossed the Rhine on the 24th April and drove Kray to Ulm, but was there checked by Napoleon's instructions, according to which he also sent a division to co-operate with the army of reserve. Napoleon himself went to Geneva on the 9th May, and assuming command of this army crossed the St Bernard and reached the plains of Italy before Melas had convinced himself of the existence even of the army of reserve, and whilst his troops were scattered from Genoa to the Var. Napoleon's obvious course would now have been to move straight on Genoa, relieve Masséna, and beat in detail as many of Melas' troops as he could encounter. But this would not have been a sufficiently brilliant triumph, as the bulk of the Austrian army might have escaped; and trusting in his star he resolved to stake the existence of his army on a gambler's cast. Leaving Masséna to be starved out, he moved to the left on Milan, and occupied the whole line of the Ticino and Po as far as Piacenza, so as to cut off entirely the retreat of the Austrians. He then crossed the Po and concen-

trated as many troops as he could spare at Stradella. The strategy was brilliant, but the risk run excessive. His army was necessarily scattered, while Melas had had time to concentrate, and he was besides ignorant of the Austrian position. He sent Desaix with a column to seek information, and moved himself on Alessandria, where he found Melas. Next day, the 14th June, Melas marched out to attack the French on the plains of Marengo, and despite all Napoleon's efforts had actually defeated them, when fortunately Desaix returned, and his advance, together with a cavalry charge by Kellermann, changed defeat into victory. Melas, losing his head, signed a convention next day giving up almost all North Italy, though Marmont says that if he had fought another battle he must have won it. Napoleon returned to Paris with the glories of this astonishing campaign; but peace did not follow till Moreau, when his liberty of action was restored to him, had won the battle of Hohenlinden on 3d December 1800. Then followed the treaty of Lunéville with Germany in February 1801, the concordat with Rome in July 1801, and the treaty of Amiens with England in March 1802, so that Napoleon was able to figure as the restorer of peace to the world. He then devoted himself to the reconstruction of the civil institutions of France, employing in this great work the best talent that he could find, and impressing on their labours the stamp of his own genius. The institutions then created, which still remain for the most part, were the restored church, the judicial system, the codes, the system of local government, the university, the Bank of France, and the Legion of Honour.

France at this period, sick of the failure of republican government, was gradually veering towards monarchy, and Napoleon knew how to take advantage of events to strengthen his position, and in due time establish his own dynasty. The plot of Nivose (24th December 1800), when his life was threatened by a bomb, gave him a pretext for arresting and transporting 130 members of the Jacobin party, with which he had long since broken; and after the conclusion of the peace of Amiens a great step was taken when, as a mark of public gratitude for the pacification of the world, he was elected First Consul for life. But though he desired the credit of making peace, so as to enable him to establish his authority over France, when that end was secured he became again eager for war, with a view to further extension of his power. He also desired to humble England, a desire that led to the rupture of the peace of Amiens in 1803. The immediate causes of this rupture were his aggressions in Holland, in the Cisalpine Republic, in Genoa, and Piedmont, and his monstrous demand that England should suppress every print that dared to criticise his actions, and drive all French refugees from her shores. Having thus forced England to resume hostilities, he made vast preparations for her invasion, at the same time taking the first step towards establishing his ascendancy in Germany by seizing Hanover. The assumption of the crown soon followed, Napoleon preparing the way with consummate cunning. He rid himself of Moreau, his most dangerous rival, by accusing him of conspiring with the royalists, into whom he then struck terror by the execution of the Duc d'Enghien. He thus succeeded in inspiring even republicans with the conviction that the best way of preventing the inauguration of a new reign of terror was by confirming his position. He chose the title of emperor as least obnoxious to the republican feeling of the army, and the change was made by a decree of the senate of the 18th May 1804.

Preparations for the invasion of England had been steadily proceeding, but Napoleon's aggressive

demeanour after becoming emperor alarmed the European cabinets, so that Pitt was able to revive the coalition, and in 1805 Napoleon found himself at war with Russia and Austria, as well as with England. Forced by England's naval supremacy to abandon the notion of invasion, he suddenly changed front in August 1805, and led his armies through Hanover and the smaller German states, disregarding the neutrality even of Prussia herself, and reached the Danube in rear of the Austrian army under Mack, which was at Ulm. The surprise was complete; Mack surrendered on the 19th October, and Napoleon then marched on Vienna, which he entered on the 13th November. But his position was critical. The Archduke Charles was approaching from Hungary, a Russian army was entering Moravia, and Prussia, incensed at the violation of her territory, undertook to put 180,000 men in the field if her terms were refused. A short delay would have surrounded Napoleon with his enemies, but the tsar was impatient, and the Russian army, with a small contingent of Austrians, encountered Napoleon at Austerlitz, 2d December 1805, and was signally defeated. This caused the break-up of the coalition; the Holy Roman Empire came to an end, the Confederation of the Rhine was formed under French protection, and the Napoleonic empire was firmly established. Napoleon then entered into negotiations for peace with Russia and England, endeavouring to conciliate those powers at the expense of Prussia. The negotiations failed, but Prussia was mortally offended, and mobilised her army in August 1806, about which time Russia finally rejected the treaty with France. Napoleon acted with his usual promptitude, and advanced against Prussia before she could get help either from England or Russia. Although the rank and file of the Prussian armies was good, their generals were antiquated, and Napoleon crushed them at Jena and Auerstädt on the 14th October, and entered Berlin on the 27th. He had then to carry on a stubbornly-contested campaign with Russia. An indecisive battle at Eylau was followed by a hardly-earned French victory at Friedland, 14th June 1807, and the peace of Tilsit ensued, by which Prussia lost half her territory, and had to submit to various humiliating conditions, while Russia escaped easily, and indeed got a share of the spoils.

Napoleon was now at the zenith of his power; he was the arbiter of Europe and the paramount head of a confederation of princes, among whom the members of his own family occupied several thrones. To reward his partisans he at this time created a new noblesse, and lavished upon them the public money. Full of inveterate hostility to England, Napoleon endeavoured to cripple her by the so-called Continental System (q.v.), by which all the states under his influence engaged to close their ports to English ships, and he also tried to combine all the European navies against her; but England, perceiving his aim, took the initiative and herself seized the Danish fleet. The emperor also turned his eyes to the Peninsula, where the dissolute conduct of the Queen of Spain and the intrigues of 'the Prince of the Peace' (see *ALCUDIA*) gave him an opportunity. He sent an army under Junot to Portugal, and another to Spain, which, under Murat, took Madrid. Napoleon then procured the abdication of the king of Spain and placed his brother Joseph on the vacant throne. But he did not foresee the consequences. The spirit of the nation was roused, and a formidable insurrection broke out, while a British army, under Sir Arthur Wellesley, landed in Portugal, defeated Junot at Vimeiro, and forced him to sign the Convention of Cintra, evacuating Portugal. So began the Peninsular War (q.v.) which for the future was to paralyse half Napoleon's strength.

In Germany also a spirit of revolt against his tyranny was rising, Austria at first taking the lead, and this brought on the war of 1809 against that power. Prussia, already beginning to recover her strength under the military system of Scharnhorst and Stein (see SCHARNHORST, STEIN), was hostile to Napoleon in sentiment, but was kept down by the pressure of Russia. Napoleon declared war on the pretext that Austria was arming, and marching through Bavaria drove the Austrians out of Ratisbon, and entered Vienna on the 13th May. Eugène Beauharnais, at the head of the Army of Italy, drove the Austrians before him into Hungary, defeated them at Raab, and joined Napoleon. The emperor then tried to cross the Danube, but was checked at Aspern and obliged to retire to the island of Lobau. Five weeks of preparation then followed, the peasant war under Hofer being carried on in Tyrol, and then Napoleon made a fresh and successful attempt to cross the Danube, and won the battle of Wagram on the 5th and 6th July. This was followed by the armistice of Znaim and the treaty of Schönbrunn, October 20, 1809, by which he obtained a heavy indemnity in money and considerable accession of territory in Carniola, Carinthia, Croatia, and Galicia. But he mortally offended the tsar by giving a large portion of the ceded territory of Galicia to the duchy of Warsaw—i.e. to Poland.

On the 16th December 1809 Napoleon, desirous of an heir, divorced Joséphine, who was childless, and married on the 1st April 1810 the Archduchess Maria Louisa of Austria. He had no doubt the wish also to get a footing in the circle of the legitimate reigning families of Europe. A son, to whom the title of King of Rome was given, was born on March 20, 1811.

Still bent on the humiliation of England, Napoleon now tried to effect his purpose by increasing the stringency of the Continental System, but this ended in bringing him into conflict with Russia. He first annexed the kingdoms of Holland and Westphalia, to give him command of their seaboard, and then prohibited English trade even when carried in neutral bottoms. The tsar, already estranged by Napoleon's alliance with Austria and his conduct as regards Poland, refused to adopt this policy, and the relations between them gradually became so strained that war was inevitable, and Napoleon took the momentous resolve to invade Russia. With Maria Louisa, he arrived at Dresden on the 16th May 1812, and was there greeted by the emperor of Austria, the king of Prussia, and other sovereigns. His army for this gigantic enterprise numbered about 600,000, including French, Germans, and Italians. He crossed the Niemen on the 24th June, reaching Vilna, which was evacuated by the Russians, on the 28th; and he remained at Vilna till the 16th July, hesitating to take the final resolution to invade the heart of Russia. He made overtures for peace to the tsar, who refused to treat as long as an enemy remained on Russian soil. Foiled here Napoleon at last decided to go on with his enterprise; so he advanced, and at first the Russians were in no condition to meet him, their forces being scattered. If Napoleon could have advanced rapidly to Smolensk, he might have cut the Russian forces in two, but his vast host appears to have been unmanageable. Barclay de Tolly and Bagration succeeded in uniting at Smolensk, but were driven from it on the 18th August after an obstinate defence. At Smolensk Napoleon again hesitated as to whether he should go into winter-quarters, but eventually decided to press on to Moscow, trusting to the moral effect of the fall of the ancient capital. It seems as if, while his superstitious belief in his star still remained, bodily ailments had caused a

deterioration in his power of rapid decision and in his energy of action. Meanwhile, great discontent had been caused in Russia by the continued retreat of the armies. Kutusoff was appointed to the chief command, and stood to fight at Borodino on September 6. Napoleon won the battle, but with unwonted and misplaced caution refused to engage his Guard, and the victory was almost fruitless.

He entered Moscow on the 14th September, and fire broke out the next night, the first effect of which was still further to alarm the Russians, who believed it to be the work of the French. The fire raged fiercely till the 20th, and a great part of the city was burned to the ground. Had the victory of Borodino been more decisive the tsar might now have yielded; but as it was he listened to the advice of Stein and Sir R. Wilson and refused to treat, thus putting Napoleon in a dilemma. His plans were always made on the basis of immediate success, and the course to be adopted in case of failure was not considered. Again he hesitated, with the result that when at last he resolved to retire from Moscow the winter, coming earlier than usual, upset his calculations, and the miseries of that terrible retreat followed. He left Moscow on the 18th October, and, reaching the Beresina with but 12,000 men, was joined there by Oudinot and Victor, who had been holding the line of the Dwina, with 18,000. His passage of the river was opposed, but he succeeded in crossing, and on the 6th December the miserable remnant of the Grand Army reached Vilna. Macdonald, Reynier, and Schwarzenberg, with 100,000 men, on the Polish frontier and in the Baltic provinces, were safe, but this was the whole available remnant of the 600,000 with which the campaign commenced. It might have been expected that Napoleon would now be anxious for peace, but his haughty spirit could not brook any diminution of his prestige, and, determining to try and efface the past with fresh triumphs, he returned to Paris to raise new levies. The tsar fully understood that no half-measures would be of any avail, but that he must follow up what had been begun and carry the war into Germany the next year, rousing the Germans to his aid. On the 30th December 1812 York, commander of the Prussian auxiliaries, on his own authority concluded a convention with the Russians, and declared his corps meanwhile neutral. Prussia entered an alliance with Russia on 26th February 1813, and declared war on France (13th March). Saxony, long disaffected, did not actually join the allies till 18th October, as the king had not dared to desert Napoleon. Austria and the middle states still clung to Napoleon.

Napoleon left Paris for Mainz on the 15th April 1813, his object being Dresden, which was held by the tsar and the king of Prussia. Eugène Beauharnais was on the Lower Saale with 70,000 men, and Napoleon, with 150,000 men, well officered, though raw and short of cavalry, moved to meet him by way of Erfurt. Davout was holding down insurrection in north Germany with 30,000. The allies at first had only 100,000 available, the process of calling out and drilling the people being slow. Napoleon moved on Leipzig, and won the battle of Lützen on the 2d May, which restored Dresden to the king of Saxony. He then followed the allies, beat them, though with heavy loss, at Bautzen on the 20th and 21st May, and forced them to retire into Silesia. The armistice of Poischwitz, signed on the 4th of June, closed the first period of the campaign. Austria then asked for certain concessions, which if Napoleon had granted he might have checkmated the coalition of Prussia and Russia; but he seems to have been unable to bring himself to accede,

and contemplated rather war with Prussia, Russia, and Austria combined, to say nothing of England, which was still carrying on the war in the Peninsula. A treaty was signed at Reichenbach on the 14th June, by which Austria engaged as mediating power to offer conditions of peace to Napoleon and to declare war on him in case of refusal. The conditions offered were that he should withdraw from north-west Germany, dissolve the duchy of Warsaw, and cede Illyria. These terms were very moderate, but Napoleon seems to have thought his position insecure without fresh success in war, and procrastinated. An ultimatum was delivered to him on August 8th to which he paid no attention; so on the night of the 10th to 11th August the armistice was declared at an end, and the drama swept rapidly to its crisis.

Napoleon had now 400,000 men along the Elbe from Bohemia to its mouth, but his position was weakened by the adhesion of Austria to the coalition, as she massed her troops in Bohemia, threatening Dresden and his communications. The allies had nearly 500,000 men in three armies, the Austrian under Schwarzenberg in Bohemia, the old Prusso-Russian under Blücher in Silesia, and the bulk of the Prussian force under Bernadotte in Brandenburg. The French armies were discouraged, and the allies enthusiastic; but the latter had difficulties to contend with from their heterogeneous composition and diversity of interests. The campaign opened with varying fortune. A blow at Berlin was parried by Bülow at Gross-Beeren on August 23. Napoleon himself forced Blücher back to the Katzbach, but had to retire again to defend Dresden from the Austrians; and his lieutenant Macdonald was defeated in the battle of the Katzbach on the 26th August. Napoleon inflicted a crushing defeat on the Austrians before Dresden on the 27th, but, while preparing to cut off their retreat, was disturbed by the news of Gross-Beeren and the Katzbach and by sudden illness, and at Kulm lost Vandamme with 20,000 men. September was spent in fruitless marches, now into Bohemia, now into Silesia, and towards the end of the month the allies began their converging march on their preconceived rendezvous at Leipzig. At the same time the Confederation of the Rhine began to dissolve. The kingdom of Westphalia was upset on the 1st October, and on the 8th Bavaria joined Austria. The toils were closing round Napoleon, and between the 14th and 19th October he was crushed in that battle of the Titans at Leipzig, and, brushing aside the Bavarians who tried to stop him at Hanau, on the 1st November led back the remnant of his army, some 70,000 strong, across the Rhine at Mainz.

The allies now made overtures for peace on the basis of natural frontiers, which would have left France the fruits of the first Revolution—viz. Belgium, the left bank of the Rhine, Savoy, and Nice; but Napoleon could not be content with such curtailment of his power. Evading at first the proposal, he would have accepted it, but with suspicious qualifications, when too late. The invasion of France followed. The allies issued on the 1st December a manifesto saying they were waging war against Napoleon alone, and advanced with three separate armies. Schwarzenberg led the Austrians through Switzerland, Blücher crossed the Middle Rhine towards Nancy, while the northern army passed through Holland. Napoleon had yet hopes of success on account of the forces he still had in the German fortresses, the mutual jealousies of the allies, his connection with the emperor of Austria, and the patriotism which would be aroused in France by invasion. But the allies gave him no time to utilise these influences, and Paris was not fortified. Napoleon carried on a

campaign full of genius, gaining what advantage he could from the separation of his enemies. He attacked Blücher and won four battles in four days at Champaubert (February 10, 1814), Montmirail (11th), Château-Thierry (12th), and Vauchamps (13th). These successes would have enabled him to make a reasonable peace, but his personal position forbade this, and he tried subterfuge and delay. The allies, however, were not to be trifled with, and in the beginning of March signed the treaty of Chaumont, which bound them each to keep 150,000 men on foot for twenty years. The battles of Craonne and Laon followed, in which Napoleon held his own, but saw his resources dwindle. On the 18th March the conferences at Chatillon came to an end, and on the 24th the allies determined to march on Paris. Marmont and Mortier, with less than 30,000 men, could make no head against them, while Napoleon himself tried a fruitless diversion against their communications. Joseph Bonaparte withdrew Maria Louisa and the king of Rome to Tours. On the 30th March the allies attacked Paris on three sides, and in the afternoon the French marshals offered to capitulate. Napoleon, when he learned the real state of affairs, hurried up in rear of the allies, but was too late, and had to fall back to Fontainebleau. His position was desperate, and to add to his difficulties Wellington, whose career of success had gradually cleared the French out of the Peninsula, had now led his victorious army across the Pyrenees into France itself.

Napoleon therefore at first offered to abdicate in favour of his son, but, when he found that would not be sufficient, he signed an unconditional abdication on the 11th April 1814. He was given the sovereignty of the island of Elba, and the Bourbons in the person of Louis XVIII. were restored to the throne of France. But the condition of affairs was very precarious. The return of the Bourbons was most unpopular. It indeed restored the parliament, but it unsettled the position of public men and the title to estates. The army was disgusted at the appointment to commands of emigrés who had fought against France. The church began to cause alarm to the holders of national property; and by the release of prisoners and the return of the garrisons of German fortresses very large numbers of Napoleonic soldiers became dispersed over France. The coalition, too, broke up, and fresh alliances began to be sought with a view to check the aggressive spirit which Russia seemed inclined to manifest. Altogether affairs in Europe and France were in such a state as to make it not impossible that the magic of Napoleon's name might replace him in power. He accordingly resolved on making the attempt, left Elba on February 26, 1815, and landed on the French coast on the 1st March. On the 20th he entered Paris, having been joined by the army. He had the advantage of being able to appear as the liberator of France from the yoke put upon her by foreigners, but he could only re-establish his position in the face of the rest of Europe by war, and he was not quite the Napoleon of old, for his physical powers had declined, he had become stout, and had attacks of illness, sleepiness, and indolence. He had been epileptic from his youth. His mind and genius were unimpaired, and his conception of the Waterloo campaign was clear and brilliant as of yore, but the execution failed.

Europe had declared war against him, and a new coalition had been formed, but only two armies were immediately ready to take the field; a mixed force under the Duke of Wellington in Belgium, and a Prussian army under Blücher in the Rhine provinces. The English army had its base on the sea, and the Prussian on the Rhine, so that they

had diverging lines of operation. Napoleon's idea was to strike suddenly at their point of junction before they could concentrate, push in between them, drive them apart, and then defeat each separately. The plan was unexceptionable, resembling that of his first campaign in 1796, and the opening moves were successfully carried out. Napoleon left Paris on the 12th June, his army being then écheloned between Paris and the Belgian frontier, so that the point where the blow would fall was still doubtful. On the 15th he occupied Charleroi, and was between the two allied armies, and on the 16th he defeated Blücher at Ligny before Wellington could come to his assistance. So far all had gone well with him; but now apparently his energy was not sufficient to cope rapidly with the difficulties that no doubt beset him through the shortcomings of his staff, and the spirit of mutual distrust that reigned among his officers. He did nothing till the morning of the 17th, and it was not till 2 P.M. that he sent Grouchy with 33,000 men to follow the Prussians in the supposed direction of their retreat towards Liège, and keep them at a distance whilst he turned against Wellington. But he had lost his opportunity; the wasted hours had enabled the Prussians to disappear, and he did not know the fact that Blücher had taken the resolution to move on Wavre, giving up his own communications in order to reunite with Wellington. The latter had retired to a previously-chosen position at Mont St Jean, and received Blücher's promise to lead his army to his assistance. So on the 18th, when Napoleon attacked the Duke, unknown to him the bulk of the Prussian army was hastening up on his right flank while Grouchy was fruitlessly engaged with the Prussian rear-guard only. This led to the crowning defeat of Waterloo, where Napoleon's fortunes were finally wrecked. He fled to Paris, and abdicated for the last time on 22d June; and, finding it impossible to escape from France, he surrendered to Captain Maitland of the *Bellerophon* at Rochefort on the 15th July. He was banished by the British government to St Helena, where he arrived on the 15th October 1815, and died there of cancer of the stomach on the 5th May 1821.

The literature referring to Napoleon may be divided into three categories: First, books dealing with his military and political career by writers contemporary with him or nearly so, such as Thiers' *Histoire du Consulat et de l'Empire*; Jomini's *Vie politique et militaire de Napoléon* (Eng. trans. 1885); Montholon and Gourgaud's *Mémoires pour servir à l'Histoire de France sous Napoléon*; and the memoirs of his generals, such as Marmont, Masséna, and Suchet. Secondly, books touching his private life by contemporaries, such as Bourrienne's *Mémoires of Napoleon Bonaparte*; Las Cases' *Journal of Private Life and Conversations of Napoleon at St Helena*; Forsyth's *History of the Captivity of Napoleon at St Helena, from Letters and Journals of Sir Hudson Lowe*; O'Meara's *Napoleon at St Helena*. In contrast to these two classes, both inevitably one-sided, are works written in a more critical spirit, such as those by Lanfrey, Jung, Guillois, Masson, Fournier, in France, with the relevant part of Taine, and those by Seeley, O'Connor Morris (1893), Lord Wolseley (1895), W. M. Sloane (1896-97), Lord Rosebery (1900), Fisher (1903), Hudson (1915), and specially the *Life of Napoleon* (2 vols. 1902; 4th ed. 1904) and other books by J. Holland Rose. See also BONAPARTE, CODE NAPOLEON, FRANCE, JOSÉPHINE, WATERLOO, WELLINGTON, PARIS.

Napoleon II., king of Rome (1811-32), was the son of Napoleon I. and Maria Louisa (q.v.).

Napoleon III., by name CHARLES LOUIS NAPOLEON BONAPARTE, the second emperor of the French, was born at Paris on the 20th of April 1808. His father was Louis Bonaparte, king of Holland, brother of the first emperor, and his mother Hortense Beauharnais, Napoleon I.'s stepdaughter (see BONAPARTE). Louis Napoleon and

his elder brothers were heirs-presumptive to the imperial throne till the birth of a son to the emperor cast them into a secondary position, whence Louis Napoleon, the only survivor, was drawn in 1832, at the death of Napoleon's only son, to become head of the House of Napoleon. That house, astoundingly risen from the nursery of a Corsican lawyer's wife to imperial and royal thrones, thrust back into private life after a complete mastery in Europe, was again raised to imperial dignity in the person of Napoleon III., only to return to obscurity in the midst of appalling disasters; and it failed to present one of the most truly tragic dramas of all time through the want of real grandeur in both Napoleons and in almost all their blood. Had the nephew been born a scion of the Bourbon house, the part of Louis-Philippe might have been his. But brought up by his mother from the year 1815, precluded by exile and imprisonment till he was far advanced in the years of manhood from learning practical politics, he became a theorist in statecraft and a brooder on the Napoleonic legend which was his only claim to the attention of the nation. He received his early education at his mother's residence, the castle of Arenenberg, in Switzerland, on the borders of the Lake of Constance. Sent to the gymnasium at Augsburg, he not only acquired there, as well as from the prolonged German surroundings of his private life, a marked German accent, but also developed those features in his individual character which were most akin to the sluggishness of his temperament—uncertainty and indefiniteness of thought, philosophic dreaminess laming every conviction, ambition touched with fatalism firing a morally indifferent soul.

Switzerland was the real foster-mother of the brighter and healthier side of his nature. Had he been practical and a man of rectitude, he could have extracted from his political and social experience of that country principles sufficiently clear and wise to prove themselves the palladium of his later reign. There he developed his aptitude for military science: he followed the courses of instruction given to the Swiss militia officers. Fairly competent in artillery, in engineering, in the exact sciences, in history, and in athletic exercises, he wrote and published at Zurich (1836) a *Manuel d'Artillerie*. He hastened with his elder brother Louis into Italy in 1830 to assist the province of Romagna in its revolt against pontifical rule, an expedition in which Louis perished of fever, and he was himself severely stricken, but was nursed out of danger by his tender mother. This expedition, though proving that he could act with energy in the discharge of Bonapartist responsibility, was a mere episode in that Swiss period of his life, extending from 1824 to 1836, in which he was exclusively a student and a writer. When at the death of the Duke of Reichstadt he became the head of that rootless growth, the Napoleonic dynasty, he sought as a pretender to lean less on any concrete historical claim to the throne of France than on the partiality of the French to a vainglorious rule, and on the intellectual interest with which he, as a man of letters, could invest the so-called Napoleonic ideas. For sixteen years he sued for the hand of France and the attention of the world, interrupting twice the method of literary courtship to make personal raids upon the kingdom of Louis-Philippe. He had indeed a fair chance. Outside of France, nationalities whose emancipation had been planned by Napoleon I., such as Poland, looked to him to effect their long-deferred liberty (1831). In France he was an outlaw, because a formidable rival to Legitimacy; in the struggle between the junior branch of the Bourbon dynasty and the forces at work since the

Revolution, the Bonapartists had a permanent power of intervention and might enlist as their own partisans the masses of Frenchmen who were lukewarm politicians. Moreover, Napoleon I.'s utter failure as an international politician had in no wise shaken the organisation he had given to France; his home legislation had become part and parcel of the nation; French law, French public education, French military institutions, the joint restoration of state and church stood forth as his lasting work.

Almost a stranger to France in nurture of thought and tone of mind, an adventurer rather than a pretender, a philosopher rather than a man of action, taciturn, speculative, driven from within by a set motive rooted in a fixed idea, absorbed with German mysticism and Italian wiliness in a career so fateful to his mind that moral briding could not avail at its turning-point, a philanthropist in some of his dreams, an idealist in some of his deeds, the heir of the French Cæsar drifted to his destiny, not without some vigour and brightness, a victim to the alleged mission of his race, to which he was enslaved as by hypnotic suggestion. He published in 1832-36 his *Réveries politiques, Projet de Constitution, and Considérations politiques et Militaires sur la Suisse*. In 1836, speculating on the instability of Louis-Philippe's throne, the disaffection of some of the middle classes, the general favour of his semi-socialistic theories with the advanced parties, and the unspent prestige of Napoleon I., he put his chances to a premature test by appearing among the military at Strasburg, hoping to bribe them into his service by the prospect of their resuming the paramount position which soldiers could not but occupy in a Napoleonic state. The rash young man was easily overpowered and conveyed to America, without being brought to trial. Being under no pledge to stay in America, Louis Napoleon returned to Europe on hearing of his mother's illness. He found her dying; two months later he received her last sighs (3d October 1837). Although the affair of Strasburg had naturally enough caused many people to doubt the talent and the judgment of Louis Napoleon, still Louis-Philippe, who was politically an extremely timid monarch, dreaded some new conspiracy; the French government demanded of Switzerland the expulsion of the obnoxious prince, M. Molé actually enjoining the French ambassador to demand his passports, in case of a refusal. Switzerland had neither the right nor the wish to expel, and was on the point of going to war for the distinguished refugee (who was, in fact, a Swiss citizen) when he resolved to prevent a rupture by leaving his adopted country. He now proceeded to England, and settled in London. With certain members of the British aristocracy he came to live on a footing of considerable intimacy, and he was also an object of languid wonder and interest to the community generally, but he impressed nobody with a belief in his future and his genius; nay, Englishmen erred so far as to suppose that the 'silent man' was merely 'dull.' In 1838 he published in London his *Idées Napoléoniennes*, which, read in the light of subsequent events, are very significant. Europe generally regarded them as idle dreams; but in France the book went through numerous editions. In 1839 Louis Napoleon was in Scotland, and took part in the celebrated Eglinton tournament. Next year (1840) he made his second attempt on the throne of France at Boulogne. It was as grotesque a failure as the one at Strasburg. Captured on the shore, while endeavouring to make his escape to the vessel that had brought him from England, Louis Napoleon was now brought to trial, and condemned to perpetual imprisonment in the fortress of Ham. Here he continued his Bonapartist

propaganda by writing *Aux Mânes de l'Empereur, Fragments Historiques, Analyse de la Question de la Suisse, Réponse à M. de Lamartine, Extinction du Paupérisme, &c.*; and actually took part in editing the *Dictionnaire de la Conversation*, a valuable French encyclopædia. After an imprisonment of more than five years, spent in patient meditation, he made his escape (25th May 1846), by the help of Dr Conneau, in the disguise of a workman, and gained the Belgian frontier, whence he returned to England.

The revolution of February (1848) was a victory of the working-men to whom some of his political theories were especially addressed; he hurried back to France as a virtual nominee of the *Fourth Estate*, or working-classes in town and country—an embarrassing position, from the obligations of which the smashing up of the Parisian socialists by the forces of General Cavaignac released the future emperor. Being elected deputy for Paris and three other departments, he took his seat in the Constituent Assembly, 13th June 1848. On the 15th he resigned his seat and left France. Recalled in the following September by a quintuple election, he once more appeared in the Assembly and commenced his candidature for the presidency. The direct election of the head of the state by the people, intended as a republican institution, proved itself to be a stepping-stone to Cæsarism, as Louis Napoleon's peculiar conception of a modern imperial democracy is called; in the constitutional history of the second empire such appeals to universal suffrage bear the name of *plébiscites*. Out of seven and a half million of votes 5,562,834 were recorded for Prince Louis Napoleon; General Cavaignac, his genuine republican competitor, obtaining only 1,469,166.

On the 20th December he took the oath of allegiance to the Republic. For a few days concord seemed established between the different political parties in the Assembly; but the beginning of the year 1849 witnessed the commencement of a series of struggles between the president and his friends on the one side and the majority of the Assembly on the other—the latter being justly penetrated with the conviction that Louis Napoleon was not devoted to the interests of the Republic, but to his own. He became practically a traitor to his republican oath when, in league with monarchical Austria and the king of Naples, he put down the republican movement in Rome. Then he committed the command of the army to hands devoted to him, he established his personal supporters in posts of honour and influence, he gained by frequent visits the favour of the provincial towns, and by acts of liberality and clemency kept that of the people. He paraded as a protector of popular rights and of national prosperity, laying to the door of the Assembly the deficiencies in his government. Resolved to transform his tenure of power by periodical election into a life-long one, he was hampered by the National Assembly; and, with the example of his uncle's *coup d'état* (18th Brumaire 1799) before him, he deliberately threw off the mask of a constitutional president, forswore his formal oath, and became a traitor to all society. From that moment a perpetual misunderstanding, badly cloaked by material prosperity and military glory, underlay Napoleon's relation to the French and to Europe generally. His methods of government belonged to no acknowledged régime.

He whom Victor Hugo satirically called Napoleon-le-Petit fatuously chose the anniversary of the battle of Austerlitz and of Napoleon I.'s coronation to rid himself by arms of the National Assembly, to make himself absolute ruler with the help of the military, and to muzzle all parliamentary opposition (2d December 1851). Imprison-

ment, banishment, deportation, the bloody repression of popular rebellion marked this black day's work, in which the president was assisted by Morny, Maupas, and St Arnaud. France, whether wearied of the incompetent Democrats, or (as Kinglake supposes) 'cowed' by the terrible audacity of the president, appeared to acquiesce in his act; for when the vote was taken upon it on the 20th and 21st of the same month, he was re-elected for ten years, with all the powers he demanded, by more than 7,000,000 suffrages. The imperial title was assumed exactly a year after the *coup d'état*, in accordance with another plebiscitary expression of the people's will.

An unlawful empire was now legally established. Men of astuteness and mediocrity took the helm of the state. The parliamentary trappings of the first empire were brought out. Resting on such artificial props as the army and police, Napoleon III. boasted that he was the upholder of law and order. Political parties were either demoralised or broken. He gagged the press, awed the *bourgeoisie*, and courted the clergy to win the peasantry. Liberals accepted him for fear of the Socialists; the Socialists applauded his plunder of the Orleans family; his duly-rewarded parasitic supporters, such as Jean Fialin, made Vicomte de Persigny, clung to him as to the fount of all honour and profit; foreign monarchies accepted him as a welcome ally in the struggle against liberalism. But unlike his uncle he did not seek matrimonial alliance with the old royal houses. He liked to profess himself the Cæsar of the people, and led to the altar Eugénie de Montijo (1826-1920), a Spanish countess of ordinary blue blood. He sought to gain international acceptance for the just, but in his mouth sophistical, doctrine as to the right of peoples to choose their own masters, availing himself of it in the annexation of Savoy and Nice to France, in his Mexican intervention, and in his handling of the Italian question. At home he kept the people well in hand by an active economic policy. The price of bread was regulated, public works occupied and enriched the workingmen in towns, while others were undertaken to protect and enhance in value the property of the peasantry. The complete remodelling of Paris under the direction of Baron Haussmann raised considerably the value of house-property, and by the opening of a network of thoroughfares suitable for the manœuvres of artillery and cavalry reduced to a minimum the risk arising from insurrectionary movements. The holding of international exhibitions and the signing of treaties of commerce with foreign states acted as a further inducement to internal peace; but the formation of unscrupulous financial, court, and clergy cliques was an ugly blot on this picture of a purely material prosperity.

To the blandishments of work and wealth at home Napoleon III. added the charm of a brilliant foreign policy. We need not dwell on the Crimean war, the campaign in Lombardy against Austria, to which Napoleon was somewhat paradoxically encouraged by the murderous attack of Orsini on his person, the expeditions to Mexico and to China. In all those undertakings Napoleon enjoyed the support if not always the actual co-operation of Great Britain. To Prussia his relations were of a very different kind, a mixture of jealousy and patronage which boded ill for France in the event of an actual conflict.

At the death of Morny in 1865 the soothing effect of Napoleon's measures and also his power to control the nation were well-nigh spent. Again the spirit of France stirred abroad. Napoleon's book, *La Vie de Cæsar*, which he wrote to extol his own methods of government under the guise of honouring Cæsar, met with loud protests. Forewarned,

Napoleon reorganised his army, set himself up more proudly as an arbiter in Europe in order to flatter his subjects, and took a more conciliatory attitude to liberalism. His concessions at home were taken advantage of to set up a regular journalistic and parliamentary opposition. In 1869 the Liberal deputy Ollivier was granted a personal interview that he might explain to the emperor the wishes of the people, and Rouher, Napoleon's prime-minister, an advocate of absolutism, was dismissed from office. New men were called into power with Ollivier to liberalise the constitution. Some wrong-headed Bonapartists suggested another *coup d'état* against the Legislative Assembly, now leavened with opposition. Napoleon was firm enough to resist such nefarious counsels, and appears to have been fairly sincere in his latter-day liberalism. That it was not yet too late to stem the tide of discontent was shown by the result of another plebiscite (the fourth), by which Napoleon's new parliamentary scheme was sanctioned by 7½ million votes (8th May 1870). But burdened as he was by a new policy at home, by financial embarrassments and worries in his own family, in ignorance of the corruption that existed in his ministry of war, he sought in foreign affairs a diversion to his troubles, and thus brought himself all of a sudden to the edge of the abyss. For the Franco-German war, see FRANCE.

Napoleon III. surrendered himself a prisoner at Sedan in September. Till the conclusion of peace he was confined at Wilhelmshöhe. In March 1871 he joined the empress at Chislehurst, Kent, and resided there till his death on 9th January 1873.—His son, Eugène Louis Jean Joseph, Prince Imperial of France, was born 16th March 1856. He was in the field with his father in 1870, but after the fall of Sedan escaped to England, where he entered the Woolwich Military Academy, and in 1875 completed with distinction a regular course of study. Volunteering to serve with the English artillery in the Zulu campaign of 1879, he was killed on 1st June, when reconnoitring, by a party of Zulus in ambush.

See the apologetic *Life* by Blanchard Jerrold (3 vols. 1874-77), and that by Archibald Forbes (1898); Delord, *Histoire du Second Empire* (6 vols. Paris, 1869-75); Simpson, *Die Beziehungen Napoleon III. zu Preussen* (1882); C. E. de Maupas, *Story of the Coup d'État* (Eng. trans. 2 vols. 1884); Hugo's *Hist. d'un Crime* (1877); books by F. A. Simpson (1923, 1925); Ollivier's *L'Empire Libéral* (1894 et seq.); books on his Empress and Court by Edward Legge (1910-12); and Filon's *Le Prince Impérial* (1912).

Napoleon, PRINCE. See BONAPARTE.

Napoleon. See LOUIS D'OR.

Napoleon, a round game at cards. Five cards are dealt to each player. Each in turn declares the number of tricks he will stand for, or whether he will pass. When a declaration is made subsequent players must stand for more tricks or pass. If *Nap* (all five tricks) is declared, no further declaration is made. The stand-hand leads; the card he first leads makes the trump suit. If the stand-hand wins the number of tricks he stood for, he receives so much for each trick from each of the other players. If he fails he similarly has to pay all round. If *Nap* is declared and won, the stand-hand receives ten (or twelve) all round; if lost, he only pays five (or six). Sometimes this rule applies to four tricks, when *Nap* receives triple and only pays single.

Napoleona (once called *Belvisia*), a tropical African genus of myrtaceous (or lecythidaceous) plants, of which *N. imperialis* is a small tree with showy red, white, or blue flowers, and a fruit resembling a pomegranate.

Narbada. See NERBUDDA.

Narbonne, a town in the French department of Aude, on the La Robine branch of the Canal du Midi, 8 miles from the Mediterranean and 93 by rail ESE. of Toulouse. The removal since 1865 of the fortifications has been an improvement, but the place remains dirty and unattractive, with only three noteworthy buildings. These are the Romanesque church of St Paul (1229); the quondam cathedral of St Just (1272-1332), only the fine Gothic choir of which, 131 feet high, has been completed; and the former archbishop's palace, now the hôtel-de-ville, in one of whose three old towers Louis XIII. in 1642 signed the order to arrest Cinq Mars, and in which are a good museum, a library, and a picture-gallery. The white heather-honey of Narbonne maintains its ancient celebrity; the wine is chiefly used for blending purposes. Pop. (1921) 28,956. Narbonne is the *Narbo Martius* of the Romans, their earliest colony (118 B.C.) beyond the Alps; and, situated on the high-road to Spain and the basin of the Garonne, was a place of great commercial importance. Under Tiberius it flourished greatly, its schools for a long time rivalling those of Rome. About 309 A.D. it became the capital of *Gallia Narbonensis*, and had its capitol, forum, theatre, aqueducts, triumphal arches, &c. In 412 it was taken by the Visigoths, in 719 by the Saracens, from whom it was recovered by Pepin in 759, to fall just a century later to the Northmen. During the 11th and 12th centuries it was a prosperous manufacturing city, but subsequently it decayed. Varro was a native.

Narcissus, according to a Greek fable, was the son of the river god Cephissus and of the nymph Liriope or Lirioessa of Thespiæ, in Boeotia. He was a youth of extraordinary beauty, of which he was excessively vain; and for this he was punished by Nemesis by being made to fall in love with himself on seeing the reflection of his own face in a fountain. He died of this love-sickness; and on the place where he died sprang up the flower which bears his name. The story of Narcissus, narrated by Ovid, is of comparatively late origin.

Narcissus, a genus of plants of the natural order Amaryllidaceæ, having a perianth of six equal petal-like segments, and a bell-shaped corona of various magnitude. The species are natives of the south of Europe, the north of Africa, and the temperate parts of Asia. The Common Daffodil is the only one which can be regarded as truly a native of Britain. Many are cultivated in gardens for the sake of their beautiful and often fragrant flowers, which in general appear early in the season. Some of them are known by the names of Daffodil (q.v.) and Jonquil (q.v.). The name narcissus is popularly restricted to those which have flat (not rush-like) leaves, and a short (not bell-shaped) corona. Of these one of the best known is the Poet's Narcissus (*N. poeticus*), with generally one-



Narcissus poeticus.

flowered scape, the flower white and fragrant, the corona with a deeply-coloured border; others

with one or two flowers on the scape are in common cultivation. The Polyanthus *Narcissus* (*N. Tazetta*) has a number of flowers on the scape. It grows wild in stony places near the Mediterranean and eastwards to China. Many varieties of it are in cultivation. It is grown not only in gardens and greenhouses, but in water-glasses, like the hyacinth. It is very common in gardens in India, where it is highly esteemed as a flower. Narcissi are propagated by seed or by offset bulbs. They succeed best in a rich light soil, and are largely grown in the Scilly Isles.

Narcotics (Gr. *narkē*, 'stupor') are remedies which produce stupor if the dose be increased beyond a certain point. Opium is the most important member of the group, and the type from which most descriptions of the action of this class of medicines have been drawn; but it includes substances of very various properties. Some, as alcohol, produce intoxication in lesser doses; some, as belladonna, delirium; most have a primary stimulating effect: in fact, almost every one presents some peculiarity in the way in which it affects the system, and no satisfactory general description of their minor effects is possible. Their power of inducing sleep has procured for them the names of Hypnotics and Soporifics; while many of them are termed Anodynes, from their possessing the property of alleviating pain. Next to opium, Henbane, Indian Hemp, and Chloral may be regarded as the most important narcotics. Numerous artificially-produced organic compounds have been introduced, such as paraldehyde, sulphonal, trional, veronal, as hypnotics; antipyrin, exalgin, phenacetin, aspirin, as anodynes, and these have taken a permanent place among useful remedies.

Narcotics are usually administered with the view either of inducing sleep or of alleviating pain or spasm. As, however, their action is much modified by a variety of circumstances—such as age, idiosyncrasy, and prolonged use—they should be administered with extreme caution, and, as a general rule, only under competent advice. The various patent medicines for children which are known as *Carminatives*, *Soothing Syrups*, &c., are apt to contain some form of opium, and are thus responsible for part of the mortality that occurs in early life, especially among the poorer classes. All the narcotics when taken in excess are poisonous (see POISONS).

Narcotine ($C_{22}H_{23}NO_7$) is one of the organic bases or alkaloids occurring in opium, in which it usually exists in the proportion of 6 or 8 per cent. It is nearly insoluble in water, but dissolves sparingly in alcohol, readily in chloroform and ether. Narcotine possesses very slight alkaline properties. When discovered (in 1803) it was supposed to be the stimulant principle of opium; but it possesses very little activity. It yields a great variety of compounds by decomposition, one being vanillin, the flavouring principle of vanilla.

Nard. See SPIKENARD.

Nardoo (*Marsilea quadrifolia*), a plant of the order Marsileæ (see WATER-FERNS), the only plant of that order which is used in any way by man. The natives of central Australia use the spore-cases for food in bad seasons, and the explorers Burke and Wills (q.v.) attempted to sustain life on them; but they have very little nourishment, and are hard to digest. (The seeds of *Sesbania aculeata*, a plant superficially of similar growth, are much used by the Queensland natives for food, and this probably gave rise to the legend about the nourishing qualities of nardoo). Nardoo grows in places occasionally covered with water;

vegetating whilst moisture abounds, and then exhibiting abundance of green clover-like foliage,



Nardoo (*Marsilea quadrifolia*).

but becoming soft and mucilaginous when moistened. The spore-cases, pounded with their contents, are made into cakes like flour.

Nariad (or *Nadiad*), a town of Bombay province, 29 miles SE. of Ahmadabad by rail. It does a great trade in tobacco and ghi, and has a government experimental farm. Pop. (1921) 31,939.

Narragansett Bay. See RHODE ISLAND.

Narses, a statesman and general, and almost the last stay of the old Roman empire in Italy, was born in Persian Armenia about 475 A.D., and being a eunuch was probably sold as a slave in childhood. From some menial office in the imperial household at Constantinople he rose to the post of keeper of the privy-purse to the Emperor Justinian. In 538 he was sent to Italy in command of a body of troops, professedly to act in concert with Belisarius (q.v.), but in reality, it is believed, with a secret commission to observe and to control that general. After some successes Narses, having disputes with Belisarius, assumed an independent authority; but his separate command was unfortunate, and he was recalled to Constantinople in 539. After some years, however, Belisarius was recalled, and Narses was appointed to the chief command in Italy. His conduct of that expedition extorted the admiration even of his enemies. Not having the command of a sufficient number of transports, he marched his army along the whole circuit of the shore of the Adriatic, and, while the enemy's fleet were still in possession of the sea, was enabled to encounter them at Taginæ (in the Apennines), where, after a desperate engagement, the Ostrogoths were totally defeated, and their king, Totila, slain. Narses took possession of Rome, and, after a series of successes both in Southern and Northern Italy, completely extinguished the Gothic power in that peninsula. Justinian appointed Narses prefect of Italy in 554. He fixed his court at Ravenna, and continued till the death of Justinian to administer the affairs of Italy with vigour and ability. But he was charged with avarice; and his exactions pressed so heavily on the exhausted resources of the population that on the death of Justinian the Romans complained to Justin of the exactions of Narses, and that emperor deprived him in 567 of his office. He is accused of thereafter intriguing with Alboin, king of the Lombards, for a new invasion of Italy; and he died at Rome about 573. See GOTHs, JUSTINIAN; and Hodgkin's *Italy and her Invaders*.

Narthex. See BASILICA.

Narva, an Esthonian town 80 miles WSW. of Petersburg, on the Narova, 10 miles from its mouth in the Gulf of Finland. The navigation of the Narova is impeded by a waterfall near Narva, 14 feet high, which is taken advantage of for driving cotton-mills, sawmills, &c. Pop. 27,000. Charles XII. (q.v.) won a great victory here in 1700.

Narváez, RAMÓN MARIA, general and statesman, was born at Loja, in Andalusia, 5th August 1800, and when very young served in the war of liberation against the French. In 1822, when a reactionary party took up arms to destroy the work of the revolution, Narváez ranged himself on the side of the liberals. The invasion of Spain by a French army in 1823 forced him to retire from active life until the death of Ferdinand VII. in 1832. In 1834 he maintained a hot struggle against the Carlists of the Basque Provinces, and in 1836 completely routed the Carlist leader, Gómez, near Arcos. He now became immensely popular, and was regarded as the rival of Espartero. In 1838 he cleared the district of La Mancha of brigands, and was appointed in 1840 captain-general of Old Castile. He took part in the insurrection against Espartero that broke out at Seville in 1840, but, that having failed, he was compelled to flee to France, where he was shortly after joined by Queen Christina (see MARIA CHRISTINA), and commenced these plots against the government of Espartero which in 1843 effected its overthrow. In 1844 he was appointed president of council, and created Duke of Valencia. His ministry was thoroughly reactionary, but was overthrown in 1846. He was four times in power before his death, 23d April 1868.

Narvik, a port in Norway, sheltered by the Lofoden Islands and open all the year, ships iron ore brought by railway (1900) from Gellivara in Sweden; pop. 5000.

Narwhal (*Monodon*), a genus of Cetacea, belonging to the Odontocetes or toothed whales (see WHALE); it is characterised by the presence in the adult male of a long spiral tusk, and by the early disappearance of the other teeth, and by other points of less importance. The tusks may represent canine teeth, and there are sometimes a pair of them present, lying side by side in the upper jaw; there is such a specimen in the Cambridge Museum. When there is only one tusk, it is the left; rarely the female has a tusk, so rarely, however, that there are only three instances



Narwhal (*Monodon monoceros*).

on record. There is only one species known, *M. monoceros*, which inhabits the northern seas, and has been on one or two occasions stranded on British shores; it was first recorded in Britain by Vulpinus from the Isle of May in 1648; another was observed in 1800 near Boston in Lincolnshire.

It is common off the shores of Greenland, and is hunted for its oil as well as ivory; as the creature is gregarious, sometimes travelling in herds 'of many thousands,' it is captured in considerable abundance. In early times the tusk of the narwhal was valued in medicine, and to this day is so used by the Chinese. The ivory is very fine, and in the castle of Rosenborg at Copenhagen is a throne of the kings of Denmark made of this substance. The female narwhal is more spotted than the male, and the young darker. The fact that the female has not the tusk seems to negative the view that it is of use in spearing fish; it is no doubt used by the males for fighting—for examples are seldom unbroken. Fabricius thought that their use was to break and keep open holes in the ice during the winter, and observers have seen such breathing-holes crowded with heads of narwhal and other whales.

Naseby, a Northamptonshire parish, 7 miles SW. of Market-Harborough. Here, on 14th June 1645, 7500 royalists under Charles I. and Prince Rupert were totally defeated by 14,000 parliamentarians under Fairfax and Cromwell, the king losing cannon, baggage, and 5000 prisoners. A 'blockhead obelisk,' which does not mark the battlefield, was erected in 1823 on the Naseby ridge (648 feet). See Gardiner's *History of the Great Civil War* (vol ii. 1889).

Nash, JOHN, architect, born in London in 1752, after the usual course of training for his profession entered into some building speculations which enabled him to buy a small property in Carmarthen. Here in fresh speculations he lost much money; therefore, in 1792, he returned to London and architecture, in which he speedily rose to eminence. On the strength of a patent (1797) for improvements in the construction of the arches and piers of bridges, he claimed a great part of the credit of introducing the use of metal girders. A large part of his time was occupied in designing and constructing mansion-houses for the nobility and gentry in England and Ireland, but he is chiefly celebrated in connection with the great street improvements in London. From February 1815, when he was appointed 'architect, valuer, and agent to the Board of Woods and Forests,' down till near the end of his professional career, he was busily engaged in the planning of routes, grouping of buildings, and fixing of sites. He died 13th May 1835. Nash, notwithstanding his many defects, possessed great power of effective grouping, as is well shown in his works. In the architecture of mansion-houses, the designing of 'interiors' was his forte.

Nash, PAUL, artist, born in London 11th May 1889. After an art training at the Slade School he went to France in 1914, from which he returned injured in 1917. In June of that year he exhibited a collection of water-colours of 'The Ypres Salient,' which immediately attracted attention by reason of their power of drawing strange places so strangely. He was appointed one of the official artists on the Western Front, and 'Inverness Copse' and the 'Menin Road' are typical examples of his work. He has published wood-engravings in *Places* (1922), *Genesis* (1924).

Nash, RICHARD, better known as 'Beau Nash,' was born the son of an impoverished Welsh gentleman at Swansea, 18th October 1674. He was educated at Carmarthen and Jesus College, Oxford, held for some time a commission in the army, and next entered at the Middle Temple, but found greater attractions in the dissipations of society than in the pursuits of law. He conducted the pageant at the entertainment of William III. by

the Inns of Court, and is said to have declined the honour of knighthood without a pension. He made a shifty living by gambling, but in 1704 he found his true function as master of the ceremonies at Bath, where he conducted the public balls with a splendour and decency never before witnessed. In this way he came to acquire an imperial influence in the fashionable society of the place. It appears that he was also distinguished by his sentimental benevolence. He played hard and successfully; yet if he heard an individual sighing behind his chair: 'Good Heavens! how happy would that money make me,' Nash would thrust his own winnings into his hands, with theatrical generosity, and exclaim: 'Go, and be happy.' His own equipage at this period of his career was sumptuous. He used, we are told, to travel to Tunbridge in a post-chariot and six greys, with outriders, footmen, French-horns, and every other appendage of expensive parade. He is praised for the great care which he took of the morals of the young ladies who attended the Bath balls, always putting them on their guard against needy adventurers like himself. In his old age Beau Nash sank into poverty, and often felt the want of that charity which he himself had never withheld. He died at Bath, 3d February 1762. A Life by Goldsmith was published anonymously in 1762. See Gosse, *Gossip in a Library* (1891), and books by Barbeau (1904) and Melville (1907).

Nash, or NASHE, THOMAS, an entertaining writer of Elizabeth's reign, was born at Lowestoft in 1567, studied almost seven years at St John's College, Cambridge, travelled abroad, visiting Italy and Germany, and thereafter plunged recklessly into the life of letters in London, and forced a shifty living from fate until the close. He kept ever a high heart amid manifold troubles, and, satirist as he was, his inexhaustible gaiety and goodness made him the darling of his friends—the 'sweet boy' and 'sweet Tom' of Greene and Francis Meres. He was dead by 1601, as prematurely as Marlowe, Peele, and Greene. Nash had a genuine relish for good literature; he praises warmly Rabelais, Aretino, Spenser, Sidney, and Marlowe. He had also a great faculty for vituperation, and the times were favourable for its exercise. His first writing was his vigorous preface to Greene's *Menaphon* (1589), and this was quickly followed by the *Anatomie of Absurditie* (1589), a satirical discussion on social manners; a series of impetuous tractates flung into the Marprelate controversy; *Pierce Penilesse, his Supplication to the Divell* (1592), full of keen observation and satire, and rich in autobiographical interest; *Strange News* (1593); and *Have with you to Saffron Walden* (1596), containing a vehement onslaught on Gabriel Harvey; *The Terrors of the Night, or a Discourse of Apparitions* (1594); *Christ's Tears over Jerusalem* (1593), a long, edifying discourse; *The Unfortunate Traveller, or the Life of Jack Wilton* (1594), the best specimen of the picaresque tale in our literature before Defoe; *The Isle of Dogs* (1597), which was at once suppressed, and is now lost, and for which the author was sent to prison; and *Lenten Stuffe* (1599), 'in praise of the red herring,' really a humorous description of Yarmouth. The tragedy of *Dido* was written in collaboration with Marlowe; *Summer's Last Will and Testament*, by Nash alone.

There are editions of his works by Grosart (1884) and McKerrow (1904-5). See Gosse's edition of *The Unfortunate Traveller* (1892), Brett-Smith's (1920), Jusserand's *The English Novel in the Time of Shakespeare* (trans. 1890).

Nashua, a manufacturing city of New Hampshire, is 40 miles by rail NW. of Boston, at the

junction of the Merrimac and Nashua rivers. The falls of the latter, rendered available by a canal 3 miles long, supply motive-power to many manufacturing establishments, including very extensive cotton-factories and ironworks, paper-mills, &c. Pop. (1880) 13,397; (1920) 28,379.

Nashville, the capital of Tennessee, is on the navigable Cumberland River, 200 miles above the Ohio, and 185 miles by rail SSW. of Louisville. The city, which is one of the principal railway centres in the southern states, is built mainly on the left bank of the river, which is crossed by a suspension bridge and a railway drawbridge to the suburb of Edgefield. Nashville is a handsome, well-built town, with an imposing state capitol of limestone, a penitentiary, and a large lunatic asylum. As an educational centre the city is of considerable importance. The public-school system is excellent; and here are the Vanderbilt University (1875), Fisk University (Congregationalist, 1867, with few but coloured students), the state normal college, &c. The city has a large wholesale trade, the staples being lumber, cotton, and tobacco; while its manufactures, which are rapidly extending, include cotton, flour, timber, iron, and phosphates. Founded in 1780, Nashville became the legal capital in 1843. In December 1864 the Confederates under Hood were completely defeated here by Thomas. Pop. (1880) 43,350; (1890) 76,169; (1920) 118,342.

Nasik, a town of Bombay, on the Godavari, 31 miles from its source, with a railway station (4 miles distant), 100 miles NE. of Bombay. It ranks as one of the most sacred of Hindu places of pilgrimage, the banks and even the bed of the river being crowded with temples and shrines. Formerly it was a Mahratta capital; now it manufactures paper, cotton, and excellent brass and copper work. Pop. (1921) 42,756. See **MAGIC SQUARES**.

Nasmyth, JAMES, inventor of the steam-hammer, was the son of Alexander Nasmyth (1758-1840), portrait and landscape painter, best known by his portrait of Burns. He was born in Edinburgh, 19th August 1808. From boyhood he evinced a turn for mechanics, and in his father's house became accustomed to use a lathe. At seventeen he constructed a small working steam-engine for grinding his father's colours, and made besides five models of a condensing steam-engine, and later a small road locomotive. Employed in 1829 by Maudsley, he started in business at Manchester in 1834, gained a good connection, and established at Patricroft what afterwards became known as the Bridgewater Foundry. The invention of the Steam-hammer (q.v.) was conceived in 1839, the occasion being the necessity for forging an enormous wrought-iron paddle shaft. But it did not take shape till 1842, when he found the steam-hammer as he had planned it at work at Creuzot in France. It had been adapted from his own scheme-book. Nasmyth patented his invention on his return to England, and it was adopted by the Admiralty in 1843. Business increased, and by 1856 he was able to retire with a handsome fortune, and settled at Penshurst, Kent. Amongst his other inventions was a steam pile-driver. He published *Remarks on Tools and Machinery* (1858), and a volume on *the Moon* (1874). He died in London, 7th May 1890. See *Autobiography*, edited by Smiles (1883).

Naso. See **OVID**.

Nassau, formerly a German duchy, now the Wiesbaden district of the Prussian province of Hesse-Nassau (q.v.). The soil is fertile, and produces some of the most esteemed Rhenish wines. The chief towns are Wiesbaden (q.v.), the capital of the district; Schwalbach, Schlagenbad, Fachingen, Selters, and Geilnau.—The family of

Nassau, the elder branch of which reigned till 1866, dates from the 10th century. The younger branch inherited in 1544 the principality of Orange (q.v.), and as the princes of Orange took an important place in European history (see **HOLLAND**). The reigning Duke of Nassau sided against Prussia in 1866, and his duchy was incorporated with Prussia (see **PRUSSIA, GERMANY**); and on the extinction of the male line of the Orange branch by the death of William III. of Holland, in 1890, the Duke of Nassau became Grand-duke of Luxemburg.

Nassau, in New Providence, capital and trading centre of the Bahamas (q.v.) and a bishop's see; pop. 13,000.

Nasturtium, properly the botanical name of the Water Cress (see **CRESS**), but also the popular designation of the Indian Cress (*Tropaeolum majus*). See **TROPEOLUM**.

Natal, an original province of the Union of South Africa, was discovered by Vasco da Gama on the Christmas-day (hence its name) of 1497. In the 18th century intermittent trading was carried on between the Cape Colony and Natal, which in 1800 was peopled by ninety-four distinct tribes of natives. From 1805 to 1828 the despotic Zulu chief Tyaka (Chaka) enforced his own rule and that of his own immediate tribe or family clan, the Amazulu, over the congeries of tribes reaching from the Limpopo on the north to the Kei River in the south. Tyaka was killed in 1828 by a political faction who placed his younger brother Dingaan on the throne. Predatory Boers who had left the Cape Colony to escape British rule divided into parties and settled in the territories now known as Natal and the Transvaal; and conflicts between Boers and natives were very frequent. In 1838 an embassy of Boers were massacred by Dingaan, and a force of Boers proceeded to Zululand to avenge their friends. The country was at this time divided into two factions, one supporting Dingaan, and the other his younger brother Umpande (Panda). The Boers entered into a secret treaty with the latter, and a combined attack was made on Dingaan, who fled and was killed. Panda succeeded him as king, and the Boers were recognised as lords of the soil of Natal. In December 1838 Sir George Napier, the Cape governor, had sent a detachment of Highland troops to take possession of the inland territory and Port Natal; but owing to the Cape Kaffir disturbances the Highlanders were withdrawn, and the Boers at once hoisted the flag of 'the Republic of Natalia.' Two British ships of war were sent from the Cape to force a landing at Durban. After a short struggle there the Boers gave up the port, and fell back on Pietermaritzburg, the capital, the name of which is a compound of the Christian name of Pieter Retief and the surname of Gert Maritz, two leaders of the Boers. Civil negotiations were then entered on by Mr Cloete, and many of the Boers accepted British rule and settled down in Natal. Those of the malcontents who crossed the Drakensberg and struck north soon found themselves fighting against Umzilikatzé (father of Lobengula of Matabeleland) in the territory now known as the Transvaal. In 1843 Natal was officially declared to be a part of the British dominions, and the colony was formally annexed to the Cape of Good Hope on the 31st of May 1844. At that time the natives numbered about 150,000, although in the previous century their total was nearly a million. But intertribal fights and the struggles for supremacy of Tyaka scattered the clans of Natal far and wide. Subsequent to the annexation by the crown and its attendant peace the aborigines of Natal gradually returned from distant places, and their numbers, still below half

a million in 1891, are now nearly a million. In 1855 there was a great flood in the colony and Zululand, and in the following year a very sanguinary fight for the Zulu succession took place on the Natal northern border between two sons of Umpande—viz. Cetewayo and Umbulaze. After a bloody battle on the Tugela River the forces of the former won the day, and Umbulaze's beaten men took refuge in Natal. On the 15th of July 1856 Natal was declared to be a separate British colony, and it was then given a limited form of representative institutions. During the decade ending with 1860 considerable immigration from Great Britain took place, and the immigrants of that time and their descendants occupy most of the land of the province to-day.

In 1873 friction arose between Langalibalele, one of the chiefs on the north-west boundary, and the next magistrate. Some of the chief's young men disobeyed the mandate of the magistrate to give up their guns. Orders were issued to apprehend the chief and certain of his followers. They retreated before the crown forces, but some of the Natal volunteers and mounted police cut them off in one of the mountain-passes; bloodshed ensued, and three well-known young colonists were killed. Langalibalele escaped to Basutoland, but was captured and brought back, tried very summarily in Maritzburg, and banished to the Cape Colony. Rigorous measures were adopted by the governor against Langalibalele's tribe and a neighbouring tribe. The home government, however, interfered, and ended the injustice which had been done to the natives by the colonial authorities while under a feeling of panic. Langalibalele remained in the Cape Colony till 1885, when he was allowed to return to Natal as a prisoner on parole; he died near Maritzburg in 1889.

In 1875, there being in the colony much dissatisfaction with the methods of Downing Street rule, Sir Garnet Wolseley was sent out to settle matters. He promulgated a new constitution providing for an extension of the representative system, with the check of certain eminent colonists, selected by the crown, having seats in the Legislative Council as nominee members. Sir Garnet Wolseley was succeeded by Sir Henry Bulwer. During the governorship of the latter a feeling of disquiet was shown in some quarters at the strength of the colony's neighbours, the Zulus under Cetewayo. Sir Bartle Frere, Her Majesty's High Commissioner for South Africa, visited the colony, and came to the conclusion that in the interests of the British colonists in South Africa it was necessary to break the power of the Zulus. Despite the protests of the Natal government and Sir Henry Bulwer, the governor, an ultimatum was served on the Zulu king, and war ensued (see ZULUS). In this war Natal suffered severely in the lives of its young colonists, in its treasure, and in the paralysis of its trade. For several years the colony was a camping-ground for British troops, for in 1881 the Transvaal Boers invaded Natal to anticipate the advance of English soldiers being sent to support those beleaguered in the Transvaal garrisons; and the fights of Schuin's Hoogte, Ingogo, Laing's Nek, and Amajuba (see MAJUBA) were all fought on British soil. The province of Zululand was annexed to Natal in 1897. On the outbreak of the South African war in October 1899, the northern part of Natal was overrun by a large force of Boers, who did great damage to railways and private property. After severe fighting at Dundee, Elandslaagte, and Nicholson's Nek, the British forces were shut up in Ladysmith, which was besieged from 2nd November till 28th February 1900, when it was relieved by General Sir Redvers Buller after much hard fighting at the river Tugela, Colenso, Spion Kop, and Vaal

Krantz. The Boers were finally driven out of Natal on 11th June 1900. After the war, the Transvaal districts of Vryheid, Utrecht, and Wakkerstroom were added to the territory of Natal in January 1903 (see TRANSVAAL).

A native rising in 1906 was put down by the Natal forces under Sir Duncan M'Kenzie. At this time the home government's action in postponing the execution of natives convicted of murder was hotly resented in Natal. In 1910, notwithstanding strong particularism, Natal became an original province of the Union of South Africa.

Natal covers an area of 35,291 sq. m., including 6970 sq. m. added in 1903. Towards the coast the Drakensberg Mountains present a scarped and almost inaccessible face, but gradually die away into the immense rolling plains of the interior.

The coast region, extending for 30 miles inland, is highly fertile, the climate being subtropical and healthy. In 1856 the cultivation of the sugar-cane was introduced on the coast, and as an industry it has thriven more or less ever since. In 1903 the area under sugar was over 33,000 acres, and the total produce was 34,000 tons; in 1911 it was 80,000 tons; in 1923, 159,000 tons. The culture of the cane requiring that continuous and arduous labour which the natives did not supply, the Legislative Council had, in 1863, to take steps to introduce immigrants from British India; and in 1904 there were in the colony over 100,000 Asiatics—coolies, with their attendant traders who followed them from India. By 1911 the number was over 133,000, many being shopkeepers and market-gardeners freed from their indentures. Their presence has been strongly objected to. The Assam tea-plant was introduced in 1877, and tea-planting has become a staple industry. The black wattle (*Acacia mollissima*) is very extensively grown for the sake of its bark, which is used for tanning. Coffee, maize, tobacco, oats, and vegetables are also important crops; and indigo, arrowroot, and ginger have been grown. All tropical fruits thrive well. The midland terrace is more fit for the cereals and usual European crops; while on the higher plateaus along the foot of the mountains are immense tracts of the finest pasturage for cattle and sheep.

The climate is very healthy; the thermometer ranges between 90° and 38° F., but the heat even in summer is seldom oppressive. The mean annual temperature at Pietermaritzburg, the capital, is 64·71°. The winter begins in April and ends in September. In the summer season the thunderstorms are very frequent and severe in the uplands. The annual rainfall over the whole province averages nearly 40 inches, the greatest fall being in summer.

The province has only one harbour worthy of the name, but that is the best on the south-east coast, Durban (q.v.) or Port Natal. The harbour is of great consequence not only to the province, but to the empire, as it must one day be an important fuelling station. The principal rivers are the Tugela, Buffalo, Umkomanzi, Umgeni, Umzimkulu, and Mooli. Like the majority of African rivers, they are of little use for purposes of inland navigation; but their streams are permanent, and often available for irrigating purposes.

Coal is destined to play a prominent part in the future of Natal, the area of the coal-measures being estimated at 1400 sq. m. The coal is serviceable for all ordinary purposes, the Union government railways being worked with it. Copper has been found, and much is hoped from the iron near the coal. The colony is also believed to be rich in other minerals, such as asbestos, mica, and plumbago. Gold has been found in the south and north. Great forests of fine timber abound in the mountain-passes, while many tracts along the coast

are well wooded. The chief towns are Pietermaritzburg (35,000), 54 miles inland, the seat of colonial, and now provincial, government and the chief military station; Durban, the greatest town; Verulam and Pine Town near the coast, Harding in the south, and Richmond, Weenen, Colenso, Greytown, Ladysmith, Estcourt, Dundee, Utrecht, Vryheid, and Newcastle up country.

The colonists were offered responsible government in 1883, with guarantees for native protection, but they refused the offer; and the bill providing responsible government passed the Council only by a narrow majority in 1891. From 1893 to 1910 the government was administered by a governor, assisted by a ministry, a Legislative Council of thirteen members, and a Legislative Assembly of forty-three members. The governor appointed ministers, and with their advice the Legislative Council. The Assembly was, of course, elective. The parliament lasted for four years, unless dissolved before then. Natal became a province of the Union of South Africa in 1910. It has an administrator and a provincial council of twenty-five members. About 1865 Natal was plunged into ecclesiastical warfare. Bishop Colenso (q.v.), the then head of the diocese, was declared heterodox by a party in the church, and unsuccessful efforts were made in South Africa and England to depose him. The Presbyterian (Scottish and Dutch), Roman Catholic, and other churches are well represented; many stations of the Wesleyan, American, Norwegian, and other missions exist; and the Trappists (q.v.) do good work near Pine Town. Education is well provided for. Natal University College at Pietermaritzburg was incorporated in 1909, and in 1918 became a constituent college of the university of South Africa. In addition to the government-aided high schools, primary schools, and art schools, there are schools for natives and for the children of Indians, all receiving government grants.

The chief passes through the Drakensberg are Van Reenen's, Oliver's Hoek, Bezuidenhout, De Beer's, and Laing's Nek. Most of the rivers have been substantially bridged, and a very energetic policy of public works is being pursued by the government. Several railways run through the province, and connect the coast with the Orange Free State and Transvaal. Lines are also laid north and south of Durban along the coast.

Natal's chief exports are bullion, wool, sugar, tea, coal, maize, and wattle-bark. The chief imports are apparel and haberdashery, railway material, provisions, flour and grain, ironmongery, cottons, woollens, beer and spirits, leather and leather goods. In 1876 the population numbered 326,957 (20,490 whites); in 1911, 1,191,958 (98,582 whites, 951,808 natives, and 141,568 others); in 1921, 1,571,047 (136,833 whites, 1,292,560 natives, 141,649 Asiatics). The natives possess horses, cattle, sheep, &c. They are a fine race physically, gifted with high intelligence, of frank and courteous bearing, and very easy to govern.

The common law in the province is that prevailing in Holland during the 16th and 17th centuries, modified by statute law in the same way practically as obtains in all parts of South Africa. The chief difference between English and Roman Dutch law rests in the laws of marriage and inheritance, but the difference is now by statute largely optional. The coolies are subject to the laws regulating Europeans, as well as to special laws controlling Indian immigration. The natives are, with few civilised and exempted exceptions, subject in civil matters to native law, which is quite different from colonial law. The Natal Provincial Division of the Supreme Court of South Africa consists of the judge-president and three puisne justices, the

Native High Court of a judge-president and two judges; and there are stipendiary magistrates in all important centres.

Eland (q.v.) and hartebeest (see ANTELOPE) are the only big game left, and these have been made royal game. There are stringent laws for the protection of deer and game-birds. Alligators are met with in a few of the central and northern rivers. Snakes, both colubrine and viperine, are plentifully distributed throughout the province. Many of the snakes are innocuous, and fatal bites from the poisonous species are rare. The python, which attains a large size, is to be found in the seacoast forests, and in the reeds by the river-sides. The hippopotamus is still to be met with at the mouths of some of the northern rivers.

See John Bird, *The Annals of Natal* (1889); *Natal Almanac*; John Noble, *South Africa, Past and Present* (1877); Sir John Robinson, *Notes on Natal and A Lifetime in South Africa* (1900); Brooks, *Natal* (1869); Russell, *The Garden Colony* (1903); Justice Cadiz, *Laws and Ordinances of Natal*; W. Y. Campbell, *Code of Native Law, Civil and Penal*.

Natal, a seaport of Brazil, capital of the province of Rio Grande do Norte, stands at the mouth of the river of that name. It exports principally cotton and sugar. Pop. 30,000.

Natal Cotton. See SWEET POTATO.

Natchez, capital of Adams county, Mississippi, is on the east bank of the Mississippi River, 214 miles by rail and about 280 by water NNW. of New Orleans. It is built mainly on a high bluff, looking out far over the cypress swamps of Louisiana; the part of the city along the bank, where the heavy shipping business (mainly in cotton) is transacted, is known as Natchez-under-the-Hill. The public buildings include a Roman Catholic cathedral and a United States marine hospital. Natchez, which was settled by the French in 1716, derives its name from a former tribe of Indians (see MOUND BUILDERS). Pop. (1870) 9057; (1880) 7058; (1900) 12,210; (1920) 12,608.

National Convention (1792-95). See FRANCE, GIRONDISTS, JACOBINS, ROBESPIERRE.

National Covenant. See COVENANT.

National Debt. National or public debts, although of early origin, were relatively of small importance before the development of the modern system of banking and credit, and it is only since the 19th century that they have become almost universal on a considerable scale (see Gilbart on *Banking*, sect. i.). So long as it was necessary either to give pledges such as crown jewels or to assign specified revenues, it was not possible that public debts could attain any great magnitude. As soon, however, as governments were able to borrow simply on credit, national debts in the modern sense of the term grew rapidly. In less than a century after the foundation of the Bank of England (1694), when for the first time in English history the item 'Interest and Management of the Public Debt' appears in the national accounts, Adam Smith felt compelled to enter a protest against 'the progress of the enormous debts which at present (1776) oppress, and will in the long-run probably ruin, all the great nations of Europe.' At that time the public debts of the civilised world were, however, only about one-tenth of their amount in 1900, which exceeded five thousand million pounds sterling, exclusive of local obligations. Although the English national debt received a great augmentation during the great Napoleonic wars, the general indebtedness of civilised nations has increased most rapidly since 1848. In fact, from that year it has been calculated that there was an annual average deficit in the public accounts of the world of over

£100,000,000. In 1862 there were quoted on the London Stock Exchange foreign public stocks to the amount of nearly £700,000,000, whilst ten years later these quotations had increased to nearly £2,500,000,000. In 1890 there were more than one hundred and fifty public securities dealt in the London market (see Adams on *Public Debts*, part i. chap. i.). Seeing, then, that national debts are now practically universal in the civilised world, and that the amounts and conditions under which they are held are constantly changing, a purely historical or statistical account is plainly out of the question in the limits of the present article. It will only be possible to indicate the most general characteristics and principles involved, and also some of the leading points of controversy. As regards *origin*, undoubtedly the most important cause of public indebtedness is, and always has been, war-expenditure. Thus the Napoleonic wars increased the English debt by over £600,000,000, the United States civil war cost the victors £450,000,000, and the Franco-German war added £390,000,000 to the total of national indebtedness. The vast accumulations due to the European war can be seen from the tables appended.

In modern times, however, governments have added largely to their indebtedness by borrowing for various public purposes of an industrial or social character. In France especially, in spite of great changes of government, expenditure of this kind has gone on increasing at an alarming rate; the amount of taxation per head of population has increased by seventy per cent., and this is largely due to the growth of administrative functions on the part of the state. In the British colonies also the rapid increase of public indebtedness must be ascribed principally to the same cause. The progress of civilisation necessarily imposes, as Adam Smith, Mill, and other economists have pointed out, new industrial functions upon governments, and it is impossible that these can in all cases be fulfilled in a directly remunerative manner. But, apart from this natural growth, in recent years a quasi-socialistic tendency has become pronounced, which has involved a large increase in public expenditure. The full importance, however, of this element can only be seen when account is taken of local taxation and indebtedness, which would require a separate investigation. It must also be observed that money spent on debts incurred for public purposes may in some cases—e.g. railways, docks, &c., be directly profitable, and in others—e.g. education, be indirectly remunerative.

The nature of public debts differs in some respects from that of private obligations. It is held, for example, that the government of a sovereign state has the discretionary power of enforcing the claims of its subjects for payment of the national (as contrasted with domestic) obligations of another state. The interests of bondholders may in consequence give rise to diplomatic intervention and thus lead to political disturbances, as has been shown by the action of England and France in Egypt and Tunis respectively. The growth of national indebtedness has, however, hitherto been generally accompanied by an increased sense of responsibility founded on the importance of public credit, and fundamental revolutions in government have not generally given rise to repudiation, although the new government might strongly disapprove of the objects for which the debt was incurred, or the methods by which the money was raised—compare, for example, the history of France during the 19th century and the revolution in Brazil in 1889. On several occasions, however, specious arguments for partial repudiation have been urged and met with some popular countenance.

It has been maintained that if a debt has been

incurred in a depreciated currency—that is to say, if the government has only received the capital sum borrowed in this form—it is only equitably bound to pay back the principal with an allowance for its depreciation. This position was taken up by some writers as regards the English debt incurred during the period of the bank restriction, when Bank of England notes were inconvertible and depreciated, and then later the same reasoning was advanced in the United States after the civil war. The obvious answer, however, is that a government would receive so much less capital if the lenders were not assured against uncertain depreciation. The amount actually received for a nominal capital sum will clearly vary, according to the standard in which the payment is to be ultimately met (see Mill's *Political Economy*, bk. iii. chap. xiii.). In the same way it has sometimes been maintained that if a government has borrowed at a discount, and its stock has afterwards risen to par, the fundholders have no equitable right to this rise in value caused by the growth of credit and national prosperity. But again the reply is that the chance of their rise in the future was taken into account by those who made the original advances, and that they would have required so much more interest if they were to be entitled simply to a return of the original sum actually advanced. The practical conclusion to be drawn from this argument is that in general it is bad policy for a nation to borrow at a discount, because it is deprived of the opportunity of conversion to a lower rate of interest. Suppose, for example, that a nation can only borrow at par at six per cent., it is better to do this than to borrow nominally at three per cent., and create (roughly) double the amount of capital obligation for the same sum actually received. In the former case every fall in the rate of interest at which the nation can borrow may be taken advantage of by a process of conversion, whilst in the latter case the whole gain accrues to the fundholders. It is of course assumed that the debt may be paid off at any time (or with a short notice), and that payment is not definitely fixed for certain dates. The opposite case of the United States shows the importance of this provision.

It is, however, true as before that the certainty of high interest for a fixed period will operate upon the amount actually given for every nominal hundred, but the point is that the state is better fitted to take advantage of the probable ultimate fall in the rate of interest. A somewhat similar argument has been advanced by Dr Chalmers and others to show that, considering the nature of a state, it is better always to meet current expenses, however extraordinary, out of present taxation, rather than to resort to loans. The contention is that to meet the actual expenditure the government must in some form or other actually take the required amount from the sum total of the national wealth. If it makes a loan it is said that it really takes the capital amount and diverts it from productive purposes, just as effectively as if it obtained the money directly by taxation, but in addition is burdened in perpetuity with the interest. The circumstances under which the national debt of England was so largely increased in the Napoleonic wars no doubt seemed to justify this position. According to a Parliamentary Return of 1869 it was shown that from 1793–1816 the total income raised from taxes amounted to 1149 millions, and the total expenditure, except for the interest on the debt, amounted to 1103 millions. That is to say, for the twenty-three years (apart from the interest on the debt) the whole civil, military, and naval expenditure was less than the amount received in taxes by 46 millions. Now the charge

on the original debt before the war was about 9½ millions per annum, or for the twenty-three years about 220 millions. Against this must be set the 46 millions of surplus shown above, leaving on the net deficit for the twenty-three years about 174 millions. But to meet this sum the national debt was by a process of borrowing and repayment actually increased by some £622 millions (see Noble's *National Finance*, p. 3, note). In answer to the general argument, however, it may be pointed out that the borrowing may be made not from the productive resources of a country, but from foreign capital or the general accumulations of the world, or that the loan may absorb wealth which otherwise would not have been saved at all, or may intercept wealth which might otherwise have gone abroad. Mill argues (*Political Economy*, bk. v. chap. vii. sect. i.) that a sufficient test whether the loan is really made from productive capital is given by the effect on the rate of interest. If the rate rises the presumption is that the productive capital has been really drawn upon. This test, however, can only be used with caution, if at all, for the rate of interest depends upon many factors—e.g. the state of credit, the general economic conditions of other nations, &c.; and on the anticipation of the outbreak of war a rise is certain to take place independently of the action upon the productive capital of the country.

The question next arises: Supposing a national debt in existence, should any effort be made to extinguish the principal? The chief arguments against any special exertion towards repayment are the following: (1) It is said that the payment of the interest constitutes a mere transfer of wealth from one class of the community to another, and therefore is no real burden. But in reply it may be urged that all taxation necessarily implies loss both directly and indirectly, the indirect and 'unseen' loss being much greater. Thus in the United Kingdom, whilst the direct expense of the customs duties has been placed at only 3½ per cent., the indirect loss has been calculated by Cliffe Leslie and others at from 20 to 30 per cent. In some cases also the national creditors are foreigners, and in this case the payment of interest must take the form of a real exportation of wealth without any corresponding importation. (2) It is argued that with the natural progress of society industrial countries become more and more wealthy, that the burden of the debt becomes proportionately less, and that its extinction can be more easily effected at a more remote period. It ought to be observed, however, that the rapid accumulations in recent times have been largely due to exceptional and great changes in connection with machinery, railways, telegraphs, financial reform, foreign trade, education, &c., and that, although the same causes will remain in operation, the rate of increase may not be so great. In certain countries also, notably France, population is almost stationary, and in nearly all the marriage rate is declining. (3) It is said that the rate of interest tends to fall, and that therefore by conversion the real burden may become less and less. The experience of Britain and of the United States in the late 19th century supported this view; but, on the other hand, there are various elements of uncertainty—e.g. the opening up of new countries, the possibility of great wars, &c. (4) It is maintained that the existence of a national debt, which consists practically of perpetual annuities guaranteed by the state, is a national convenience; and, further, that if the debt were extinguished capital would tend to be sent abroad. The answer is that under modern conditions there are many safe investments, and that only surplus capital migrates from a country. (5) It is said that it is unjust to the present generation

to impose a burden upon it simply for the benefit of future and probably more wealthy generations; but it may be rejoined that we must consider the continuity of national life, and remember that the present race is supposed to enjoy the benefits of former sacrifices.

On a balance of arguments most economists have approved of the rule that it is advisable to pay off debt, so long as the taxes by which the surplus is raised do not directly or indirectly impose still greater burdens. A bad system of customs and excise duties, for example, by checking the natural development of production and trade, may practically leave the nation poorer than if it had not paid off its debt by such means. On the other hand, if remissions of taxation have already been carried so far as to leave the burden of taxation comparatively light, it is better to use any surplus rather for the payment of debt than for a further reduction of taxation. In support of this view, it may be added that the less the previous debt, so much the greater would the power of a state be in making a loan in case of exceptional need. A nation already overburdened with debt might be obliged, in the case of a great war, immediately to resort to a forced currency, which would be liable to a serious or fluctuating depreciation. An issue of inconvertible notes is generally the worst method of incurring a national obligation, being in reality a species of forced loan. At one time a favourite argument against the immediate repayment of public debts was the assertion that there was in progress a natural depreciation of gold, owing to great discoveries and to the use of credit substitutes. This argument must, however, now be reversed, for the debts of the Great War have been contracted in an inflated currency, and this, as a process of deflation sets in, will make the real burden of this debt so much heavier. With falling prices and falling incomes, the same amount of nominal taxation involves greater sacrifices on the part of the taxpayers. Accordingly it will be advisable to reduce money debts of all kinds as rapidly as possible. It should also be noticed that 'an old tax is no tax,' and that in general it is not advisable to lessen or abolish taxes which must afterwards be reimposed. It is preferable to create a surplus for the extinction of debt. The case of the United States with a surplus larger than could be made use of, and raised to a great extent by burdensome indirect taxation, may be regarded rather as an exception which proves the rule.

In conclusion, attention may be called to the principal methods adopted for the extinction of public debts. These are mainly two, with variations in detail. First, there is the simple plan of raising directly more in revenue than is required for expenditure, and devoting the surplus directly to the purchase of the bonds or stock representing the debt. A continuous surplus of this kind is a real sinking fund. In former times many fallacies have been current regarding the powers of a sinking fund. Financiers have been deluded through spurious figures on the powers of indefinite accumulation of a small sum at compound interest, and have imagined that if a certain sum were set aside and allowed to grow in this manner, it would insensibly extinguish any debt. If, however, in the meantime, the state, as in the case of England during the Napoleonic wars, continues to borrow at higher rates, a sinking fund of this kind is directly worse than useless, although indirectly it may find defenders on the ground that a suspension would injure the national credit. The second method of repayment which has met with much favour in the United Kingdom is the substitution of terminable annuities, at a higher rate, for the perpetual annuities which constitute

the interest on the debt. The great advantage of this plan is that there is so far no apparent surplus which the government or the people can devote to a reduction of taxes or to new modes of expenditure, whilst a sinking fund is always open to attack. If the stock has originally been issued at a discount, and a rise may be expected, the adoption of terminable annuities gives the nation the benefit of this rise, whilst the gradual diminution of the debt of itself increases the tendency to rise.

A third method of getting rid of public debts has sometimes been proposed, founded upon the fact that a state can borrow on lower terms, or that its credit is better, than is the case of private individuals or companies. Thus it was argued that the state might purchase the railways, the ordinary stock of which in the United Kingdom earned, before the war, about 4 per cent., with money borrowed at less than 3 per cent. Adam Smith, however, long ago pointed out that a nation can rarely make a profit of any industrial undertaking, and to judge by recent experience that criticism still holds good.

Another proposed method which has come into prominence since the war is that of a levy on capital.

In 1750-57 took place the first great consolidation of stocks (see CONSOLS); in 1888 the '3 per cents.' were consolidated into 'new stock' to bear 2½ per cent. till 1903, and thereafter 2½ (see also EXCHEQUER BILLS).

DEBT OF UNITED KINGDOM AT VARIOUS DATES.

At the Revolution of 1688	£664,263
At the accession of Queen Anne	12,767,225
At the accession of George I.	86,175,460
At the end of the Spanish war, 1748	75,812,132
At the Peace of Paris, 1763	132,716,049
At the end of the American war, 1784	243,068,145
At the Peace of Paris, 1815	861,089,049
At commencement of Crimean war, 1854	769,082,549
In 1890	689,944,026
After the Boer war, 1903	798,349,190
At outbreak of European war, 1914	716,288,421
At end of war, 1919	8,000,000,000
In 1924	7,641,047,000

DEBT OF PRINCIPAL BRITISH COLONIES (MILLION £).

	Pre-war, 1913.	Post-war, 1923.		Pre-war, 1913.	Post-war, 1923.
Canada	£90	£500	Tasmania	£11	£22
Newfoundland	5	15	New Zealand	87	219
N. S. Wales	106	188	Union of South		
Victoria	62	109	Africa	117	199
Queensland	52	88	India	303	585
S. Australia	30	62	Ceylon	5	10
W. Australia	30	58	[Egypt	96	92]

DEBT OF UNITED STATES.

In 1701	\$75,463,476	In 1862	\$524,176,412
In 1812	45,209,787	In 1863	1,119,772,188
In 1832	24,322,285	In 1866	2,773,286,173
In 1835	87,513	In 1876	2,180,395,067
In 1838	10,454,221	In 1886	1,783,488,697
In 1850	63,452,773	In 1890	1,722,240,163
In 1857	28,699,831	In 1913	2,915,987,917
In 1861	90,580,878	In 1923	21,250,812,989

DEBT OF THE CHIEF EUROPEAN COUNTRIES (MILLION £).

	Pre-war, 1913.	Post-war, 1919.		Pre-war, 1913.	Post-war, 1919.
Austria	£510	£3470	Portugal	£130	£360
Hungary	270	1587	Russia	1046	3415*
Belgium	185	784	Spain	382	480
Denmark	19	64	Sweden	33	85
Germany	1055	9850	Norway	20	56
France	1315	8264	Switzerland	68	148
Holland	97	191	Turkey	151	412
Italy	611	8124		* 1917.	

(† Owing to currency depreciation these values are nominal.) Also in 1919 the debt of Brazil approximated £180,000,000, of Japan £300,000,000, of Chile £50,000,000, of Mexico £65,000,000, of China £172,000,000.

See the sections dealing with finance and debt in the articles on the several countries; H. C. Adams, *Public Debts* (1888); J. Noble, *National Finance* (1875); P.

Leroy-Beaulieu, *Traité de la Science des Finances* (2d ed. 1879); R. Dudley Baxter, *National Debts* (1871); Adolph Wagner, *Die Ordnung der Finanzwirtschaft* (in Schönberg's *Handbuch der Pol. Oekon.*, 3d ed. 1885); Sir Stafford Northcote, *Twenty Years of Financial Policy* (1862); Leone Levi, *History of British Commerce* (2d ed. 1880); A. J. Wilson, *The National Budget* (1882); Adam Smith, *Wealth of Nations* (McCulloch's ed. 1872), bk. v. chap. iii., and appendix on the *Funding System*; E. W. Hamilton, *An Account of the Operations under the National Debt Conversion Act, 1888, and the National Debt Redemption Act, 1889* (1889); Fenn's *Compendium of the Funds* (ed. by Nash); Mallet, *British Budgets* (1913); J. S. Nicholson, *War Finance* (2d ed. 1918); *Economic Journal*, vols. xxviii.-xxx.; G. F. Shirras, *The Science of Public Finance* (1924).

National Gallery, the principal depository of the pictures belonging to the British nation. The present building, which was intended to accommodate the Royal Academy and National Gallery, stands in Trafalgar Square, London, and was finished in 1838 at a cost of £100,000, but was enlarged in 1861, in 1869, in 1876, and in 1887. The nucleus of the National Gallery was the Angerstein collection of thirty-eight pictures, purchased in 1824 for £57,000, and a considerable sum is now annually voted by parliament for the purpose of adding to it. The various early and late Italian schools are extensively illustrated; there are good examples of the chief representatives of Italian art, as Raphael, Correggio, Paul Veronese. There are a few good examples of Murillo and Velázquez and the Spanish school; and the great Dutch and Flemish painters, Rembrandt, Rubens, Van Dyck, and the others, are well represented. The Royal Academy of Arts, which used to have its headquarters here, is now established at Burlington House. See also WAL-LACE (SIR RICHARD).

The NATIONAL PORTRAIT GALLERY, founded in 1856, was established at South Kensington in 1869, but removed on loan to the Bethnal Green Museum in 1885. Thence it was finally transferred in 1896, to occupy a handsome suite of buildings erected for it at the rear of the National Gallery.

There are also National Galleries of Art in Edinburgh and Dublin; the great public collections of Paris, Berlin, Dresden, Munich, Florence, Rome, &c. are mentioned in the articles on those cities.

National Guard, an organisation for local defence, at the disposal of the municipalities, not of the crown. Such a burgher guard had long existed in many French towns, but it was introduced into Paris only in July 1789, during the Revolution, when the revolutionary leaders decreed the formation of a national guard for Paris of 48,000 citizens; and ere long there were 300,000 for the kingdom. During the revolutionary excesses they were sometimes supine, sometimes they withstood the more violent insurrectionists. In 1794 they were the most devoted adherents of Robespierre. In 1795 they assisted in disarming the people, and were themselves reorganised so as to exclude turbulent elements, none but men of substance being allowed to serve; they even became royalist in feeling, and, rebelling against the convention, were defeated by Napoleon and the regular army, and practically ceased to exist. Napoleon re-established a national guard or militia, but, after various vicissitudes in 1814, 1830, and 1845, it has been wholly superseded by the military reorganisation since 1870.

National Hymns. The origin of the English national anthem has been a subject of controversy since the end of the 18th century, and is still involved in obscurity. 'God save the King' was first printed in the *Harmonia Anglicana* of 1742, without name of author or composer, varying slightly from the present version; and in 1745, during the Scottish rebellion, it became widely known, ver-

sions of it being sung nightly at Drury Lane and Covent Garden Theatres with great applause. Of the numerous claims to its parentage, the view supported by most, and by several eminent writers, attributes it, both words and music, to Henry Carey (q.v.), the popular song-writer, about 1740. The evidence for this is given in Chappell's *Popular Music of the Olden Time*, and Chrysander's *Jahrbücher*, vol. i. But Mr W. H. Cummings, who thoroughly beat out the subject in a series of papers in the *Musical Times* in 1878, entitled to the greatest weight, considers this evidence untrustworthy; and he arrives at the conclusion that the music has been adopted (but when, and by whom, we shall probably never know) from an 'Ayre' by Dr John Bull (q.v.), found (without words) in a collection of music by him once in the hands of Dr Kitchener, afterwards of Richard Clark, the original of which seems to have disappeared. It is also attributed by some to James Oswald.

The hymn was translated into German by Heinrich Harries, a Holstein clergyman, and sung to the original air at a birthday celebration in honour of the king of Denmark in 1790; and an adaptation from these words, made in 1793 by Dr B. G. Schumacher, beginning 'Heil dir im Siegerkrantz,' came into use as the Prussian national hymn. It called forth the admiration of Beethoven and Haydn, and moved the latter to compose an Austrian national hymn, which was first sung on the Emperor Franz's birthday in 1797. The best-known words, beginning, 'Gott erhalte Franz den Kaiser,' are by Baron Zedlitz; the original words were by Haschka. 'Deutschland, Deutschland über alles' is sung to the same tune. The first chancellor of the Austrian republic, Dr Renner, composed a new national hymn, 'Deutsch-Oesterreich, du herrliches Land.' The Hungarians have two national hymns—the 'Szózat' ('The Appeal'), beginning, 'Be true to the land of thy birth,' written by Vörösmarty (1800–55), the creator of Hungarian poetry of the Romantic school, and composed by Benjamin Egressy, an actor and eminent composer of sacred music; and the 'Magyar Hymnusz,' written by Kölcsey and composed by Francis Erkel. The Rákóczy march, by an unknown composer, dates from the end of the 17th century. The Russian anthem, dating from 1830, the work of General Alexis Lwoff (1799–1870), was set aside at the Revolution, and international songs ('The Red Flag' and 'The Internationale') took the place of national. Of the Danish national hymn, 'Kong Christian,' the words are by Ewald and the music by Johann Ernst Hartmann (1726–91). There are several claimants to the honour of being the Norwegian national hymn, of which may be mentioned 'Sønner af Norge,' written about the beginning of the 19th century, music by C. Blom; and the modern 'Ja, vi elsker dette Landet' ('Yes, we love this land'), words by Björnson, music by R. Nordraak. The Swedish hymn, 'King Karl, the young hero,' was written by Esaias Tegner (1782–1846). The Dutch national hymn, 'Wien Neerlandsch Bloed,' was written by Henrik Tollens (1780–1856), and composed by J. W. Wilms. 'La Brabançonne,' the Belgian revolutionary song of 1830, was written by Jenneval, a Brussels actor, and composed by Campenhout. The 'Marseillaise' is the subject of a separate article. The officially recognised national hymn of Italy is rather a march ('Inno reale'), composed, without words, by Giuseppe Gabetti (1796–1862), and seldom sung. The music to the patriotic hymn of Mamei ('Fratelli d'Italia') was composed by Michele Novaro (1822–85). The Portuguese 'Hymno constitucional,' composed by Dom Pedro I. of Brazil, was set aside for 'A Portuguesa.' Scarcely to be called a hymn, 'Yankee Doodle' is the Ameri-

can air, notwithstanding the more recent rival claims of 'Hail Columbia' and 'The Star-spangled Banner,' neither of which has high intrinsic merit or has taken any great popular hold. More like a hymn is the song 'America,' which is sung to the tune of 'God save the King.' The origin of 'Yankee Doodle' is as obscure and disputed as that of 'God save the King.' Most probably the tune is English, and the words by Dr Schuckburgh, an army surgeon, about 1755. During the American revolution, it came extensively into vogue. It was printed in Aird's *Selection of Scotch, English, Irish, and Foreign Airs* (1778), and in Arnold's opera, *Two to One* (1784).

National Park. See YELLOWSTONE, and YOSEMITE. In Canada a domain 26 miles by 10 in extent has been set aside as a national park at Banff in Alberta (by rail 562 miles N.E. of Vancouver and 920 W. by N. of Winnipeg). It embraces one of the most beautiful sections of the Rocky Mountains, contains hot sulphur-springs, has a handsome railway hotel, and is popular as a pleasure-resort. Roger's Pass, 135 miles to the west, and other areas, are also reserved as national parks. See also NIAGARA.

Nations, LAW OF. See INTERNATIONAL LAW.

Nations, LEAGUE OF. See LEAGUE OF NATIONS, PEACE AND INTERNATIONAL ARBITRATION.

Nativity. See ASTROLOGY.

Natrolite, one of the most common of the group of minerals known as *Zeolites* (q.v.).

Natron, or TRONA, an impure sesquicarbonate of sodium, which always contains sulphate and chloride of sodium. It is obtained from the margins of lakes in Egypt, Siberia, Tibet, &c., and from the borders of the Black and Caspian Seas.

Natron Lakes, eight in number, are in a depression to the west of the Damietta branch of the Nile. The locality is renowned for four monasteries, from whose libraries of Arabic, Coptic, and Syriac MSS. various European collections have been enriched. In the time of St Pachomius 5000 anchorites dwelt here.

Natterjack. See TOAD.

Natural History, in its widest and oldest sense, includes all the concrete sciences, but psychology and sociology have been separated off at the one end of the series, physics and chemistry and all their branches at the other, so that natural history became synonymous with the science of living things. Most frequently, however, it simply means zoology, especially in so far as that is concerned with the life and habits of animals. See BIOLOGY, BOTANY, EVOLUTION, SCIENCE, ZOOLOGY.

Naturalisation is the process whereby an Alien (q.v.) is invested with the privileges and made liable to the obligations of a natural-born citizen. It implies the renunciation of one political status and the adoption of another. Formerly many states absolutely refused to recognise any act of naturalisation as exempting the party naturalised from the consequences of his allegiance. Thus, the maxim of English common law, *Nemo potest exuere patriam*, precluded a natural-born subject from adopting a new political status, and rendered him liable to the penalties of treason if found in arms against his native country. The existence of this principle gave rise to many disputes, more particularly between Great Britain and the United States. It was not, however, till the Naturalisation Act of 1870 that the doctrine of the indelibility of natural allegiance was formally abandoned by Britain. In the same year a treaty was entered into between Great Britain and the United States, which provided that British subjects

becoming naturalised in the United States should be treated in all respects as United States citizens; and a corresponding provision was made with respect to United States citizens becoming naturalised in British dominions.

The conditions on which naturalisation will be allowed by the state to which the applicant seeks to affiliate himself vary in different countries. In Great Britain naturalisation is effected either through a special act of parliament or under the British Nationality and Status of Aliens Acts, 1914 and 1918. The Act of 1914, sect. 2 (1), enacts that the Secretary of State may grant a certificate of naturalisation to an alien who makes an application and satisfies the Secretary of State (a) that he has either resided in his Majesty's dominions for a period of not less than five years or been in the service of the crown for not less than five years within the last eight years before the application; (b) that he is of good character and has an adequate knowledge of the English language; and (c) that he intends, if his application is granted, either to reside in his Majesty's dominions or to enter or continue in the service of the crown. Under sect. 2 (2) of the act the residence required is defined as residence in the United Kingdom for not less than one year immediately preceding the application, and previous residence, either in the United Kingdom or in some other part of his Majesty's dominions, for a period of four years within the last eight years before the application. The Act of 1918, sect. 2, provides that a period spent in the service of the crown may be treated as equivalent to a period of residence in the United Kingdom. The grant of a certificate of naturalisation is in the absolute discretion of the Secretary of State. The Acts of 1914 and 1918 contain provisions as to the revocation by order of the Secretary of State of certificates of naturalisation. A certificate of naturalisation does not take effect until the applicant has taken the oath of allegiance. A person on being naturalised is entitled in the United Kingdom to all political and other rights, powers, and privileges, and is subject to all obligations to which a natural-born British subject is entitled or subject. He, under the statutes now in force, does not cease to be a British subject when within the limits of the foreign state of which he was a subject previously to obtaining his certificate of naturalisation, and of which he has not ceased to be a subject by the laws of that state. In *The King v. Speyer*, 1916, 2 K.B. 858, it was held that a naturalised subject born out of the British dominions and not of British parents may validly be appointed a member of the Privy Council. The application for a certificate of naturalisation states the foreign state of which the applicant is a subject, his place of birth, the names and nationality of his parents, his own name, address, age, and occupation, whether he is married and has any children, under age, residing with him (with names and ages), and the details of the requisite period of residence (see British Nationality and Status of Aliens Regulations, 1914 and 1918). The Secretary of State may, on application by the alien, include in the certificate of naturalisation the name of any child of the alien born before the date of the certificate and being a minor. Thereupon such a child, if not already a British subject, becomes a British subject; but he may, within one year after attaining his majority, make a declaration of alienage and cease to be a British subject.

The British Nationality Act, 1914, sect. 8, contains provisions as to the issue of colonial certificates of imperial naturalisation. The government of any British possession has the same power as the Secretary of State to grant or revoke a certificate of

naturalisation. A certificate granted under this section has the same effect as a certificate of naturalisation granted by the Secretary of State. In a British possession other than one of the self-governing dominions this power must be exercised by the governor or a personality under his authority, but is subject in each case to the approval of the Secretary of State. In a self-governing dominion the government of the dominion, after the act has been adopted by the legislature, may make regulations as to how and by what department the power is to be exercised.

In the United States the period of residence required for naturalisation is five years, one of which must have been passed within the state or territory of the court to which application is made. The requisites for naturalisation also include, besides the preliminary residence in the United States, a declaration or oath before a competent court, two years previously to admission, of *bona fide* intention to become a citizen of the United States and to renounce foreign allegiance. An act of Congress of 2d March 1907 provides that when any naturalised citizen shall have resided for two years in the foreign state from which he came, or for five years in any other foreign state, it shall be presumed that he has ceased to be an American citizen; but this presumption may be rebutted on presentation of satisfactory evidence to a diplomatic or consular officer of the United States. It is also provided by the same act that any American citizen shall be deemed to have expatriated himself when he has been nationalised in any foreign state, or when he has taken the oath of allegiance to any foreign state.

The German Imperial and State Nationality Law of 1913 enacts that a German can only lose his nationality, by a definite act showing an intention to sever his connection with his country, and, in particular, that he does not lose his nationality if, before acquiring a foreign nationality, he obtains the written permission of the competent home authorities to retain his German nationality. The effect of this law is to render it almost impossible to say that a German has ever lost his nationality.

The general rule is that a married woman is held to be a citizen of the state of which her husband is for the time being a subject; but the wife of a French citizen, upon the acquisition of a new nationality by her husband, may, if she chooses, retain the nationality possessed by her at the date of the marriage.

Certain privileges of British nationality may be acquired by the issue to an alien of letters of denization granted by the crown; and for this no previous residence is required. The grant may be temporary or conditional, and may either express the privileges conferred or confer all the rights of a naturalised subject. A denizen acquires his privileges as from the date of the letters. The grant is not retrospective, and therefore his children, if born outwith the king's dominions before the issue of the letters, do not acquire British nationality unless expressly included in the terms of the grant.

See *Reports upon the Laws of Foreign Countries* (1893).

Naturalism, a term once used as almost equivalent to Deism, and sometimes for nature-worship, also for brutish defiance of moral law, is now usually employed as synonymous with Realism (q.v.) in art, literary or other.

Natural Philosophy. See PHYSICS, SCIENCE.

Natural Selection. See DARWINIAN THEORY.

Natural Theology. See APOLOGETICS, and THEOLOGY.

Naturism, a derivative of Animism (q.v.) which attributes spiritual being to the various permanent and recurring natural phenomena.

Nau'cratis, an ancient city of Egypt, situated in the Nile delta, near the modern village of Nebireh, 47 miles SE. of Alexandria, existed in the 7th century B.C. It was the only city in Egypt at which the Greeks were allowed to trade, was celebrated for its artistic pottery, and was a centre for the worship of Aphrodite. The site was discovered by Flinders Petrie in 1884. His monograph *Naukratis* (1886) gives an account of the ruined temples and the many valuable archaeological discoveries made on this site. See also *The Annual of the British School at Athens* (1898-99).

Naugatuck, in Connecticut, on the Naugatuck River, 22 miles by rail NNW. of New Haven, manufactures gloves, rubber, cutlery, and iron-wares; pop. 15,000.

Nauheim, or BAD NAUHEIM, a watering-place of Upper Hesse, renowned for its medicinal springs.

Naumachia, a Greek word signifying literally a naval battle; afterwards, among the Romans, a spectacle which consisted in the imitation of a naval battle. Julius Cæsar was the first to introduce a naumachia into Rome, 46 B.C., causing a portion of the Campus Martius to be dug to form a lake, on which the spectacle came off. Augustus also made an artificial lake near the Tiber for the same purpose, and Claudius employed Lake Fucinus, where on one occasion 19,000 combatants were engaged for this purpose. The combatants were for the most part either captives or condemned criminals. These *naumachie* were not *sham-fights* any more than were ordinary gladiatorial combats; both sides fought on in real earnest for dear life until one was utterly overpowered.

Naumburg, a quaint old town of Prussian Saxony, on the Saale, in an amphitheatre of vine-clad hills, 30 miles by rail SW. of Leipzig. Of its six churches, the triple-towered cathedral (1207-42) is a noble Romanesque and Gothic structure. The manufactures include ivory carvings, combs, hosiery, &c. The yearly 'cherry feast' commemorates the raising of the siege of Naumburg by the Hussite leader Procopius in response to the supplication of the children (28th July 1432); but recent historians cast doubt on the whole episode. The seat of a bishopric (1059-1564), Naumburg suffered much in the Thirty Years' War; in 1814 it came to Prussia. Pop. (1875) 16,258; (1919) 28,545.

Naupactus. See LEPANTO.

Nauplia, a small town and seaport with an excellent roadstead in the Peloponnesus, Greece, at the northern extremity of the Gulf of Argos or Nauplia, 25 miles S. of Corinth. At an early period it was the port and arsenal of Argos. In the 13th century it was occupied by the Venetians (who called it Napoli di Romania), and it was taken by the Turks in 1540. From 1824 to 1835 it was the capital of Greece, and had a population of upwards of 12,000; but on the removal of the court to Athens it fell into decay. Pop. 4000.

Nauplius. See CRUSTACEA.

Nauru, a Pacific atoll in 0° 15' S. lat., 167° E. long., with a valuable phosphate deposit, was German from 1888 to 1914, when it was taken by the Australians. The Treaty of Versailles placed it under a mandate of the British Empire (Great Britain, Australia, and New Zealand jointly). Area, 8 sq. m.; pop. 2000 (one-half native).

Nausea is a distressing sensation always referred to the stomach. It is unattended by pain, but is usually accompanied by a feeling of general languor or debility, a small and often irregular pulse, a pale, cool, and moist skin, general mus-

cular relaxation, an increased flow of saliva, and a sensation that vomiting will supervene. It is most commonly a *direct* symptom of disease or disorder of the stomach, but sometimes it is a very important *indirect* symptom of disease of some part at a distance from the stomach—as, for example, the brain or the kidney. The nausea which is so troublesome to pregnant women is due to the irritation excited by the enlarged uterus being reflected by nervous agency to the stomach. Seasickness is separately discussed.

Nausicaa, a charming female character of Homer's *Odyssey* who hospitably entertained the shipwrecked Odysseus at the court of her father Alcinoüs, king of the Phæacians.

Nautch Girls, or BAYADERES, public female dancers in India and the East Indies. Their performances constitute a principal part in the spectacular entertainment called a nautch or natch.

Nautical Almanac See ALMANAC.

Nautilus, a remarkable mollusc in the class of Cephalopods, the only surviving member of a race once abundant. It differs conspicuously from the other extant Cephalopods or 'cuttle-fish' in possessing a shell, within the outermost chamber of which it lives, while the lobes of the 'foot' round about the mouth bear numerous tentacles retractile into sheaths, the 'siphon' consists of two free folds, the eyes are open sacs without cornea or lens, there are four gills and four kidneys, and there is no ink-bag. The spiral shell, coiled in one plane like that of the water-snail Planorbis, differs from this in being chambered; moreover, the foot or ventral side of the enclosed animal is towards the outside in Nautilus, towards the inside in Planorbis. When young the Nautilus lives in a small shell bent like a horn; with growth this is increased spirally, but as the animal periodically draws itself onwards and closes a door behind it, a chambered spiral results, in which the original shell is in the very centre. The successive chambers are all connected, however, by an organic, partially calcareous tube; and all except the outermost, in which the animal lives, are filled with gas—apparently a mixture of oxygen and nitrogen somewhat different from air. The outside of the shell is covered with a thin

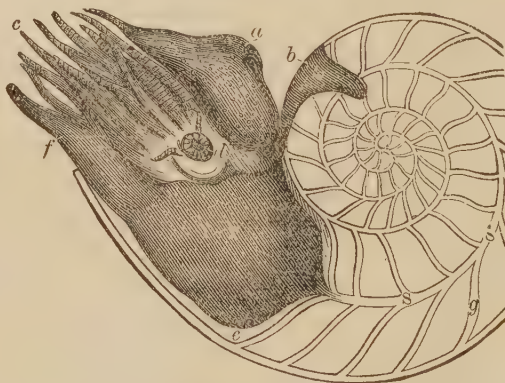


Fig. 1.—Pearly Nautilus (after Owen). Contracted spirit specimen, with the shell in section:

a, dorsal 'hood'—a portion of the 'foot'; b, a portion of the mantle reflected on the shell; c, tentacles; d, eye; e, ventral side of visceral hump; f, funnel; g, a partition between two chambers; s, siphuncle or tube traversing the chambers.

organic layer, beneath which there is a porcelain-like stratum with bands of colour, while internally the lime has the usual mother-of-pearl structure, the lustre of which, often artificially exposed by the use of acids, has earned for the animal its common name of Pearly Nautilus.

Though the Nautilus seems to have been known to Aristotle, and though the shells have always been familiar, the animal itself is rare. The rarity of specimens, so evident from the fact that only one was collected on the *Challenger* expedition, is mainly due to its habitat in somewhat deep water. But it must also be noted that the natives of Fiji, the New Hebrides, the Moluccan Islands, &c. catch the animal in lobster-pots and eat it with relish. Dr Willey studied the Pearly Nautilus in New Britain (Neu Pommern), where he kept them in cages in the sea. The Nautilus probably creeps or gently swims along the sea-bottom, feeding on crustaceans and the like; but it is also seen floating on the surface, probably washed up by storms and injured by the waves. The species best known is *Nautilus pompilius*, but there are probably four or five others, while the fossil relatives are reckoned in hundreds.

The *Paper Nautilus* (*Argonauta*) is a very different animal, like an octopus except that the



Fig. 2.—Female Paper Nautilus, showing the two modified arms which make and embrace the shell.

female bears a beautiful, translucent, ribbed shell in which the eggs are sheltered. But this shell is not in any way comparable to that of the Nautilus or of other molluscs; it is a cradle, not a house; it is secreted and embraced by two broadened dorsal 'arms,' not by the mantle; it is unchambered and peculiar to the females. The Argonaut was credited by Aristotle with the power of lifting its broad arms, and of thus sailing before the wind, but there is no truth in this fancy often reiterated by poets and naturalists. For the Argonaut squirts water from its funnel and swims backwards like any other cuttle-fish, or else creeps along the bottom. At the breeding season it is a pelagic surface swimmer in tropical seas, at other times it seeks the depths. The male measures little more than an inch in length, only about a tenth of the size of his mate, and he is also notable for the modification of one of the arms into a detachable sac of spermatozoa, formerly mistaken for a parasitic worm. Some half-dozen living species are recorded. See CEPHALOPODA, CUTTLE-FISH.

Nauvoo' (Heb., 'beautiful'), a city of Illinois, on the Mississippi, in a fertile fruit-growing country, 14 miles above Keokuk. It was built by the Mormons (q.v.) in 1840, and in a few months contained a prosperous population of 15,000. Its principal feature was a great temple of white limestone (1845). After the expulsion of the Mormons in 1846, the temple was ruined by a fire and a tornado. The town was for a time occupied by French Socialists, and has now only 1000 inhabitants.

Navajo, an American Indian tribe of Arizona and New Mexico, of Athabaskan speech, long marauders, are now peaceful horse-breeders and

blanket-weavers. Their traditions go back to the 14th century. They give their name to a county in Arizona.

Naval Reserve. See NAVY.

Navan, a market-town in Meath, at the junction of the Boyne and Blackwater, 16 miles W. of Drogheda; pop. 4000.

Navarino (officially *Pylos*), a town of 2000 inhabitants, with a good harbour, on the SW. coast of the Morea, near the ancient Pylos, the city of Nestor. The Bay of Navarino was the scene of a great sea-fight between the Athenians and Spartans (425 B.C.), in which the latter were defeated; and on the 20th of October 1827 it saw the Turkish and Egyptian navies annihilated by the combined British, French, and Russian fleets under Codrington.

Navarre, once a kingdom in the Pyrenees, but since 1512 divided into Spanish Navarra and French Navarre (now Basses Pyrénées). Spanish Navarra, by far the greater, between France, Aragon, Castile, Alava, and Guipúzcoa, has an area of 4000 sq. m. and a pop. of 312,000. It is one of the most varied provinces of Spain in surface and climate; at its north-west corner the rainfall is one of the heaviest in Europe, while in the south-east the steppes of the Bardenas Reales are almost sterile for want of water. The mountains of the northern frontier range, west to east, from 3000 to 8000 feet of altitude. With the exception of the Bidassoa, which enters the Atlantic at the inner angle of the Bay of Biscay, the numerous other streams flow at right angles to the Pyrenees, and are all affluents of the Ebro; the principal are the Aragon, Arga, and Ega. The mountain-valleys are narrow but fertile. By the energy of the Basques, who do not live like the Spaniards only in towns and villages, cultivation is carried on almost everywhere. The chief productions are maize, wheat, chestnuts, apples, and a strong red wine. Cattle abound, but not many sheep or horses. Minerals are found in the Pyrenees, and mines of argentiferous lead, copper, and iron are worked; rock-salt also is found in the province. The wild animals include the bear, wolf, roe-deer, ibex, in the mountains of the Aragonese frontier; foxes, wild cat, genet, otter, marten, &c. are in sufficient numbers to make commerce of their skins. The population of Navarre is generally bilingual; from a little to the south of Pamplona northwards Basque prevails; to the south Spanish only is spoken. Until now Spanish has encroached far more on Basque in Navarra than has French in Basse-Navarre.

History.—In Roman times the country now called Navarre was occupied by the Iberian Vascones, who have given their name both to Basques and Gascons. Within historic times there has been a strong Celtic element in the country. The capital, Pamplona (*Pompeopolis*), recalls the Roman Triumvir, but the older native name, Irun (*Irunean*), is often on books printed at Pamplona. The subjection of the Vascones to the Visigoths was nominal only. On the downfall of the latter and the incursion of the Arabs the mountains of Navarre became one of the early centres of resistance and of reconquest. From the native chiefs, or counts, arose the first dynasty of Navarre—Garcia Jimenez (860) to Sancho the Strong (1234). The history of Navarre is full of interest. In 778 the rout of Charlemagne's rear-guard, and the death of Roland at Roncesvalles, furnished a theme for countless poems and romances. With Aragon and Castile Navarre shares the honour of being one of the first countries in which parliamentary rule with representation of towns and commons (*Universidades*) obtained. The Cortes (*Curiae*) arose out of the Councils, and there was regular represen-

tation of the three orders before the close of the 12th century. During this period Navarre gained its name and modern limits, but under Sancho the Great (1028-35), and again (1109-34) under Alfonso I., it seemed as if the union completed under Ferdinand and Isabel would have taken place three or four centuries earlier. Sancho the Strong left no male heirs, and the future succession of Navarre was singularly broken from the same cause. The crown passed to Thibaut, count of Champagne, through the younger daughter. There were three kings of this house from 1234-84, when the crown passed by marriage to Philippe le Bel of France. Five kings of France (1284-1328) reigned over Navarre, when, through the female succession, it passed to Philippe, count of Évreux; three kings of this line succeeded—Philip III., Charles II. the Bad, and Charles III. Under them Navarre reached its highest prosperity; most of the architectural beauties of Navarre date from this period, 1328-1416. Navarre had been always closely connected with Aragon, and three of its kings had already borne the title of Aragon and Navarre. Blanca, the daughter of Charles III., married first Martin, king of Sicily, and after his death Juan II. of Aragon. Civil war arose between him and his son, Don Carlos, Prince of Viana, one of the most interesting characters of his time. The factions of Beaumont (Don Carlos) and of Agramont (Juan II.) proved the ruin of Navarre. Henceforth her jealous neighbours could always rely on the support of one or other in their encroachments. Leonor, the daughter of Juan II., married Gaston of Foix, and thus Navarre became united to Béarn; her granddaughter, Catharine de Foix, married Jean d'Albret in 1486, and during their reign in 1512 the Duke d'Alba conquered Navarre, which has since been united with the Spanish crown. French Navarre was joined to that of France by the accession of Henri of Navarre in 1589, but the formal union was not completed until 1620 by Louis XIII. After its union Spanish Navarre was governed by a viceroy, and retained its own cortes, mint, style of kings (Carlos III. of Spain was VI. of Navarra, &c.), power of taxation, and *Fueros* (q.v.). These privileges were almost wholly lost by the first Carlist war (1833-39), and were still more diminished by the second (1872-76). Navarre is now one of the forty-nine provinces of Spain, with merely local self-government in minor matters in certain districts. In France Basse Navarre preserved its *fueros* till 1789, refused to send deputies to the States-general as part of France, and declared that it would only accept the new constitution if it were better than its own. The *fueros* of Navarre are more like those of Aragon than those of the Basque Provinces. In their written form they are probably not older than the 13th century, but many provisions point back to a higher antiquity. The seven *Fazanas* (precedents) are in the form of apologies, animals are considered as morally responsible and guilty of homicide towards each other, marriage is a civil right, the children of a concubine (*barragana*) are provided for, compurgation is in full force, and social excommunication is inflicted on those who will not conform to the customs. Toleration is extended to Moors and Jews, and the oath to be taken by the latter is very long and curious. In the Cortes the power of taxation was secured by supplies being withheld until all grievances had been redressed. With consent of the Cortes the king might amend, but could not impair the *fueros*. Navarre was a frontier of the English possessions in south-west France from 1152 to 1453. Richard I. and Henry IV. married princesses of Navarre; had the former had issue, they would have been heirs of Navarre in preference to the counts of

Champagne. Charles the Bad was the ally of the Black Prince, who passed through his dominions to Navarrete. Wellington blockaded Pamplona, and marched through Navarre in 1813-14.

See P. J. Moret, *Investigaciones Historicas del reyno de Navarra* (1 vol. 1665) and *Anales del reyno de Navarra* (3 vols. Pamplona, 1684)—both reprinted by E. Lopez of Tolosa in 1890-91; Tanguas, *Diccionario de las Antigüedades de Navarra* (4 vols. Pamplona, 1840-43); *Fuero General de Navarra* (Pamplona, 1869); *La Navarre Française*, par M. G. B. de Lagrèze (2 vols. Paris, 1881); the decisions of the Cortes under title *Quaderno de las Leyes y Agrarios Reparados*, &c., vol. vii., and V. de la Fuente, *Estudios Críticos sobre la Historia y el Derecho de Aragon*, vols. i. and ii. (Madrid, 1884-85).

Navarrete, JUAN FERNÁNDEZ, a Spanish painter, born at Logroño in 1526, died at Toledo in 1579. Losing his powers of hearing and speech at an early age, he developed a marked aptitude for sketching, and was sent to study art at Estrella. Navarrete, called El Mudo ('the mute') from his physical affliction, sojourned in Italy, where he was a pupil of Titian, and finally returned to Madrid, becoming in 1568 the royal painter to Philip II. He left many paintings at the Escorial, notably his 'St Jerome' and 'Holy Family.' His 'Nativity' and 'Abraham receiving the Three Angels' are worthy of notice. See Stirling-Maxwell, *Annals of the Artists of Spain* (1891).

Nave. See CHURCH, GOTHIC ARCHITECTURE.

Navelwort (*Cotyledon Umbilicus*), a plant of the family Crassulaceae, characteristic in Britain of the west coast, where it grows on walls and rocks. It takes its names from the concave peltate fleshy leaves. The pendulous flowers are yellowish-green. To the same genus belong about 100 species in the Old World, Mexico, and South America.

Navev (Fr. *navette*), a garden vegetable much cultivated in France and other parts of the continent of Europe, although little used in Britain. *Brassica Napus*, or Rape (q.v.), is regarded as a cultivated variety of *B. campestris*, sometimes called Wild Navev, the species which is also supposed to be the original of the Swedish Turnip (q.v.). But the relationships of these long-cultivated plants are obscure. The part used is the swollen root, which is rather like a carrot in shape. Its colour is white. Its flavour is much stronger than that of the turnip. It succeeds best in a dry, light soil. The seed is sown in spring, and the plants thinned out to 5 inches apart. *Wild Navev* is extensively cultivated in the north of France and Holland for the sake of its seed, which yields Colza oil.

Navicular Disease, in the horse, consists of an inflammation, often of a rheumatic character, of the small bone—the navicular—below which passes the strong flexor tendon of the foot and the bursa between them. It is most common among the lighter sorts of horses, especially when they are given early and severe work on hard roads. It soon gives rise to a short tripping yet cautious gait, undue wear of the toe of the shoe, and projecting or 'pointing' of the affected foot whilst standing. Even when early noticed and in horses with well-formed legs, it is often incurable; and when of several weeks' standing it leads to so much inflammation and disease of the tendon and adjoining parts that soundness and fitness for fast work again are seldom attained. In order to reduce the pain and inflammation, rest should at once be given, the shoe removed, the toe shortened, and the foot placed in a large, soft, hot poultice, changed every few hours. Laxative medicine and bran mash should be ordered, and a soft bed made with short litter. After a few days, and when the heat and tenderness abate, cold applications should supersede the hot; and after another week a blister may be

applied round the coronet, and the animal placed for two months in a good yard or in a grass field, in which the ground is soft and moist, or, if strong enough, at slow farm-work on soft land. Division of the nerve going to the foot removes sensation, and is useful in relieving animals intended for slow work. It often enables young animals with good feet to work sound for years, but is not to be recommended in older animals where fast work is required, for the animal, insensible to pain, uses the limb as if nothing were amiss, and the disease rapidly becomes worse. Navicular disease is very often hereditary; hence horses suffering from it should never be used for breeding purposes.

Navigation Laws. The importance of the early maritime codes in developing International Law is indicated in that article. Laws restricting foreign trade and supposed to be in favour of native commerce and shipping are of very ancient date. Thus, in England, by a statute of Richard II., in order to augment the navy of England, it was ordained that none of the lieges should ship any merchandise out of the realm except in native ships, though the statute was soon evaded and seldom followed. At length in 1650 an act was passed with a view to stop the gainful trade of the Dutch. It prohibited all ships of foreign nations from trading with any English plantation without a license from the Council of State. In 1651 the prohibition was extended to the mother-country, and no goods were suffered to be imported into England or any of its dependencies in any other than English bottoms, or in the ships of that European nation of which the merchandise was the genuine growth or manufacture. At the Restoration these enactments were repeated and continued by the Navigation Act (12 Char. II. chap. 18), with the further addition that the master and three-fourths of the mariners should also be British subjects. The object of this act was to encourage British shipping, and was long believed to be wise and salutary. Adam Smith, however, perceived that the act was not favourable to foreign commerce or to opulence, and it was only on the ground that defence was more important than opulence that he said it was 'perhaps the wisest of all the commercial regulations of England.' In 1826 the statute 4 Geo. IV. chap. 41 repealed the Navigation Act, and established a new system of regulations, which were further varied by subsequent statutes, till, under the influence of the free-trade doctrines, new statutes were passed which reversed the ancient policy. It was not, however, till 1854 that the English coasting trade was thrown open to foreign vessels. In the United States the coasting trade is reserved exclusively to American vessels. As regards those laws of navigation which affect the property and management of ships, a complete code of regulations is contained in the Merchant Shipping Acts.—On navigation, see GEOGRAPHY, LATITUDE and LONGITUDE, GREAT CIRCLE SAILING, &c.

Navigators' Islands. See SAMOA.

Naville, HENRI ÉDOUARD, was born at Geneva in 1844. Educated at the universities of Bonn, Paris, and Berlin, he devoted himself from 1883 to Egyptian excavation. He is the author of many books on the subject, especially on its religious side, among them being *La religion des anciens Égyptiens* (1906), *L'Évolution de la langue égyptienne et des langues sémitiques* (1920), *The Law of Moses* (1920).

Navy. The ancient method of naval warfare consisted in great part in the driving of beaked vessels against each other; and therefore skill and celerity in manœuvring, so as to strike the enemy at the greatest disadvantage, were of the utmost importance. The victory thus usually remained

with the best sailor. These vessels were propelled by oars, which were arranged in one, two, or three banks, according to size of ship; the oars were manned by men sitting or standing on platforms arranged above each other according to the number of banks; those with three banks of oars were called triremes. The earliest powers having efficient fleets appear to have been the Phœnicians, Carthaginians, Persians, and Greeks; the Greeks had fleets as early as the beginning of the 7th century B.C.—the first sea-fight on record being that between the Corinthians and their colonists of Corcyra, 664 B.C. The earliest great battle in which tactics appear to have distinctly been opposed to superior force, and with success, was that of Salamis (480 B.C.), where Themistocles, taking advantage of the narrows, forced the Persian fleet of Xerxes to combat in such a manner that their line of battle but little exceeded in length the line of the much inferior Athenian fleet. The largest triremes in the Persian fleet were manned by 200 rowers and 30 fighting-men; there were 1200 triremes and 3000 smaller vessels, while the Greek fleet consisted of 366 triremes only, with a certain proportion of smaller vessels, yet they succeeded in inflicting a crushing defeat on the Persians. The Peloponnesian war, where 'Greek met Greek,' tended much to develop the art of naval warfare. But the destruction of the Athenian maritime power in the Syracusan expedition of 414 B.C. left Carthage mistress of the Mediterranean. The Roman power, however, gradually asserted itself, and after two centuries became omnipotent by the destruction of Carthage; the greatest Roman sea-fight was that of Actium (q.v.) in 31 B.C. Gradually fighting with pointed prows was discontinued in favour of running alongside and boarding. Onagers and ballistæ were also carried in the ships and used as artillery.

The northern invaders of the empire, and subsequently the Moors, introduced swift-sailing Galleys (q.v.), warring both in small squadrons and singly, and ravaging all civilised coasts for plunder and slaves; the Norsemen penetrated in every direction from the Bosphorus to Newfoundland. As a defence against these marauders, the mediæval navies gradually sprang up. In the 16th century, so powerful was the Turkish fleet that a combination of the Christian powers was formed for self-defence; and in 1571 the battle of Lepanto (q.v.) broke the naval power of the Turks. Thereafter the Venetian and Maltese fleets became the most powerful; but by the 17th century naval power was falling into the hands of the English, French, Dutch, and Spaniards.

The destruction of the Spanish Armada in 1588 by the English fleet placed Great Britain in the front rank of naval powers, while Spain received a blow from which she never completely recovered. The Commonwealth and reign of Charles II. were signalised by the struggle for mastery between the English and Dutch; but victory finally sided with the former. In the 18th century Great Britain and France were the two great rivals, and during the American War of Independence the naval power of this country was seriously threatened. The Dutch and Spanish fleets were still formidable, and Russia as a naval power added a new element of danger. Camperdown broke the Dutch power; many disastrous battles weakened the French navy; and at Trafalgar in 1805 the French and Spanish navies were swept temporarily from the ocean, leaving Great Britain the mastery of the seas.

MODERN NAVIES.—*France.*—Soon after the peace of 1815 the French fleet was again brought up to its old strength. France was the first country to commence the construction of an ironclad fleet by the launch of the armoured frigate *Gloire* at Toulon in 1859, and from that date up to 1889 the French

armoured fleet was a formidable rival to our own. But from the passing of our Naval Defence Act in 1889 her navy dropped steadily behind—a result brought about partly by the refusal of the French chambers to vote the necessary money, and partly because a powerful school had been advocating the building of nothing but cruisers, believing that a 'corsair war,' directed solely against her trade, would prove the most effective weapon in the event of a war with Great Britain. But in 1899 the then Minister of Marine and the Superior Council of the Navy placed on record their opinion that the 'minimum' number of first-class battle-ships France required was twenty-eight, organised in four squadrons of six ships each, with a spare ship for each division; that as each division of six ships was completed a new division should be laid down until by 1916 the full number should be made up, and pace would thus be kept with the latest German programme. The chambers sanctioned in 1900 the commencement of a new programme providing for the construction of six powerful battle-ships, besides cruisers and smaller vessels. France has given the lead to all countries in the matter of submarines (see SUBMARINE NAVIGATION).

United States.—From the commencement of the War of Independence the Americans began to build a fleet, and during that war and the war of 1812-14 they maintained on the sea a glorious, although unequal, struggle with Great Britain. The Secession in 1860 found the navy at a low ebb, and the vessels built in the next four years were mostly gunboats for blockading and monitors (see below) for coast and river work. During the twenty years after the war the navy was again much neglected, but since 1887 great efforts have been made to construct a new fleet of the most formidable character. In the war with Spain in 1898 the United States squadrons in China and the West Indies easily annihilated those of Spain. Since then the United States has embarked on a more ambitious building programme, which had by 1914 raised her to the third place among the great naval powers, and has now put her second to Great Britain.

Germany.—The German navy dates from the acquisition of Kiel by Prussia after the war with Denmark in 1864. The fleet was too weak to count in the war with France in 1870; and although from that time on it increased steadily, it was not until after 1895 that Germany showed any determination to become a great naval power. From his accession in 1888 the Kaiser William II. insisted that a powerful fleet was essential not only to the interests but to the future existence of the German empire. But it was only after 1896 that he was able to bring the Reichstag and people round to his views. In 1898 a Naval Act was passed fixing the strength of the future German fleet at thirty-eight first-class battle-ships—four squadrons of eight ships each, with a spare ship for each squadron, and two additional ships as flag-ships, with cruisers and torpedo-boat destroyers. The new programme was to be completed in 1916, but in 1914 the Great War found the German fleet but little inferior in material to the British fleet except in matter of submarines; it was actually numerically superior in torpedo craft and in mines and mine-layers.

Russia.—The Russian navy was founded by Peter the Great, but has never had much opportunity of distinguishing itself. In 1853 the bulk of the Black Sea fleet was sunk in order to block the entrance to the harbour of Sebastopol, and the remaining ships were burnt when the Russians evacuated the town in 1855. By the abrogation of the Black Sea clauses of the treaty of Vienna in 1871 Russia re-

gained a free hand; and although during the war with Turkey (1877-78) her fleet was unable to make head against that of Turkey, from 1890 Russia's naval force in those waters dominated the Dardanelles and Constantinople. The Russian fleet steadily increased, so that in 1904, at the outbreak of the war with Japan, it stood next to that of the United States. But from the beginning the Japanese proved more than a match, and in and about Port Arthur and Vladivostok annihilated the Pacific fleet.

Italy.—The Italian navy dates from the absorption of Naples by Sardinia in 1860. After the disastrous defeat of the Italian fleet off Lissa by the Austrians in 1866, successive Italian governments devoted large sums towards building up a powerful navy, and in 1893 Italy could fairly claim to rank as a first-class naval power, next to France. But owing to financial difficulties, Italy had so far fallen behind that in 1914 her fleet ranked below those of the United States and Germany.

Austria-Hungary.—The Austrians from 1840 possessed a small navy, but for its size one of the most efficient, as was shown during the war of 1866, when the numerically and generally inferior fleet under Tegethoff annihilated the Italian under Persano off Lissa.

Turkey.—The Turkish navy, once the terror of the Mediterranean, sustained at Navarino (q.v.) in 1827 a crushing defeat, from which it never recovered. In 1853 a division of the Turkish fleet was completely destroyed by a superior Russian force at Sinope; but as a result of the restrictions imposed on Russia after the Crimean war, and of the energy infused into Turkish naval administration by Hobart Pasha, in 1877 the Russian fleet was paralysed by the superior Turkish force, which retained command of the Black Sea during the war.

Spain.—Unlike France, Spain never recovered from the blow inflicted at Trafalgar. The war with the United States in 1898 proved disastrous to Spain, her four finest armoured cruisers and several smaller ships being destroyed or captured in the battles of Manila Bay (April) and Santiago de Cuba (July); and in 1904 one first-class battle-ship was all that was left to the country which once held the undisputed mastery of the sea.

Japan.—Japan has swiftly become a naval power to be reckoned with, as was triumphantly shown from the beginning of the war with Russia. Even before the civil war of 1868-69, the government had recognised the necessity of creating a fleet on the European model, and had applied to the English government for some officers to be lent as instructors; and in 1867 a picked staff of officers and petty officers was sent out. A naval college was organised; the Japanese, both officers and men, proved apt pupils; dockyards were constructed at Yokosuka and at Nagasaki, and so well organised that in 1875 they were able to dock large warships at Yokosuka, the whole work being carried out by the Japanese employees of the yard. In 1878 a corvette was cruising in European waters, which was built at Yokosuka to Japanese designs, by Japanese workmen, everything about her, including the engines and guns, being turned out in the country, and she was manned entirely by Japanese officers and men. In the war with China (1894-95) the smaller and weaker Japanese fleet destroyed or captured that of China, though the officers and men of the Chinese fleet had been well trained by English officers. At the battle of the Yalu the Japanese ships were manœuvred with great skill. In the war with Russia in 1904-5 the interest largely centred in the steps by which the Japanese fleet secured the command of the seas, and ultimately shut up the Russian Pacific fleet in Port Arthur and Vladivostok.

THE BRITISH NAVY.—Alfred the Great was the founder of the English navy; an advantage gained by some ships of his over the Danes in 876 induced him to build long ships and galleys, which, as his countrymen were not competent to manage them, he partly manned with piratical foreigners. After he had driven out the Danes he built vessels higher, longer, and swifter than before, some rowing more than thirty pairs of oars. Under his successors the number of vessels increased, and both Edward the Elder and Athelstan fought many naval battles with the Danes. Edgar aspired to be lord of all the northern seas, and had from three to five thousand galleys, which he divided into three fleets, on the western, southern, and eastern coasts respectively. Ethelred II. enacted that every owner of 310 hides of land should build and furnish one vessel for the service of his country. When the right to press private ships for the service of the crown originated is not clear, but in 1049 a fleet of Edward the Confessor consisted partly of 'king's ships' and partly of 'people's ships.' William the Conqueror established the Cinque Ports, and gave them certain privileges, on condition of their furnishing fifty-two ships for fifteen days, carrying twenty-four men each, in case of emergency. Richard I. took one hundred large ships and fifty galleys to Palestine, and it was he who at 'Grymmesby,' by the advice of 'many lords of the Realme,' issued the first known ordinance empowering the 'Admiral' to seize private ships for the public service, and fixing a 'yeare's imprisonment' as the punishment for the crime of desertion. King John claimed for England the sovereignty of the seas, and required all foreigners to strike to the English flag, an honour which was exacted by the English admiral off Southampton Water from the fleet bringing Philip II. of Spain hither to espouse Queen Mary. This honour was formally yielded by the Dutch in 1673 and the French in 1704, but the custom fell into disuse after the peace of 1815. In 1293 a great naval action was fought in mid-Channel with the French, when the English captured 250 sail; and Edward III. with the Black Prince at Sluys in 1340 defeated a greatly superior French fleet. It was Edward III. who first appointed a 'High Admiral of all the Fleets,' Sir John de Beauchamp being the first holder of this high office, and it was also in his reign that the first authentic records as to the mounting of guns in some of the ships of the fleet appear. In the Public Record Office is an 'Indenture between the Clerk of the ships, galleys, &c. and the Keeper of the same, supplying to the latter, among certain other stores for the ship called the *Bernard de la Tour*, two iron guns; also to the *Marie de la Tour*, one iron gun of two chambers, and another of brass.' In the reign of Richard II. parliament passed the first statute legalising 'pressing for the king's navy,' and laying down penalties for desertion. This act was held to be still in force in a case tried at Bristol in 1743, when the legality of pressing men for the king's navy was upheld.

Henry V. added to the navy; but Henry VII. seems to have been the first king who thought of providing a naval force which might be at all times ready for the service of the state. He built the *Great Harry*, the largest ship yet constructed for the royal navy. She cost £15,000, and was accidentally burned in 1553. To Henry VIII., however, belongs the honour of having laid the foundation of the British navy as a distinct service. He constituted the Admiralty and Navy Office; established the Trinity House, and the dockyards of Deptford, Woolwich, and Portsmouth; fixed regular salaries for the admirals, captains, and sailors; and made the sea-service a distinct profession. In 1512, when a fleet was fitted out against France

under Sir Edward Howard, Lord High Admiral, the following allowances were made: for his own diet, maintenance, wages, and rewards per diem, 10s.; each captain for his own diet, maintenance, wages, and rewards per diem, 1s. 6d.; every soldier, mariner, and gunner for his wages per lunar month, 5s., and for his victuals, 5s. In 1515 King Henry caused the *Henri Grace-à-Dieu*, of about 1000 tons and carrying 122 guns, to be constructed, in emulation of a somewhat similar ship called the *Caracon*, but only carrying 100 guns, which had lately been built by Francis I. of France. She appears to have been built rather for magnificence than for use; only thirteen of her guns were 9-pounders or upwards, and she is



Fig. 1.—The *Great Harry*.

said to have steered badly and rolled heavily. After making one voyage, she was disarmed at Bristol and suffered to decay. The French ship was still more unfortunate, being accidentally destroyed by fire at Havre. The ships of this period were high, unwieldy, and narrow, with lofty poops and forecastles, while their guns were very close to the water. At the death of Henry VIII. the tonnage of the navy was 12,000 tons; and there were some fifty ships, manned by 8000 men. Elizabeth increased the fleet greatly. The fleet which met the Spanish Armada numbered 176 ships, armed by 14,996 men; but these were not all 'shippes royal,' for she encouraged the merchants to build large ships which were as much fighting-ships as traders, and rated at 50 to 100 tons more than they measured. She raised the wages of seamen to 10s. per month. Signals were first used in this reign as means of communication between ships. In the reign of James I. lived the first able and scientific naval architect, Phineas Pett; he introduced a better system of building, and relieved the ships of much of their top-hamper, abolishing the lofty poops and forecastles. In 1610 he laid down the *Prince-Royal*, a two-decker carrying sixty-four guns; and in 1637 from Woolwich he launched the celebrated *Sovereign of the Seas*, the first three-decker and the largest ship hitherto constructed on modern principles. She was 232 feet in length, of 1637 tons, and carried at first 130 pieces of cannon. Being found unwieldy, she was cut down, and proved an excellent ship, but was burned in 1696. In this reign the navy was first divided into rates and classes. Cromwell left 154 sail, measuring 57,643 tons, of which one-third were two-deckers. He was the first to lay before parliament annual estimates for the support of the navy, and obtained £400,000 for that purpose. During the Protectorate Peter

Pett, son of Phineas, built the *Constant Warwick*, the earliest British frigate, from a French design and pattern. The Duke of York, afterwards James II., assisted by the celebrated Samuel Pepys, as Secretary, did much for the navy. He appointed a new commission when he came to the throne, with which he joined Sir Anthony Deane, the best naval architect of the time, who essentially improved the ships of the line by copying from French models. At this time, and during the 18th century, naval architecture was zealously studied in France, and the English constructors were so sensible of their inferiority that even up to the beginning of the 19th century all our best ships were either captured from the French or copied from them. At the Revolution of 1689 the fleet was in excellent condition, with sea stores complete for eight months for each ship. The force consisted of 184 vessels, carrying 6930 guns and 42,000 men, whereof nine were first-rates.

William III. added greatly to the navy, which numbered at his death 272 ships of 159,020 tons, the annual charge being £1,056,915. The dockyard at Hamoaze, out of which has since grown the considerable town of Devonport (q.v.), was also established during his reign (see also the article DOCKYARDS, ROYAL).

At the death of Queen Anne in 1714 the number of ships was less, but the tonnage relatively greater, there being 198 ships, carrying 10,600 guns, the tonnage being 156,640. In 1747 a naval uniform was first established. The navy increased rapidly during the reigns of the first two Georges, and at the accession of George III. consisted of 127 ships of the line and 198 of fifty guns and under, measuring 321,104 tons, and manned by 70,000 seamen and marines. The navy was kept in a high state of preparation, and when, in February 1793, the French Republic declared war against England, in a few weeks fifty-four sail of the line and 146 smaller vessels had put to sea completely equipped. The whole fleet in 1793 consisted of 122 ships of the line, 97 frigates, and 102 sloops and smaller vessels, manned by 85,000 seamen and marines. The navy of France had never been so powerful; it amounted to above 200 vessels, of which 82 were of the line, and 71 were in addition ordered to be built. The English had about 115 sail of the line fit for service; but the majority of the French ships were larger and finer, and carried heavier guns on their lower or principal battery. The following abstract will show the losses on both sides up to the peace of Amiens (1802).

	Captured.	Destroyed.
English ships of the line.....	5	0
Smaller vessels.....	37	9
Total.....	42	9
French ships of the line.....	32	11
Dutch " ".....	18	0
Spanish " ".....	6	5
Danish " ".....	2	0
Total.....	58	16
French smaller vessels.....	266	44
Dutch " ".....	62	6
Spanish " ".....	57	10
Grand total.....	443	76

This estimate does not include 807 privateers, chiefly French, taken and destroyed. Of the above, 50 sail of the line and 94 under that size were added to the British navy.

During the peace of Amiens preparations for war were actively continued on both sides, and when war broke out again in March 1803 the British fleet consisted of 153 ships of the line and 411 under that size, manned by 120,000 seamen and

marines. 'In the year 1809,' to quote the words of Alison, 'the British fleet was at the zenith of its power, and Great Britain first appeared in the field on a scale adequate to her mighty strength. With a fleet of near 1100 vessels, including 240 of the line, manned by 140,000 men, she blockaded every hostile harbour in Europe, and still had 37 ships of the line to strike a blow at the Scheldt. With 100,000 regular troops she maintained her immense colonial empire; with 191,000 more she ruled India; with 400,000 militia she guarded the British Isles; while her fleet could convey yet another 100,000, with which she menaced, at once, Antwerp, Madrid, and Naples; while Lord Minto, the Governor-general of India, announced in his despatches with well-founded pride that "from Cape Comorin to Cape Horn a French flag could nowhere be found flying."'

The following abstract shows the losses on each side from 1803 to the end of the war, during which 33 sail of the line and 68 under were added to the British navy.

	Captured.	Destroyed.
British ships of the line.....	0	0
" " under.....	83	7
Total.....	83	7
Enemies' ships of the line.....	55	14
" " under.....	79	23
Total.....	134	37

Since the peace in 1815 the number of vessels has been greatly diminished, although their power has vastly increased.

The progressive augmentation of size in vessels may be judged from the increase in first-rates. In 1677 the largest vessel was from 1500 to 1600 tons; by 1720, 1800 tons had been reached; by 1745, 2000 tons; 1808, 2616 tons; 1853, 4000 tons; 1860, 6959 tons—the *Victoria*, the last three-decker built in England; while the *Warrior*, the first ironclad built in Britain, and launched in 1861, was 9210 tons, in 1903 ironclads were building of 16,500 tons, and in 1919 of over 40,000 tons. We may observe by the way that up to the year 1860 the ships were practically the ships of the last two centuries—improved and developed largely, certainly, by the introduction of steam, of increased tonnage and of better lines, but still the same ships, and in the matter of armament with but little improvement to record over the beginning of the century. In 1786 the *Victory* was launched; she was at that time the largest three-decker in the English service; she is 186 feet long, has a tonnage of 2100 tons, and carried 100 guns, the bulk of which were long 32-pounders, weighing 56 cwt. In 1859 the flag-ship in the Mediterranean was the screw three-decker, the *Marlborough*; she was 282 feet long, 6100 tons, and carried 121 guns; her lower-deck guns were 65 cwt. 8-inch shell guns throwing a shell with bursting charge inclusive of 56 lb., while her remaining guns were the long 56 cwt. 32-pounders, with which the *Victory* had been armed nearly a century before. But since 1860 a vast revolution has been effected in our naval forces, and it seems almost incredible that in so short a space so great a transformation should have taken place. Masts and sails have disappeared, the wooden walls of Old England are things of the past, and, instead of the graceful frigate and stately line-of-battle ship, our battle-ships of the present day are floating castles protected with massive armour, crammed with engines, without which they could neither move nor fight their guns; elaborate provision for ventilation below is required; while the 32-pounders and 10-inch shell guns have given place to 70-ton rifled guns, throwing projectiles of 2000 lb. weight.

The use of steam as a propelling-power is the agent by which this change has been effected. From 1841 a gradual substitution of steam for sailing vessels began, which was not completed, however, until 1860; in fact, the last sailing-frigate in commission, the *Calypso*, only returned from the Pacific at the latter end of 1861. The first war steamers were all paddle-wheel vessels, and this mode of propulsion brought a change in the armament, or rather in the method of mounting guns. The paddle-wheels being quite exposed, and the machinery also being mostly above the water-line, there was great danger that a lucky shot would soon put a ship out of action, if compelled to fight broadside to broadside, as ships had been accustomed to do formerly. To obviate this danger as far as possible, the few guns these paddle-ships carried were mounted as pivot-guns, by which a far larger arc of training was possible than to a gun mounted on the broadside, thus enabling a ship to fight her guns without exposing her whole broadside to an enemy's fire. A few paddle-frigates, however, of large size, were built, and in their day did good service. Of these the well-known *Terrible*, nicknamed during the Russian war of 1854-56 the 'Black-Sea Cat,' was the largest; she was a ship of some 3600 tons, carried sixteen 68-pounders, and had engines of 800 horse-power. At the bombardment of Sebastopol the sailing line-of-battle ships were all towed into their places by the paddle-frigates, which were lashed on their off-sides. But it was the application of the screw as a means of propelling ships which has really revolutionised ships of war. Its vast superiority over the paddle was at once seen, and by the commencement of the Russian war in 1854 many ships of the line, frigates, and smaller vessels had been either converted or built as screw ships. After the conclusion of the war many of the sailing three-deckers were converted into steam two-deckers, being lengthened amidships, and engines being then fitted to them; while during the three or four succeeding years naval architecture seemed to have reached its acme, the line-of-battle ships and frigates which were launched at the time being quite unsurpassed for beauty of their hulls, their size, and their sailing and steaming qualities. Strangely enough, for the first time in history, the new ships at this time were far superior to the French, especially the line-of-battle ships, which all carried their lower-deck guns twice as high out of the water as the French ships, and were altogether finer and handsomer models. But the knell of wooden ships had already sounded, and many of the finest line-of-battle ships built at this time were never even commissioned.

To Napoleon III. belongs the idea of plating ships with iron. The effect of shells on the ships at the first bombardment of Sebastopol showed the necessity of some means of protection, and led to the laying down in France and England in 1855 of what were called floating batteries, plated with 4 inches of iron on 20 inches of wood backing; flat-bottomed and unmanageable, but carrying sixteen 68-pounders in their batteries. Three years later the first ironclad frigate was laid down at Tonlon, the *La Gloire*, built of wood and plated entirely with 4½-inch iron plates to 6 feet below the water-line; she was 250 feet long, with 55 feet beam, had a ram-bow, and could steam about 13·5 knots. In 1861 our *Warrior* was launched, built entirely of iron, but armour-plated for only two-thirds of her length, her bow and stern being unprotected; she had a displacement of 9210 tons, and was 420 feet over all, with a beam of 59 feet; her plating was 4½ inches thick, and her speed nearly 15 knots. She was quickly followed by ships in which the armour was carried completely round the hull; and several of the new line-of-battle ships were cut down, and

converted into armoured frigates with ram-bows, and with plating from 4½ to 6 inches in thickness. In 1861 the civil war between the Northern and Southern States of the American Union broke out, and the naval action fought in Hampton Roads on 9th March 1862 powerfully influenced the future lines of battle-ship construction. At the outbreak of hostilities the *Merrimac*, a large 50-gun steam-frigate, under repair at the Norfolk dockyard, was set on fire to prevent her from falling into the hands of the Confederates. She was, however, only partly burned, and the Confederates built up over her deck and down upon her sides to below the water-line a shot-proof covering formed of sloping plates of railroad iron, which met at the top like the roof of a house. Armed with two 100-pounder Armstrong guns and eight 11-inch guns, she on the 8th of March 1862 steamed out to attack the blockading Federal squadron, consisting of two sailing-frigates, the *Cumberland* and the *Congress*, both of which she sank. The next morning she met an antagonist which, although much smaller, proved more than

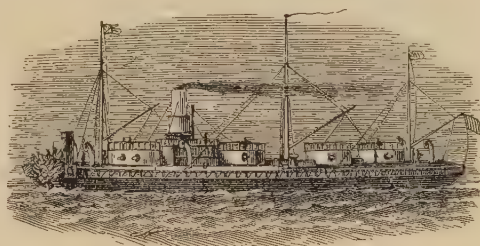


Fig. 2.—Turret-ship, *Royal Sovereign* of 1862.

a match for her—the famous *Monitor*, built by Ericsson (q.v.), parent of the monster turret-ships of the present day. She was only 210 feet long, with an extreme beam of 45 feet; her deck and low sides were plated, and she carried two 150-pounder Dahlgren guns in a single turret amidships, which was protected with eight 1-inch iron plates screwed together, and was turned by steam; she had no bulwarks, and her deck was barely two feet out of the water. The *Merrimac* had to retreat before her small opponent. A demand immediately arose in England for the construction of turret-ships, and Captain Cowper Coles (q.v.), who had long been pressing this type of ship on the Admiralty, now came forward with plans for converting some of the wooden ships into 'Monitors,' and as the result the *Royal Sovereign*, a new 131-gun ship, was cut down, armour-plated, and fitted with four turrets, each carrying two 9-ton guns. It was evident that for carrying heavy guns the turret system offered great advantages; but turret-ships did not immediately supersede broadside ships. Thus the *Bellerophon* (1866), designed by Sir E. Reed, was a broadside ship, with a complete water-line belt, and 5-inch armour over her main-deck battery, in which were mounted twelve 12-ton muzzle-loading rifled guns. Iron had now superseded wood in the construction of the hulls, a double bottom extended for some two-thirds the length of the ship, while by means of transverse and other bulkheads the whole hull below the water-line was subdivided into a number of watertight compartments. Two sets of engines, each driving a separate screw, one on each quarter of the ship, were also superseding the single screw.

Captain Coles was permitted by the Admiralty, under pressure from parliament, to design the *Captain*, a large ship of over 6000 tons, with a freeboard of only 6 feet, and heavily sparred so as to give her great sail-power. But at the Admiralty

her freeboard for a masted ship was considered dangerously low; and the Admiralty view was embodied in the *Monarch*, with a freeboard of 14 feet. Off Cape Finisterre, on the 6th of September 1870, the *Captain* capsized under sail in a heavy squall, and went down immediately with 500 officers and men, including her captain, Burgoyne, and Captain Coles himself.

In 1868 a committee reported that, to secure the full advantages of the turret system, it was necessary that vessels should have a low freeboard, no sail-power, and only one military mast. The result was the construction of the three sea-going turret-vessels, *Devastation*, *Thunderer*, and *Dreadnought*.



Fig. 3.—The *Devastation*.

Protection was afforded by a belt of 14-inch armour at the water-line; above this, for about half the length, was an armoured breastwork with 12-inch armour, which protected the base of the turrets, the turrets themselves having armour of the same thickness. These ships originally carried four 35-ton muzzle-loading rifled guns, but the *Devastation* (completed 1872) and *Thunderer* were re-armed with 29-ton 10-inch breech-loaders.

In 1875 were launched the *Alexandra* and *Téméraire*. In these and a few smaller ships the attempt was made to combine the advantages of the turret system with the broadside, so as to permit of an end-on fire from two or more of the heavy battery guns. Both the *Alexandra* and *Téméraire* carried 25-ton and 18-ton guns in their batteries; they both took part in the bombardment of Alexandria in 1882, and were only struck off the effective list in 1901.

The battle between guns and armour was now being waged more fiercely than ever. France and other Continental naval powers had long adopted rifled breech-loading guns; in 1879 the Admiralty decided for breech-loading guns; but it was not until 1881 that the manufacture of the new breech-loading ordnance fairly commenced. The increasing thickness of armour called for yet heavier guns; the adoption of the turret or barbette system had become inevitable; and Sir N. Barnaby designed the 'citadel' type of ship. In it the continuous armour-belt round the water-line was done away with, but armour of great thickness was concentrated round a citadel in the central portion of the ship, varying from about one-third the length of the ship to nearly a half, the armour extending to a depth of some 5 feet below the water and some 6 feet above. In the *Inflexible* the armour on the water-line was 24 inches thick, with 17 inches on the turrets. From the base of the citadel fore and aft extended the whole remaining length of the ship a watertight turtle-backed armoured deck, from 2½ to 3 inches thick; and below this deck, which was itself below the water-line and within the citadel, were contained

all the vital parts of the ship—engines, boilers, magazines. All round the water-line of the long, unarmoured ends of these ships above the armoured deck were constructed coffer-dams filled with cork. The idea was that the unarmoured ends might be destroyed by the enemy's fire, but that the body of the ship would remain intact—the citadel, in fact, resting upon an unsinkable inner ship below the surface of the water, which was divided into an immense number of different watertight compartments, in addition to the compartments of the double bottom. The *Agamemnon* and *Ajax*, somewhat smaller than the *Inflexible*, were built at the same time; none of these three ships steamed or steered well, and they were the last to carry muzzle-loading guns and to have iron armour. In the *Colossus* and *Edinburgh* (1881) their defensive powers were much increased by their being protected with 'compound' armour—iron armour faced with steel—while they were the first ships to carry the new 47-ton 12-inch breech-loading guns in their turrets.

To deal with torpedo-boats, it became necessary for the few heavy guns to be supplemented by a large number of light guns, and to this necessity we are indebted for all the small quick-firing guns now in use. It thus came about that, as a certain number of guns had to be mounted on the broadside, a material alteration in the design of the citadel ships became necessary, and six battle-ships of the 'Admiral' class were built. The distinguishing features of these ships were the mounting of the heavy guns in two 'barbettes,' one forward and one aft, with a central battery built between them, in which an auxiliary battery of 6-inch guns was mounted. It was claimed for the barbette system that the guns could be carried much higher out of water; they are revolved on a turn-table inside the barbette, the armour of which can be made sufficiently thick effectually to protect this movable platform, and thus prevent any chance of jamming, when, as in the case of turrets, the whole structure has to be revolved. In the earlier barbette ships, the whole gun being exposed except when in the loading position, the guns were much more liable to injury than when mounted in turrets; but since 1893 there are armoured hoods revolving with the guns.

The 'Admiral' class were not only deficient in armour protection, but the disposition of the armour was bad; on the other hand, their armament was a very formidable one. One, the *Benbow*, carried two breech-loading 111-ton guns, one in each barbette; while the *Collingwood*, which was somewhat smaller than her five sisters, carried four of the breech-loading 12-inch 47-ton guns. A belt of 18-inch compound armour protected about 150 feet of the water-lines of the ships amidships; at each end the armour was carried up to the upper-deck so as to form a wall protecting the loading arrangements of the barbette guns and the ammunition-supplies, while athwartships bulkheads complete the citadel; before and abaft the citadel was a 3-inch armoured deck. The weak points are the long unarmoured ends, the unprotected central batteries, and the fact that the bases of the barbettes are only partially protected. Yet they were formidable ships in their day; they were the first really homogeneous squadron built for the fleet, and although possessing but very low freeboards, they proved admirable sea-boats and excellent steamers. The ill-fated *Victoria* and her sister-ship the *Sans-Pareil* were single-turreted ships of 10,473 tons; in their turrets were mounted two of the unwieldy 111-ton breech-loading guns, while farther aft was a battery of twelve 6-inch guns, with a 10-inch gun as a stern-chaser, and the armour protection was as defective as in the 'Admiral' class. The *Victoria* was sunk off Tripoli, in the Levant, 22d June 1893.

by collision with the *Camperdown*, and foundered, with Admiral Tryon and 350 officers and men, a few minutes after being struck.

When, in 1885, Sir W. White was appointed Director of Naval Construction, he found our fleet composed of heterogeneous types, and our latest ships looked upon with the greatest distrust by the service—the two exceptions to the sweeping condemnation which naval officers had passed on Sir N. Barnaby's designs being the *Trafalgar* and *Nile*, laid down in 1886. The alarm at the small amount of armour on the ships of the 'Admiral' class, and its faulty distribution, was so great that when, in 1885, it was decided to build two new ships, it was determined that these should be improved 'Devastations' of 11,940 tons; they were protected by a



Fig. 4.—Armour in H.M.S. *Rodney* (1885), of the 'Admiral' class.

b, spar-deck with quick-firing guns; c, officers' quarters; d, men's quarters; e, barbettes, with four 67-ton guns mounted in pairs; f, fighting-top, with two 6-pounder quick-firing guns.

nearly complete water-line belt of compound armour 20 inches thick; above this belt was a citadel of 16-inch armour, which protected the bases of the turrets, which were themselves of 18-inch armour. The armament consisted of four 67-ton guns in the turrets, and a secondary battery of eight of the new quick-firing 4·7-inch guns in a casemate between the turrets, protected by 4-inch steel armour. Sir N. Barnaby protested strongly against the design of the new ships, for which he had to draw the plans; nor did they altogether meet with the approval of his successor, their great defect being their low freeboard. There was a feeling at the time of the launch of the *Trafalgar* that these two ships would be the last heavy armoured ships; even the *Times* voiced the impression that the days of armour for ships were numbered. Admiral Aube in France was also then preaching his crusade against heavy battle-ships, and advocating instead the system of 'corsair' warfare against our trade.

As the result of a press agitation in 1888 denouncing the weakness of the fleet, the government in 1889 brought in the Naval Defence Act, which provided for the construction of 10 first-class battle-ships, 40 first and second class cruisers, and 20 torpedo gunboats. The act marked the birth of our modern navy, and the completion of the building programme placed our navy in a far stronger position than it had occupied for many years.

Sir W. White was soon to show himself the greatest naval designer of his time, and the creator of the modern battle-ship. The units of a modern fleet fall into six classes—battle-ships, battle cruisers, light cruisers, torpedo-boat destroyers, submarines, sloops. It was now possible to build in classes, and thus introduce into the navy that homogeneity which had been up to that time so sadly lacking in our armoured ships. Of the ten new battle-ships it was determined that eight should be vessels of 14,150 tons, with engines of 13,000 indicated horse-power, which should give a speed of 17·5 knots. They were 380 feet long, with a beam of 75 feet and a draught of 27 feet 6 inches. Protection was afforded by a water-line belt of 18-inch compound armour for 250 feet of their length. Above this again, between the barbettes, was a belt of 5-inch steel carried up to the main-deck; at each end of the belt were 16-inch athwart-ships bulkheads, and at each end of the citadel thus

formed rose the barbettes, which were protected by 17-inch armour; before and abaft the armour-belt, protection was afforded by a 3-inch armour deck. The side of the ship was thus protected by a depth of 15 feet of armour, while the length of the unarmoured ends was reduced to proportions which would no longer endanger the stability of the ships in action should they be destroyed. The armament of the ships consisted of four 13·5-inch guns in pairs in the barbettes, except in the case of the *Hood* (which had turrets, not barbettes); ten 6-inch quick-firing guns, four of which were in 5-inch casemates on the main-deck, and the other six in shields on the upper-deck; sixteen 6-pounders and twelve 3-pounders, distributed over different parts of the ships, with three torpedo-tubes, two of which are submerged. The new 'Royal Sovereign' class were the prototypes of the modern battle-ships. At the same time the *Centurion* and *Barfleur*, of 10,500 tons displacement, were built for service on distant stations, and so as to pass easily through the Suez Canal; in design they were identical with the 'Royal Sovereign' class, but carried 10-inch guns in their barbettes, with less armour protection. The underlying idea in Sir W. White's designs was to produce a ship which, while she should have good sea-keeping qualities and good speed, should also be a steady gun-platform and carry her guns sufficiently high out of the water to be able to fight them even in moderately bad weather. To gain these qualities it was necessary to build ships of larger displacement, and to give them a high freeboard, so that they could steam against a head sea and yet fight the fore barbettes guns, which it was very often impossible to do in low-freeboard ships; and it was to gain an increased height for the guns that barbettes were now definitely adopted in place of turrets. A glance at the diagrams of the *Rodney* (fig. 4), one of the 'Admiral' class, and of the *Royal Sovereign* (fig. 5) respectively will show at once the great advance made in the way of protection.

On the completion of the Hamilton programme of 1889, a new one was brought forward in 1893 by Lord Spencer, and the result was the laying down of the nine ships of the 'Majestic' class, as it had now been settled that the normal strength of the navy must be maintained at a standard which would admit of its meeting successfully a combination of any other two powers. Their design was practically the same as the 'Royal Sovereigns'; but there were some notable improvements. Steel armour, 9 inches thick, hardened on the Harvey principle, was substituted for the 18-inch compound of the earlier ships, and there was thus a considerable saving of weight, while the resisting-power of the new armour was much greater. This saving in weight was used to protect that portion of the ship's side, some 250 feet in length and 15 feet in depth, which is covered with armour, with plating of a uniform thickness of 9 inches; the barbettes for the heavy guns were given 14-inch armour, while the barbettes guns, which were completely exposed in the 'Admiral' and 'Royal Sovereign' classes, were protected in the new ships with steel hoods, 10 inches thick, made of specially hardened steel; the secondary battery of twelve 6-inch quick-firing guns were all protected by 6-inch steel casemates, while the thickness of the protective deck, which was made to take the form of a turtle-back, curving down from just above the water-line in the central part of the ship to the lower shelf of the armour-belt, was increased to 4 inches, thus adding more than a third to the protection already afforded by the outer belt, while an additional 800 tons of coal were carried. An additional 750 tons was added to the displacement of the ships, which brought it up to 14,900 tons, as compared

with the 14,150 of the *Royal Sovereign* and her sisters. Another important change was the adoption as the heavy gun for our battle-ships of the wire-wound 12-inch gun, which throws a projectile of 850 lb. with a muzzle velocity of nearly 2500 feet a second; two aimed rounds could be fired from it per minute, while in penetrating-power it far exceeded the older and heavier guns it superseded. The 15-inch gun has been adopted by almost all the great naval powers as the standard weapon for the heavy armament of their battle-ships.

In 1896-97 another group of six ships, known as the 'Canopus' class, were laid down; they were of somewhat smaller tonnage (12,950) than the 'Royal Sovereigns' and the 'Majestics,' and drew less water by 18 inches than those ships, so that they would pass easily through the Suez Canal; the thickness of the side armour was reduced from 9 inches to 6, and to 12 inches on the barbettes instead of 14; but, on the other hand, a belt of 2-inch nickel-steel was carried forward from the fore end of the citadel to the stem and downwards to the ram, thus materially strengthening the fore-part of the

ship; the speed was also increased to 18 knots, and the coal-supply to 2300 tons. The armament was the same as in the ships of the 'Majestic' class.

Another group of eight ships of still more formidable character than any yet built were laid down in 1898-1901. These vessels are known as the 'London' class; their displacement was raised to 15,000 tons, and the speed to 18 knots. The thickness of the armour is 9 inches on the side, which is carried forward to within 30 feet of the bow, and from there to the ram there is a 3-inch belt of hard steel; the armour on the barbettes is 12 inches thick, and the whole of the armour is hardened by the Krupp process. The armament is the same as in the earlier classes, but the guns are improved. In three of the ships the disposition of the armour forward is somewhat different.

In the 'King Edward VII.' group of 1902, the displacement was raised to 16,350 tons; they had a length of 425 feet, with a beam of 78 feet, and a speed of 18.5 knots. In these ships the side armour between the barbettes is carried up to the level of the upper-deck, its

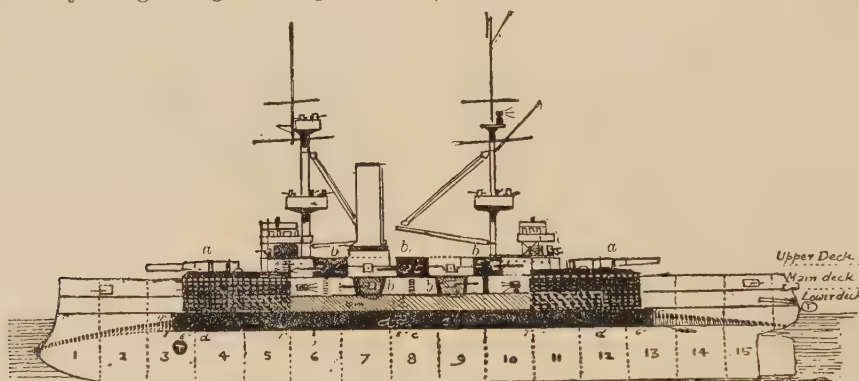


Fig. 5.—Diagram showing Disposition of Armour in Battle-ships of the 'Royal Sovereign' class (1889); 14,150 tons; 13,000 I.H.P.; speed, 17 knots. (From F. T. Jane's *All the World's Fighting Ships*.)

ARMAMENT.—(a) Four 13.5-inch 67-ton guns, two in each barrette; (b) ten 6-inch quick-firing guns in casemates, six on upper, four on main deck, with twenty-eight small quick-firing guns (6- and 8-pounders), and three torpedo-tubes.

thickness, however, between the levels of the main and upper decks being reduced to 7 inches. The offensive power was much increased by the addition of four 9.2-inch guns, carried singly in turrets protected by 7-inch armour on the upper-deck, one at each corner of the main-deck central battery, in which the secondary armament of 6-inch quick-firing guns is mounted, instead of in casemates. All the battle-ships from the 'Majestic' class onward have four submerged discharges for the 18-inch torpedoes. The three battle-ships of the 1903 programme were the last ships to be designed by Sir W. White, who was succeeded by Mr P. Watts in 1902. So far from the predictions of certain naval experts of 1887 coming true, that the *Trafalgar* would be the last battle-ship to be built for our navy, the position of the armoured battle-ship is firmer than ever. The result is that the newest ships designed for the navy are more powerful than ever, with thicker armour and heavier armament. The *Dreadnought*, with displacement of 18,000 tons, was the next class in 1906. These have increased in size each successive programme until in the 'Queen Elizabeth' type we have reached 27,500 tons displacement, 25 knots speed, eight 15-inch breech-loading guns, as compared with ten 12-inch guns, twenty-seven 12-pounder guns, and five torpedo-tubes; the speed being 21 knots, with an indicated horse-power of 16,750. To appreciate the great advance made in our battle-ships during the time Sir Philip Watts was in office, and Sir

Tennyson D'Eyncourt, who succeeded him, compare the *King Edward VII.* with the *Queen Elizabeth*. By 1914, when war broke out, the Grand Fleet consisted of 28 battle-ships of 'Dreadnought' class; three of these were building for foreign powers.

The battle cruisers of 'Dreadnought' class were introduced in 1908 with *Invincible* and *Inflexible*, of 17,250 tons and 26 knots speed, and eight 12-inch guns. These have now been increased in size to 33,000 tons, 32 knots, and six 15-inch guns. These battle cruisers bore the brunt of the fighting, and of them *Queen Mary* and *Invincible* were sunk at the battle of Jutland, and *Inflexible* and *Indefatigable* badly damaged at the Dardanelles. These superseded the armoured cruisers described below, and rendered scouting with light cruisers a very difficult matter to the enemy.

'Cruisers' is a term which was wont to include all ships not ranked as fighting ships of the line, and was applied indiscriminately to frigates, corvettes, sloops, and even such small vessels as armed cutters. To these have been added torpedo-boat destroyers and submarines. All may be called the eyes of the fleet—submarines especially were used to collect and transmit news of movements of enemy surface craft and aircraft near enemy's coast during the Great War. The modern cruiser has developed as masts and sails have disappeared, and speed has become more and more essential. Under this head are now included the monster 14,000-ton armoured cruiser and the little 2000-ton rapid scouts, which

are the latest and smallest development of the fast cruiser. 'Armoured' cruisers are vessels with some description of armoured belt, while 'protected' vessels have only an armoured protective deck. The first batch of armoured (then called 'belted') cruisers were the *Orlando* and her six sisters, laid down in 1885. With a displacement of only 5600 tons, and comparatively short, they yet had a speed of 18 knots or over. They were protected by a water-line armoured belt, 10 inches thick and 5 feet 6 inches broad, shut in at each end by 16-inch transverse bulkheads; extending fore and aft at each end of this belt was a protective belt of 3-inch steel. The armament consisted of two 9·2-inch guns and ten 6-inch quick-firing guns, besides smaller guns. Their great defect was that when they were fully loaded the top of the belt was down to the level of the water, their guns were unprotected, and their coal-supply limited. It was under the Naval Defence Act of 1889 that the development of the modern cruiser really began. Here, as with the battle-ships, Sir W. White built in groups, 9 first-class cruisers, known as the 'Edgar' type,

and 28 second-class cruisers being laid down. Of the second-class cruisers 20 were vessels of 3600 tons displacement, with a speed of 19·5 knots, which was exceeded by half a knot in many of the vessels; their armament consisted of two 6-inch quick-firing guns, one forward and one aft, and six 4·7-inch quick-firing guns on the broadside, with eight 6-pounders and some machine-guns; and there was a steel protective deck of from 1 to 2 inches in thickness. The remaining eight, known as the 'Astræa' class, were somewhat larger, their displacement being 4360 tons, and the speed was the same, but the coal-supply was nearly doubled, being raised from 550 tons to 1000, while two additional 4·7-inch guns were added. Since 1889 three further groups of second-class cruisers have been built; nine of the 'Talbot' class, laid down in 1893-94-95, are improved 'Astræas,' vessels of 5600 tons, of the same speed but a much-improved armament—five 6-inch quick-firing guns and six 4·7-inch, with nine 12-pounders and some smaller guns; in all these ships 6-inch guns have been substituted for the 4·7-inch. Next, in 1896, came the four

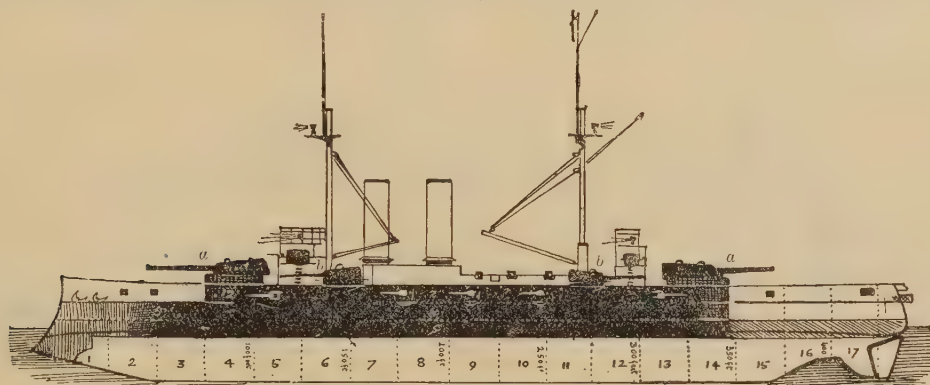


Fig. 6.—Diagram showing Disposition of Armour in the new Battle-ships of the 'King Edward VII' class (1902); 16,350 tons; 18,000 I.H.P.; speed, 18·5 knots. (From F. T. Jane's *All the World's Fighting Ships*.)

ARMAMENT.—(a) Four 12-inch 50-ton wire guns, two in each barbette; (b) four 9·2-inch guns, singly in turrets, two each side as shown; ten 6-inch quick-firing guns, in central battery, five each side, with twenty-eight small quick-firing guns (12- and 3-pounders), and four submerged torpedo-tubes.

cruisers of the 'Arrogant' type; they are of much the same dimensions as the 'Talbot' class, but are designed to act as rams. Finally, there is a group of five, the first three of which, the *Hyacinth* and two sisters, were laid down in 1896; and the two last, the *Encounter* and *Challenger*, in 1901. The second-class cruiser is a thing of the past, but they did good work in distant seas during the Great War. No more vessels of medium size of this description called 'light' cruisers are being built.

The nine first-class cruisers of the 'Edgar' class were among the most successful creations of Sir W. White. Of 7700 tons displacement, with a nominal speed of 19·5 knots, these fine ships in every case when commissioned for service proved in reality to have a speed of between 20 and 21 knots, which they were able to keep up, in ordinary circumstances of wind and weather, as long as their coal lasted. As armament they carried two 9·2-inch guns, one forward and one aft, and twelve 6-inch quick-firing guns, with some twenty smaller guns. Four of the 6-inch guns are in 6-inch casemates on the main-deck, the remaining guns on the upper-deck with shields. Protection is afforded by a turtle-back armoured deck, 5 inches thick on the slopes and 1 inch on the flat surface, while the coamings are also protected by 6-inch armour. The *Powerful* and *Terrible* were laid down in 1895, and commissioned in 1897. They are vessels of 14,200 tons displacement, with a speed of 22 knots, protection

being afforded by a turtle-back armoured deck of Harvey steel, 6 inches on the slopes and 3 inches on the flat surface. Their armament consisted of two 9·2-inch guns, mounted in barbettes, the bases protected by 6-inch Harvey steel, one forward and one aft, protected by 6-inch shields; sixteen 6-inch quick-firing guns, eight on the main and eight on the upper deck, in 6-inch casemates; and sixteen 12-pounders and fourteen smaller quick-firing guns, with four submerged torpedo-tubes. They were the first vessels to be fitted with the Belleville water-tube boiler. These ships were built as a reply to two large belted cruisers built by Russia as a reply to our 'Edgars.' In 1895-97 eight protected cruisers were laid down, known as the 'Diadem' class; they are smaller than the *Powerful* and *Terrible* by 3000 tons, and both their protection and armament are less, but their general design is identical. They were the last of their class, and are now used as depot hulks.

The armoured cruiser is the large cruiser of the future. In 1898 the Admiralty at last recognised that our large protected cruisers would be at a serious disadvantage if called upon to engage the improved armoured cruisers which the French were building, so in 1898-99 ten armoured cruisers were laid down. Four of these, known as the 'Drake' class, were the largest armoured cruisers afloat; they had a displacement of 14,100 tons, with engines developing 30,000 indicated horse-power,

giving them a speed of 23 knots. They have realised a speed of nearly 24 knots, and they can steam 4300 miles at 19 knots, or at 11 knots from Spithead to Hong-kong, without coaling. They are protected by a 6-inch belt of hard Krupp steel between the barbettes, which is carried up to the height of the main-deck, while from the fore barrette on up to the height of the upper-deck this belt tapers to 2 inches (see diagram). There is a protective deck, 3 inches on the slope and 2 inches on the flat, with an 8-inch transverse bulkhead aft. The armament consists of two 9.2-inch guns in barbettes, one forward and one aft, protected by 6-inch armour; sixteen 6-inch quick-firing guns in 6-inch casemates, with fourteen 12-pounders and some smaller guns, and two submerged torpedo-tubes. These formidable vessels were really second-class battle-ships in disguise, and were certainly more than a match for many of the older battle-ships. The remaining six, known as the 'Cressy' class, were somewhat smaller, with a displacement of 12,000 tons and a speed of only 21 knots; their armour protection and armament are much the

same as in the 'Drake' class. Since 1900 sixteen armoured cruisers of a somewhat smaller type, known as the 'County' type, have been laid down. They all have a speed of 23 knots; but while the first ten have a displacement of 9800 tons, the remaining six have a displacement of 10,700, which has enabled increased armour protection to be given them. Thus, instead of a partial water-line belt only 4 inches thick, the later vessels have a complete belt, with a maximum thickness of 6 inches, tapering to 2 inches forward; while, instead of an armament of sixteen 6-inch guns, they have two 7.5-inch quick-firing guns (a quite new type of gun) and ten 6-inch quick-firing guns, in addition to ten 12-pounders, which both types have, and some fifteen smaller guns. In 1903 were laid down six armoured cruisers of a new class, with a displacement of 13,550 tons and a speed of 22.5 knots, protection being afforded by a 6-inch water-line belt, tapering at ends to 4 and 3 inches; above that again a central citadel some 300 feet in length, protected also by 6-inch armour, shut in at the ends by 6-inch bulkheads. The armament, a formid-

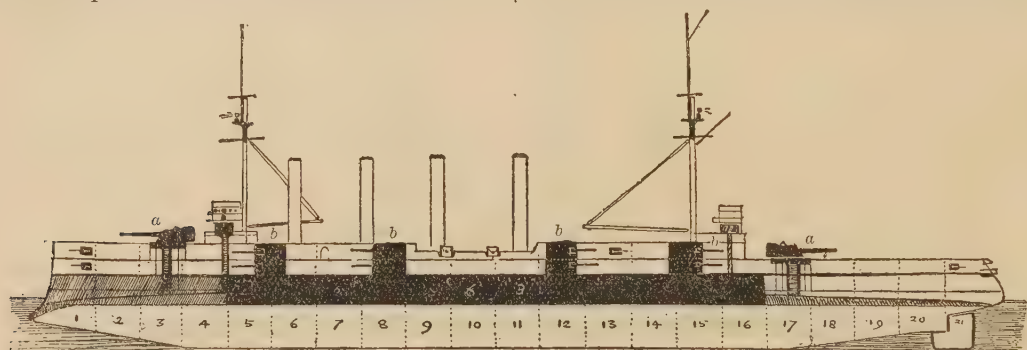


Fig. 7.—Diagram showing Disposition of Armour in first-class Armoured Cruiser of the 'Drake' class (1901); 14,100 tons; 30,000 I.H.P.; speed, 23 knots. (From F. T. Jane's *All the World's Fighting Ships*.)

ARMAMENT.—(a) Two 9.2-inch guns, singly in barbettes; (b) sixteen 6-inch quick-firing guns, in eight double casemates, four each side, with fourteen 12-pounder quick-firing guns, and two submerged torpedo-tubes.

able one, consisted of six 9.2-inch guns, one forward and one aft, and one at each corner of the citadel, with ten 6-inch guns in the central battery, and twenty-eight small and machine guns.

The battle cruiser takes the place of the first and second class protected cruisers. Any ground we may have lost by delaying the construction of this class of vessel until 1899 has now been fully made up, and Britain is now far ahead of any foreign country in this type of cruiser. But a class called 'Light' cruisers has been introduced to supersede the second-class and third-class cruisers. These resemble big torpedo-boat destroyers. They commenced with the 'Bristol' class, 1910, of 4800 tons, 27 knots, two 6-inch and ten 4-inch guns, and have increased to about 6000 tons, 28 knots, and five 6-inch guns in centre-line, the 'Caradoc' class; and several of the old second-class cruisers, the 'Latona' type, were fitted and used for mine-laying.

The duties of cruisers are: (1) to act as scouts for the battle fleet, keeping in touch with the enemy and communicating his movements; (2) to keep up communication between the battle fleet and its base or bases; (3) to hunt down any hostile cruiser known to have escaped from an enemy's port, and not to rest until she has been brought to action and destroyed; (4) to patrol the principal trade-routes. It was at one time believed that these duties would be best performed by a number of medium-sized cruisers, such as those built under the first Naval Defence Act; but with the advent of the armoured cruiser in foreign navies, it became clear that one fast, well-armed,

and armoured cruiser might easily sweep away and destroy in detail any number of protected cruisers. Hence the large number of armoured cruisers that have recently been added to the fighting strength of our own and other navies.

Battle-ships and cruisers alike are lit by electricity, by means of which also the guns are fired and torpedoes discharged; they are also provided with powerful electric searchlights, which illumine the sea for some two miles, while night-signalling and day-signalling is also carried on by electric light. As a further protection against torpedoes, all large ships were provided with torpedo-nets of steel wire, which were rigged out all round the ship by means of booms about 30 feet from the ship's side. When not required these nets were stored inboard. But torpedo-nets and booms have been entirely abolished, and their place has been taken by bulges built on to the sides of battle-ships; this causes the torpedo to explode outside the real hull, and the speed is only reduced by about 1 knot at full speed, and by smaller amounts at low speeds.

Another protection against mines for men-of-war and merchant-ships during the war was a kind of otter, resembling a fish. The otters were towed from the forefoot of the ships and swam below the surface, and about 60 feet or more from the ship the mine-moorings were caught by the wires and slid along to the fish, where a knife cut them, and they floated clear. These were called Paravanes.

Torpedo-boats date from 1877, as a consequence of the introduction of the Whitehead or 'fish' Torpedo (q.v.). From the first the British Ad-

miralty looked with disfavour upon the torpedo-boat, although between 1877 and 1891 a considerable number were constructed; they were considered to be a weapon *par excellence* for weak powers, and as more suited for defensive than offensive purposes. Foreign navies adopted them largely, and in France there was a scheme for sweeping the Channel, in the event of war, by means of swarms of torpedo-boats. In 1892 this menace was so formidable that the Admiralty resolved to take special measures against them. The result was the Torpedo-boat Destroyer. There are practically two classes of torpedo-boats in France: the first-class torpedo-boat for coast and harbour defence, vessels of about 85 tons and a speed of 24 knots; and the so-called 'torpilleurs de haute mer' or 'squadron' torpedo-boats, which have a displacement of 150 tons and a nominal speed of 26 knots. Neither of these types can be counted on as good for much, except in calm weather. The first destroyers designed by the Admiralty were vessels of from 250 to 300 tons displacement, with a speed of 27.5 knots; they carried for armament one 12-pounder quick-firing

gun forward, and five 6-pounders, besides two torpedo-tubes. They proved to be excellent sea-boats. By 1898 we had over eighty destroyers constructed or building, and in 1903 we had over 150 of these formidable little vessels. The displacement was gradually increased to 500 tons, and many of them attained a speed of 30 knots; their armament remained the same, the increased tonnage being absorbed by more powerful engines and an increased coal-supply. But in 1910 the size was increased to 1000 tons, speed 34 knots, and armament two 4-inch guns; while during the war they increased to over 1300 tons, speed 37 knots, and four 4.7-inch guns in centre-line, and two triple torpedo-tubes. Since 1899 France, Russia, and Germany had been following in our steps, but we had fortunately a long start with our formidable fleet of destroyers; but at the outbreak of the Great War Germany was actually in numerical superiority, and produced most excellent types called V., S., and G. There were several actions between our torpedo-boat destroyers and the Germans, but the British torpedo-boat destroyers practically always defeated

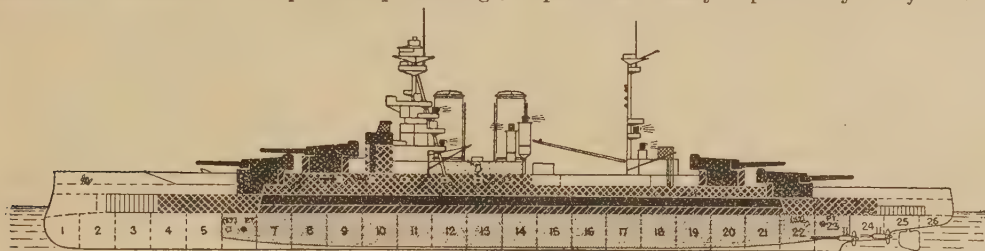


Fig. 8.—H.M.S. *Queen Elizabeth*. (Reproduced by permission of Messrs Sampson Low, Marston, & Co., Ltd., from the naval annual, *Jane's Fighting Ships*, 1919.)

ARMAMENT.—Eight 15-inch guns, twelve 6-inch guns, two 3-inch guns (anti-aircraft), four 3-pounders, five machine-guns; four submerged (broadside) torpedo-tubes, 21 inches. Normal displacement, 27,500 tons; full load, 31,300 to 33,000 tons; length between perpendiculars, 600 feet; length over all, 643½ feet; beam, 90½ feet; mean draught, 30½ feet; maximum draught, 33½ feet; complement, 1000 (approximately).

the German torpedo-boat destroyers. Destroyers can be used for the purposes of torpedo attack against battle-ships; but this sort of warfare can only be successfully attempted at night-time, or during a general action with the use of a smoke-screen. These smoke-screens were perfected and used with effect on several occasions, such as Jutland, Zeebrugge, Ostend, and minor actions in the Strait of Dover. The primary duty of destroyers is to accompany the battle fleets, over which they should keep continuous guard, in order to ward off the enemy's destroyers, torpedo-boats, and submarines.

Submarine boats are dealt with in the article SUBMARINE NAVIGATION. Here we need only say that the French were the first to make submarines of real value. The *Gymnote* of 1888 was the first; by 1904 France had built or was building nearly 50 submarines or submersibles, with displacements varying from 68 to 200 tons. Some have now increased to about 2000 tons displacement when submerged, and a few carry one heavy gun each—and may be forerunners of submersible battle fleets. Submarines proper either navigate below the surface of the sea or, when immersed to their proper bearings, are almost entirely covered by water. The 'submersible' besides navigating on the surface, has the power of submerging itself when required.

In 1905 the British navy was completely re-organised with the object of concentrating a strong striking force ready for immediate use in European waters. The non-fighting ships were withdrawn from distant stations, certain distant squadrons were reduced, and the North Pacific and South Atlantic squadrons were abolished. About 124 ships were struck off the effective list, including 13 battle-ships, 15 large cruisers, 42 smaller vessels,

and a number of other obsolete ships of all kinds, leaving the 'war-list' composed of effective fighting-ships only. The officers and men withdrawn by these changes were utilised as nucleus crews for a strong reserve of fighting-ships on the 'war-list,' whose crews could be completed and be ready for sea at very short notice. The 'war-list' of the navy at the beginning of 1905 consisted of 52 battle-ships, 36 armoured cruisers, 11 first-class unarmoured cruisers, 38 second-class cruisers, 21 third-class cruisers, with gunboats, torpedo destroyers, torpedo-boats, and submarines.

During the Great War the British fleet was distributed as follows:

Grand Fleet, comprising 'Dreadnought' battle-ships, battle cruisers, light cruisers, torpedo-boat destroyers, submarines, and auxiliaries, mainly at Scapa Flow, Orkneys; but part was generally at Rosyth, Firth of Forth.

Mediterranean.—'King Edward' and 'London' class battle-ships and the *Lord Nelson* and *Agamemnon*, some light cruisers, older torpedo-boat destroyers working in co-operation with the French and Italians. The French admiral, commander-in-chief, was at Malta, and had general charge of sea-forces in the Mediterranean, but there were special zones of action for each nationality.

Auxiliary Patrol.—This was a new force organised for anti-submarine work; it began with yachts, trawlers, drifters, and old torpedo-boat destroyers and torpedo-boats, supplemented later by sloops—'P' boats—looking like submarines on the surface, but really torpedo-boat destroyers.

Many ocean liners were converted into cruisers carrying 6-inch guns. These did excellent service on blockade duty and in convoy-work, and in freeing

the seas of similar enemy vessels, and two were fitted out as aircraft carriers.

By a time-honoured distinction, the executive or military branch of the *personnel* comprised all officers from the Admiral of the Fleet down to naval cadets, as well as warrant officers; to the civilian branch belonged engineer officers, doctors, accountant officers, chaplains, and naval instructors (the marines forming a category by themselves). Modern conditions have necessitated a change in the training of both officers and men; and engineer officers had become dissatisfied with their position as non-executive, in view of the growing importance of their duties and the largely increased number of the engine-room staff. By a new order brought out at the end of 1918 all officers for the executive and engineering and civilian branches were made executive officers, and given executive titles preceded by the name of branch to which they belong—e.g. Surgeon-commander, Paymaster-lieutenant, Engineer-lieutenant, &c. Cadets on joining are sent to the Naval College at Dartmouth for two years, and then to sea for three years; after which, as acting sub-lieutenants, they pass through a course at the college at Greenwich, followed by courses of gunnery, torpedo-work, and engineering. On passing they will be distributed between the executive and engineer branches, being as far as possible allowed to choose their branch. Sub-lieutenants of the executive will then go to sea for two years, and so become eligible for promotion to lieutenant. Engineer officers go through a special course at Keyham, and become eligible for promotion to lieutenant, whence they may rise to rear-admiral, uniform and titles being as in the executive. Cadets are also entered at seventeen to eighteen direct from public schools, and after a year's training—six months' if the cadet is at sea in a cruiser—they go to ships of the fleet and are amalgamated with the others. This system is under trial.

Recruiting is purely voluntary, and the term of engagement is twelve years, voluntary re-engagement for ten years qualifying for pension. The Royal Naval Reserve is drawn from the mercantile marine and fishing population of the country. The Royal Fleet Reserve, introduced in 1901, is designed to secure in war-time the services of men who have left the fleet after expiry of the ordinary twelve years' term. There are, besides pensioners, officers and seamen under fifty-five years of age who were not enrolled in the reserve, but are bound to serve in case of need. The Naval Forces Act of 1903 strengthens the reserve by authorising short service on condition that a term of seven years is completed in the reserve; and an act of 1902 authorised the formation of a body of Royal Naval Volunteers.

In 1914, at commencement of the war, the *personnel* consisted of: Naval officers, 9561; Naval ratings—seamen, engine-room, and others, 115,232; Marines—officers 595, men 17,646; Coastguards, 3013; Reserve—retired officers 866, pensioners 9110; R.N.R. officers 1660, men 16,341; R.N.R. trawler section, 1025; Fleet reserve, 29,033; R.N.V.R.—officers 199, men 5608. When the armistice was declared these numbers were:

Active service—Naval officers	13,678
Naval ratings—seamen, engine-room, and others	198,465
Royal Marine officers	1,527
" " men	47,533
	261,203
Coastguard	4,281
Reserves—Retired officers	1,145
Pensioners	9,918
R.F.R.	19,180
R.N.R. officers	7,523
" men	17,921
" " trawler section	37,145
R.N.V.R. officers	4,568
" men	44,432
	141,832
Grand total	407,816

The Royal Dockyards of Britain and those of other countries are the subject of a separate article; at COALING STATIONS will be found some discussion of those indispensable aids to naval effectiveness, with their later development oiling-stations. The growth of naval interests may be somewhat strikingly illustrated by contrasting the total naval estimates for the year 1885-86 with those for 1902-3 and for 1904-5; in the former year the total was £12,176,500, in 1902-3 it was £31,170,000, and 1904-5 it had increased to £36,889,000. In 1913-14 they were £51,250,000, and during the war went to £150,000,000.

During the Great War British naval losses were as follows: Total tons, 550,000, consisting of 13 battle-ships, 3 battle cruisers, 15 cruisers, 14 light cruisers, 8 monitors, 20 sloops, 26 mine-sweepers, 5 torpedo gunboats, 69 torpedo-boat destroyers and flotilla leaders, 58 submarines, 81 auxiliaries. Killed—officers 2061, men 20,197; wounded—officers 813, men 4035; missing—officers 15, men 8. The German fleet, consisting of 11 battle-ships, 5 battle cruisers, 6 light cruisers, 2 mine-laying cruisers, 51 torpedo-boat destroyers, surrendered to the Grand Fleet at sea, off the Firth of Forth, on 21st November 1918, and was then anchored in Scapa Flow with German care and maintenance crews; but on 21st June 1919 the German admiral, Von Reuter, sank them at their anchorage. At the end of 1919 the British naval force was reduced to Atlantic Fleet, consisting of 9 battle-ships, 5 battle cruisers, 8 light cruisers, 72 torpedo-boat destroyers, 49 submarines, 20 auxiliary craft in full commission; a Reserve Fleet, consisting of 6 battle-ships, 3 battle cruisers, 8 light cruisers, 40 torpedo-boat destroyers, 10 submarines, 40 auxiliary craft, with about one-tenth crews to keep all machinery efficient, and various ships on foreign stations with full crews—Mediterranean, China, North Atlantic, South Atlantic, North Pacific, South Pacific, Cape station, &c.—consisting of 8 battle-ships and battle-cruisers, 25 light cruisers, 35 torpedo-boat destroyers, and various small craft.

See W. James's *Naval History of Great Britain* (3d. ed. 6 vols. 1847); Lord Brassey, *The British Navy* (5 vols. 1882-83), and his *Naval Annual*; works by Admiral Colomb (1893) and Mr Spenser Wilkinson; Admiral Mahan, *The Influence of Sea Power upon History* (1890), *The Sea Power of Great Britain, The Interest of the United States in Sea Power, Types of Naval Officers*, and other works (1892-1912); Sir W. L. Clowes, *The Royal Navy, a History from the Earliest Times to the Present* (7 vols. 1897-1903), and other works; Sir Julian S. Corbett's *Drake and the Tudor Navy* (1900), *The Successors of Drake* (1901), and *Naval History of the Great War*; Sir J. K. Laughton, *From Howard to Nelson* (1899), and other works; Viscount Jellicoe, *The Grand Fleet, 1914-1917*; *Jane's Fighting Ships* (1919). The Navy Records Society's publications; the *Proceedings* of the Institution of Naval Architects, and the *Journal* of the Royal United Service Institution; and *Notes on Naval Intelligence* of the United States Naval Intelligence Department—not to speak of the large literature of the subject in French and German. The *Navy List* gives much information—on ships in commission, officers, navy agents, &c. See also the various naval articles in this work—CADET, COASTGUARD, DOCKYARDS (ROYAL), GREENWICH, MARINES, PENSIONS, SUBMARINE NAVIGATION, TACTICS. (NAVAL), TORPEDO, &c.; those on Admiralty, Admiral, Captain, &c.; those on the great naval commanders. Blake, Drake, Nelson, and the rest; and the relevant sections of the articles on the several countries.

Nawanagar, or JAMNAGAR, a seaport of India, and capital of a state (area, 3800 sq. m.; pop. 345,000), stands on the south shore of the Gulf of Cutch, 310 miles NW. of Bombay. Pop. 42,500.

Naworth Castle. See LANERCOST.

Naxos, the largest, most beautiful, and most fertile of the Cyclades, is situated in the Ægean, midway between the coasts of Greece and Asia.

Minor. It is 20 miles in length. The shores are steep, and the island is traversed by a ridge rising in Dia to 3289 feet. The wine of Naxos was famous in ancient as it is in modern times, and on this account the island was celebrated in the legends of Dionysus, and especially in those relating to Ariadne (q.v.). Its emery also has long enjoyed repute. It was ravaged by the Persians, 490 B.C., and after the conquest of Constantinople by the Latins became the seat of a dukedom founded by the Venetians. It was Turkish from 1566 till Greece became a kingdom. Naxos, the capital, is the seat of a Greek bishop and a Latin archbishop. See Tozer's *Islands of the Ægean* (1890).

Nazarenes. See EBIONITES.

Nazareth, the home of Jesus, anciently in the district of Galilee, 21 miles SE. of Acre, is still a small but flourishing town of Palestine. It lies in a hilly tract of country, and is built partly on the sides of some rocky ridges. In the earliest ages of Christianity Nazareth (which is not mentioned in the Old Testament) was quite overlooked by the church; the first Christian pilgrimage to it took place in the 6th century. The principal building is the Latin convent, on the supposed scene of the Annunciation; but the Greeks have also erected on another spot a church in commemoration. The traveller is also shown a Latin chapel, affirmed to be built over the 'workshop of Joseph'; the chapel of 'The Table of Christ' (*Mensa Christi*), a vaulted chamber, containing the veritable table at which our Lord and his disciples ate; and the synagogue out of which he was thrust by his townsmen. The Virgin's Well is just outside the town. The women of the village have long been famous for their beauty. Population, 7400.

Nazarites (properly *Nazirites*, from Heb. *nazar*, 'to separate'), men or women among the Jews who had consecrated themselves to God by certain acts of abstinence, as refraining from using wine, from shaving their heads, as well as from the defilement of contact with the dead. The law in regard to them is laid down in the Book of Numbers (vi. 1-21). The usual term of the vow was thirty days, but examples of vows for life were the cases of Samson, Samuel, and John the Baptist.

Nazianzen. See GREGORY.

Neagh, LOUGH, the largest lake of the British Islands, is situated in the province of Ulster, Ireland, and is surrounded by the counties of Armagh, Tyrone, Londonderry, Antrim, and Down. It is 16 miles in length and 10 miles in average breadth, contains 98,255 acres, is 102 feet in greatest depth, and is 48 feet above sea-level. It receives the waters of numerous streams, of which the principal are the Upper Bann, the Blackwater, and the Callan; and its surplus waters are carried off northward to the North Channel by the Lower Bann. Communication by means of canals subsists between the Lough and Belfast, Newry, and the Tyrone coalfield. The southern shores of the Lough are low and marshy, and dreary in appearance. It is well stocked with fish—lake trout, char, and pellen.

Neal, DANIEL, author of the *History of the Puritans*, was born in London, December 14, 1678. He was educated first at Merchant Taylors' School, and afterwards at Utrecht and Leyden, and in 1706 became minister of an Independent congregation in Aldersgate Street, London. His first work was a *History of New England* (1720), which met with a very favourable reception in America. But his reputation rests on his laborious and accurate *History of the Puritans* (4 vols. 1732-38; new ed., with Life by Joseph Toulmin, Bath, 1793). Neal died at Bath, 4th April 1743.

Neal, JOHN, American author, was born at Falmouth (now Portland, Maine), August 25, 1793. In his youth he was a Quaker, and he began the world at twelve as a shop-boy. In 1816 he failed in business, and turned to the study of law, supporting himself the while by his pen. He was one of the first Americans to write in the greater English magazines, and from 1823 till 1827 he lived in England, part of the time as one of Bentham's students and secretaries. After his return to America he settled in his native town, practised law, edited newspapers, lectured, and found relaxation in practising and teaching boxing, fencing, and gymnastics. He died 21st June 1876. Among his numerous works are a series of novels, *Bentham's Morals and Legislation*, and *Wandering Recollections of a Somewhat Busy Life* (1869).

Neale, JOHN MASON, hymnologist, born in London, January 24, 1818, was educated at Trinity College, Cambridge, became incumbent of Crawley, Sussex, in 1842, and in May 1846 warden of Sackville College, East Grinstead, where he died, August 6, 1866. He belonged to the most advanced section of the High Church party, and was long one of the most misunderstood and unpopular men in England. He was inhibited by his bishop for fourteen years, and burned in effigy in 1857, while throughout life his means were of the smallest. He founded in 1854 the well-known sisterhood of St Margaret. His most important work is his *History of the Holy Eastern Church* (4 vols. 1847-51); others were *Medieval Preachers* (1857), *History of the so-called 'Jansenist' Church of Holland* (1858), a preposterous adaptation of *The Pilgrims' Progress* (1853), and a long series of stories for the young, intended to popularise church history, but the value of which is almost exclusively other than historical. But his greatest work was his invaluable contribution to hymnology, both original and translated. His *Hymns for the Sick and Hymns for Children* were followed by his more important volumes of translations: *Medieval Hymns and Sequences* (1851), the *Rhythm of Bernard of Morlaix* (1858), and his *Hymns of the Eastern Church* (1863). His *Collected Hymns, Sequences, and Carols* appeared in 1914. See HYMN; his Life by Mrs Towle (1906); and his Letters (1910).

Neander, JOHANN AUGUST WILHELM, the greatest of church historians, was born at Göttingen, 17th January 1789, of Jewish parentage. His name prior to baptism was David Mendel, and by the mother's side he was related to the philosopher Mendelssohn. He received his early education at the Johanneum in Hamburg, and had for companions Varnhagen von Ense and Chamisso the poet. Even while he was a boy Plato and Plutarch were his favourite books, and he was profoundly stirred by Schleiermacher's famous *Reden über die Religion* (1799). Finally in 1806 he publicly renounced Judaism, and was baptised, adopting the name of Neander ('new man'), and taking his Christian names from several of his friends. His sisters and brothers, and later his mother also, followed his example. He now proceeded to Halle, where he studied theology under Schleiermacher, and concluded his academic course at Göttingen. In 1811 he took up his residence at Heidelberg as a *privat-docent*; in 1812 he was appointed extra-ordinary professor of Theology there; and in the following year he was called to the newly-established university of Berlin as professor of Church History. There he laboured till his death, 14th July 1850. Students flocked to him not only from all parts of Germany, but from the most distant Protestant countries. And his sweetness of character was no less attractive than his genius. Profoundly devotional, sympathetic, glad-hearted,

profusely benevolent, and without a shadow of selfishness, he inspired universal reverence, and was himself by the simplicity and sanctity of his life a more powerful argument on behalf of Christianity than even his writings. He used to give the poorer students free admission to his lectures, and to supply them with clothes and money. The greater portion of what he made by his books he bestowed upon missionary, Bible, and other societies, and upon hospitals.

Neander is believed to have contributed more than any other single Christian scholar to the overthrow, on the one side, of that anti-historical Rationalism, and on the other of that dead Lutheran formalism, from both of which the religious life of Germany had so long suffered. To the delineation of the development of historical Christianity he brought a generous and sympathetic, yet broad and impartial intellect. To him Christianity was a permeating force more than a series of dogmas, and the history of the church was throughout but the history of the divine life of Christ pervading humanity, to be understood only in proportion to the student's personal experience of the significance of the life of Christ. This is the meaning of Neander's famous aphorism—'Pectus est quod facit theologum.' The most striking characteristic of his great work is its objectivity in the portrayal of persons and the movement of events; its greatest merit is the admirable biographical skill with which the figures are made to pass before the reader; its one defect, the weakness with which the outstanding separate figures are fitted into their relation to the general movement of the history.

Neander's works, in the order of time, are monographs on Julian and his times (1812), St Bernard (1813), the Gnostics (1818), St Chrysostom (1822); *Denkwürdigkeiten aus der Geschichte des Christenthums und des Christlichen Lebens* (1822; 3d ed. 1845-46); *Antignosticus* (1826); the great *Allgemeine Geschichte der Christlichen Religion und Kirche* (6 vols. 1825-52); *Geschichte der Pflanzung und Leitung der Kirche durch die Apostel* (2 vols. 1833; 4th ed. 1847); *Das Leben Jesu Christi*, written as a reply to Strauss's work (1837; 5th ed. 1853); *Wissenschaftliche Abhandlungen* (1851); *Geschichte der Christlichen Dogmen* (1856). Most of these works are accessible in good English translations. See the studies by Hagenbach (1851), Otto Kraabe (1852), J. L. Jacobi (1882), Adelbert Wiegand, with a good bibliography (1889), and Schneider (1894).

Neanderthal, a wilder romantic valley between Düsseldorf and Elberfeld in Rheinland. In a limestone cave in this valley were found in 1856 some bones of a prehistoric man, and the peculiar formation of the skull induced anthropologists to regard it as typical of a separate race of ancient man—not the ancestor of modern man. Some explained the abnormality as pathological, but remains of the race have since been found elsewhere. To *Homo neanderthalensis* is assigned the Mousterian culture. See ANTHROPOLOGY.

Nea Pesara. See ERETRIA.

Neap-tides. See TIDES.

Nearchus, an officer of Alexander the Great, was a native of Crete, who settled in Amphipolis during the reign of Philip, and became the companion and friend of the young prince Alexander. In 330 B.C. he was governor of Lycia and other provinces in Asia Minor. In 329 he joined Alexander in Bactria with a body of Greek mercenaries, and took part in the Indian campaigns. Having built a fleet on the Hydaspes, Alexander gave Nearchus the command of it. He left the Indus towards the end of November 325, and, skirting the coast all the way, arrived at Susa, in Persia, in February 324. His own narrative of his voyage has been preserved in the *Indica* of Arrian.

Nearctic. See GEOGRAPHICAL DISTRIBUTION.

Neath, a municipal borough and river-port of Glamorgan, South Wales, on a navigable river of the same name, 8 miles ENE. of Swansea by rail. It stands on the site of the Roman station *Nidum*; there are remains of an ancient castle, burned in 1231, and near it are the ruins of Neath Abbey, described by Leland as 'the fairest abbey in all Wales,' but now sadly decayed and begrimed by smoke and coal-dust. Till 1918 one of the Swansea boroughs, Neath has extensive tin-plate works, steel and iron foundries, &c., and chemicals are manufactured. The engineering-works are also important. Pop. (1851) 5831; (1881) 10,447; (1921) 18,936, almost doubled in 1922 by absorption of Briton Ferry, &c.

Neat's-foot Oil is, as the name implies, an oil obtained from the feet of the common ox, either by splitting them up and boiling them over an open fire, or by treating them with superheated steam in a closed cylinder. See OILS.

Nebo. See BABYLONIA (*Religion*).

Nebraska, popularly known as the 'Black-water State,' is one of the north-central states of the American Union and fifteenth in area. It lies between 40° and 43° N. lat., and between 95° 23' and 104° W. long., and is bounded by South Dakota, Iowa, and Missouri (across the Missouri River), Kansas, Colorado, and Wyoming. Area, 77,510 sq. m., of which one-fifth is in improved farms. The surface is chiefly an elevated, undulating prairie; it is very level in the eastern and southern portions, but in the north and west the 'Bad Lands' extend into the state, while to the north of the Niobrara River there are great sandhills, composed of pebbles, gravel, and sand, covered for the most part with a sparse vegetation. The average elevation of the state rises from about 1200 feet in the east to 6000 feet towards the western border. The principal rivers are the Platte, Niobrara, and Republican, all flowing east. The atmosphere is dry and invigorating, and, though great extremes of heat and cold are sometimes experienced, they are not usual. There are few swamps and marshes. The rainfall is unequal, ranging from 30 or more inches in the east to 15 or less in the west. Temperature also has a wide range. Antelope are seldom seen, but the coyote, large timber wolf, fox, skunk, rabbits, &c. abound.

The soil of Nebraska, except in the Bad Lands and sandhills, is mostly a rich black mould, 2 to 8 feet in depth. The staple crop is maize, of which enormous quantities are grown. Tobacco and the sugar-beet also are cultivated successfully—the latter, however, in small quantity as compared with several other states. There are a number of factories for the manufacture of beet-sugar. Other important crops are maize, oats, wheat, barley, flax, potatoes, and buckwheat. In the western part of the state the droughts are hurtful; there flowing wells are rare, and irrigation is needed. Forests are nowhere found, and tree-planting has been extensively practised. The uncultivated lands yield great quantities of hay, and Nebraska holds a good place among the stock-raising states; sheep, horses, and mules are raised, cattle in the western uplands, and hogs in the east. The live-stock trade has its headquarters in Omaha, which in this respect ranks after Chicago and Kansas City.

While there are numerous factories in the eastern and southern parts of the state, the principal industries are limited to manufactures based on agricultural and stock-raising products—viz. slaughtering and meat-packing, flour and grist mill products, cheese, butter, and condensed milk. In minerals it is not rich. Its potash lakes were exploited during the Great War. The ever-changing current and dangerous sand-bars of the Missouri discourage

river trade; but the trade by rail (6000 miles) is very heavy. Omaha and Lincoln are ports of entry.

The state university is at Lincoln. Nebraska is well supplied with schools for higher education, and its public schools have a daily attendance of about 300,000 pupils, with 15,000 teachers. The state and private charitable institutions also are numerous. Industrial education has received special attention. Pop. (1880) 452,402; (1900) 1,066,300; (1910) 1,192,214; (1920) 1,296,372. The principal cities are Omaha (191,601) and Lincoln, the capital (54,948).

History.—Nebraska was included in the Louisiana Purchase, and was for many years a part of the North-west Territory. The way was prepared for settlers by the overland emigration to California in 1849. Nebraska territory was organised in 1854, with an area of 351,558 sq. m.; it extended north to British America, and west to the Rocky Mountains. But of this vast area great portions were afterwards carved out for Colorado, Dakota, and Idaho. Nebraska became a state in 1867.

Nebraska River. See PLATTE.

Nebuchadnezzar, better NEBUCHADREZZAR. See BABYLONIA.

Nebulæ are cloudy patches of light in the heavens. Some, as those in Andromeda and Orion, are visible to the naked eye, but the greater number can only be seen in telescopes of considerable power. Halley in 1716 gave a small list of 6 nebulae, but the chief workers in this field are Messier, who in 1784 catalogued 103; Sir W. Herschel, who alone discovered more than 2500; and Sir J. Herschel, who added to them more than 2000. These lists, however, include many star-clusters. Many objects which appear to be nebulae when examined with small telescopes are resolved by larger ones into clusters of stars. That some nebulae are not unresolved clusters of stars was shown by Huggins, who found that their spectra consisted of a few bright lines, and not, like those of the sun and stars, of a bright band crossed by dark lines. These nebulae were thus proved to consist of luminous gas. The chemical origin of the brightest of the lines found in the spectra of nebulae is still unknown, and is attributed to a hypothetical gas, *nebulium*. Other lines in the spectra have been identified as due to hydrogen and helium. The application of photography has revealed the great extent and intricate structure of many of the extended nebulae and those of spiral form. Large reflectors have usually been employed on account of their great light-gathering power. The photographs taken by Common, Roberts, Keeler, and Ritchey may be specially mentioned. In addition, photographs taken by Barnard and others have shown that a faint and diffused nebulosity is sometimes found extending over large areas of the sky. Nebulae may be divided into three classes: (1) *Extended Nebulae* like that in Orion. These have little motion, and give a bright line spectrum. Photographs show dark patches which must be attributed to non-luminous nebular matter. (2) *Planetary Nebulae*.—These show a sensible disc of diameter from 15' to a few seconds. Their spectra contain bright lines. They are masses of gas of much greater extent than the whole solar system. About 150 are known, and they show a tendency to congregate in the Milky Way. (3) *Spiral Nebulae*.—These are so called from their shape. Condensations usually occur in the arms of the spirals. They show a continuous spectrum with absorption-lines like stars. The nebula in Andromeda is in this class. These nebulae are very vast bodies at great distances from the solar system moving with velocities of

hundreds of kilometres per second, and the suggestion has been put forward that they consist of great aggregations of stars external to our galactic system. Another view is that they are rotating masses of gravitating gas in an extremely tenuous condition. For a mathematical treatment of this hypothesis reference may be made to Jeans's *Cosmogony*. Some of these objects are at such a great distance that light takes a million years to reach the earth from them.

NEBULAR HYPOTHESIS.—A striking feature in the solar system is that the planets are nearly in the same plane and move round the sun in the same direction. The moon and the large satellites of Jupiter and Saturn are also in this plane and moving in the same direction. Further, the sun, planets, and satellites are revolving in the same direction round axes which are perpendicular to this plane. All the members of the solar system known in the time of Laplace had this remarkable characteristic, though a number of exceptions, usually of small bodies, occur among members which have been discovered during the last century. As an explanation of this community of motion Laplace put forward the theory that the solar system had been formed by the gradual condensation of a large disc of gas or nebula. This he supposed to have been rotating in its own plane. Under the influence of gravitation it collected together, but, in consequence of the rotation, masses which formed planets were successively thrown off, and the main bulk of the nebula contracted further and now forms the sun. The existence of nebulae in the sky of forms which suggest rotation makes this hypothesis extremely plausible. But from our knowledge of the movements of the bodies composing the solar system the moment of angular momentum—which is a measure of the spin of the system—can be calculated. Dynamics teaches that this moment of angular momentum remains constant. Thus the spin of the original nebula can be calculated, and it is so small that planets would not have been thrown off. Many attempts have been made to modify Laplace's hypothesis, but in vain. Recently a very complete examination has been made by Jeans, who concludes that the peculiarities of the solar system cannot be explained in this way, and advances, what seems at first sight a very unlikely hypothesis, that the planetary system has been brought about by the near approach of two stars (Jeans, *Cosmogony*).

Necessaries. See INFANT.

Necessity may be *natural*, according to the laws of nature; *logical* or *mathematical*, according to the laws of human intelligence; *moral*, according to moral law. See CAUSALITY, LOGIC, ETHICS, KANT, EMPIRICISM. Necessity, Necessitarianism, or Necessarianism, is also a name for the view that denies the freedom of the will. See WILL.

Neck. See SPINAL COLUMN, THROAT.—Of diseases of the neck, STIFF-NECK is the term commonly applied to a condition of the neck in which lateral movement of the head causes great pain, and which is due to rheumatism of the muscles lying on the side of the neck, especially the sternomastoid. In the great majority of cases only one side of the neck is affected, the head being drawn more or less obliquely towards that side; but occasionally both sides are equally attacked, in which case the head is kept stiffly erect and looking straight forwards. As long as the head is allowed to remain at rest there is merely a feeling of discomfort; but every movement is extremely painful. This affection is usually caused either by exposure of the part affected to a current of cold air, or by wearing wet or damp clothes round the

neck (see RHEUMATISM).—*Derbyshire Neck* is a synonym for Goitre (q.v.).—For Necks in geology, see IGNEOUS ROCKS.

Neckar, one of the largest tributaries of the Rhine, and the principal river of Württemberg, rises on the eastern declivity of the Black Forest, near the village of Schwenningen. It has a winding course of 250 miles, and joins the Rhine at Mannheim—the other towns on its banks being Tübingen, Stuttgart (Cannstadt), Heilbronn, and Heidelberg. From Plochingen it is navigable. Fair wines are grown on its banks.

Necker, JACQUES, a famous financier and minister of France, was born 30th September 1732 at Geneva, where his father, a native of Küstrin in Brandenburg, had become professor of Public Law. At fifteen he went to Paris as a clerk to the banker Vernet, and in 1762 established the famous London and Paris bank of Thellusson and Necker. His public career commenced with his becoming a syndic of the French East India Company, as well as minister for the republic of Geneva at Paris, and with his marriage (1764) to the charming, accomplished, and ambitious Suzanne Curchod, who was born in 1737, the daughter of a pastor near Lausanne, and had loved Gibbon for five years with a constancy of which his colder temper was not worthy. The rich banker had first wooed Madame de Verméneux, a wealthy young widow, who scrupled at her suitor's lack of nobility, but he easily transferred his affections to her young protégée, and he proved till death an affectionate and faithful husband. She was religious and above reproach in character, yet her *salon* became a centre of all the intellect of Paris, and her Fridays drew together such celebrities as Grimm, Diderot, the aged Buffon, Marmontel, Thomas, D'Alembert, and the Abbé Galiani. In 1773 Necker gained the prize of the French Academy for an *éloge* on Colbert, and in 1775 he distinguished himself still further by his *Essai sur le Commerce des Grains*, in answer to the free-trade policy of the great Turgot, in which he claims for the state the right of fixing the price of grain and, if necessary, of prohibiting its exportation. Already also he had lent money to the needy government when in 1776, Protestant as he was, he was made Director of the Treasury and next year Director-general of Finance. He devoted five years of hard work to his hopeless task, and, if he showed no great statesmanlike foresight, he proved himself an honest, prudent, and sagacious minister. Indeed, some of his remedial measures were a real boon to suffering France, as his more equitable adjustment of taxes, his establishment of state-guaranteed annuities and *monts de piété*. But his most ambitious scheme—the establishment of provincial assemblies over all France, one of the functions of which should be the apportionment of taxes, proved a disastrous failure. His retrenchments were hateful to the queen, and the publication in 1781 of his famous *Compte Rendu*, a plain statement of the financial state of France, was promptly made the occasion for his dismissal. He retired to Geneva, carrying with him the respect of all Frenchmen; and here he busied himself with writing, and married his only daughter in 1786 to the Swedish Baron von Staël-Holstein. In 1787 he returned to Paris, and when M. de Calonne at the opening of the Assembly of Notables in that year cast a doubt on the truth of the *Compte Rendu*, he published a justificatory minute, which drew upon him the king's displeasure and his banishment to a distance of forty leagues from Paris.

He was recalled to his former office in September 1788, and quickly made himself the popular hero of the hour by recommending the summons of the States-general. But the successful banker was in-

fatuated with his popularity, and quickly proved himself unfit to steer the ship of state amid the storms of revolution, while his constitutional irresolution in the hour of danger drew the well-meaning king into the fatal error of being forced into recognising the union of the three estates, instead of taking the lead in freely granting what was inevitable. On the 11th July, while sitting at dinner, he received the royal command to leave France at once, but the fall of the Bastille three days later frightened the king into recalling him amid the wildest popular enthusiasm. But now his incompetence for greater matters than accounts was at length fully discovered, and after with fatal obstinacy spurning the help of Lafayette and Mirabeau, and leading the king to surrender his suspensive veto and the Assembly to stultify itself by a self-denying ordinance that ministers should not be chosen from its members, which made a really responsible parliamentary government in France impossible, he finally laid down his office unnoticed and without regret, after the carrying of Mirabeau's scheme for relieving immediate financial distress by the issue of *assignats*, September 1790. He retired to his estate of Coppet near Geneva, and here his wife died, 6th May 1794, while he himself, after publishing books which had no longer any importance, followed her on 9th April 1804.

The only other works that need be named are *De l'Administration des Finances de la France* (3 vols. 1784), *Sur l'Administration de M. Necker, par lui-même* (1791), *Du Pouvoir exécutif dans les Grands États* (2 vols. 1792), *De la Révolution Française* (last ed. 4 vols. 1797), and *Dernières Vues de Politique et de Finance* (1802). A collected edition was edited by his grandson (15 vols. 1820-21). See also the *Manuscrits de M. Necker*, published by his daughter in 1804; and for his life, her work, *La Vie privée de M. Necker* (1804), and his grandson's *Notice sur la Vie de M. Necker*, prefixed to the collected edition of his works. Five volumes of *Mélanges* from his wife's journals and papers were printed (1798-1802). Her story is charmingly told, from the papers preserved at Coppet, in the Comte D'Haussonville's *Le Salon de Madame Necker* (1882; Eng. trans. 1882). See M. G. Parry, *Mme. Necker* (1913).

Necklace, DIAMOND. See DIAMOND NECKLACE.

Necromancy, an ancient mode of divination by conjuring up the spirits of the dead to give answers about the future. A classical example is the Old Testament story of the witch of Endor. The eleventh book of Homer's *Odyssey* bears the title of *Nekromanteia*, and in it the shade of Tiresias is brought up and consulted by Ulysses. In most parts of Greece necromancy was practised by priests or consecrated persons in the temples; in Thessaly it was the profession of a distinct class of persons called Psychagögoi. See DIVINATION.

Necrosis (Gr. *nekros*, 'dead') is a term meaning the death of a localised portion of tissue. It is most commonly applied to death of part of a bone, either directly from injury or from violent inflammation. Death of a thin superficial layer, which is not enclosed in a shell of new bone, is usually termed *exfoliation*, and the more gradual destruction of cancellous tissue, Caries (q.v.). The bones of the lower extremity—the femur and tibia—are those which are most frequently affected by necrosis, but any bone may be the seat of the process. The jawbones, however, very often suffer from it in persons engaged in making lucifer matches. The more general use of red or amorphous Phosphorus (q.v.) for this purpose has rendered necrosis of the jaws much less common. The dead bone, known as the *sequestrum*, presents a rough appearance, as if worm-eaten. If the membrane investing the bone (the periosteum) remain healthy, a shell of healthy bone completely invests the dead portion. The

essential point in the treatment is the removal of the *sequestrum*, which is too purely a surgical operation to be described in these pages.

Nectar, the name given by Homer, Hesiod, Pindar, and the Greek poets generally, and by the Romans, to the beverage of the gods, their food being called *Ambrosia* (q.v.). But Sappho and Aleman make nectar the food of the gods and ambrosia their drink. Homer describes nectar as resembling red wine, and represents its continued use as causing immortality. By the later poets nectar and ambrosia are represented as of most delicious odour; and sprinkling with nectar, or anointing with ambrosia, is spoken of as conferring perpetual youth, and they are assumed as the symbols of everything most delightful to the taste.

Nectarine. See PEACH.

Need-fire. See FIRE.

Needle-gun. See BREECH-LOADING, RIFLE.

Needles of bone with eyes have been found dating from Aurignacian and Solutrean times, much finer ones from Magdalenian. These were shaped with a flint implement, rounded by rolling in a groove in a stone, and pierced with a flint awl. In later times there were eyed needles of bronze and iron. Savage races use needles of various materials, such as bone, ivory, wood, and metal. Some tribes do their sewing with awls of bone or of thorns with which they make holes, and then by pushing and pulling work the thread or string through them in the same manner as a shoemaker does. The Fuegians in sewing skins even make a tie at every hole. The Kaffirs make needles of iron or steel, with a constriction under the pin-like head, round which the end of the thread is tied instead of being passed through an eye.

Steel needles were made in 1370 at Nuremberg, at which early time its artisans were skilled in working metals, including the drawing of wire in iron, steel, and brass. Previous to 1563 the wire used for making needles in England was imported from Spain and Germany, but in England the manufacture was not of much importance till about 1650. The early-made needles were all square-eyed. The seat of the needle-manufacture in Great Britain is at Redditch near Birmingham, where in the best factories considerable improvements have in recent years been effected by the adoption of new mechanical appliances, and especially of automatic machines in some of the processes. See SEWING-MACHINE.

Needles. See WIGHT (ISLE OF).

Needlework. See BAYEUX, EMBROIDERY, LACE, TAPESTRY.

Neerwinden, a small village in the north-west corner of the Belgian province of Liège, is noted for the victory gained by the French under Luxembourg over the English under William III. (29th July 1693), and also for the defeat of the French under Dumouriez by the Allies under the Prince of Coburg (18th March 1793).

Ne Exeat Regno, a writ issued by a superior court to prevent a person leaving the country unless he gives security to abide a decree of the court.

Negapatam, a seaport of British India, on the Coromandel coast. Originally a Portuguese settlement, it was taken by the Dutch in 1660, and by the English in 1781. The port trades in cottons, live-stock, ghi (exported), and spices, piece-goods, coal, gunny bags (imported), chiefly with Burma, the Straits Settlements, and Ceylon. Pop. 54,000.

Negri, ADA, Italian poetess, born in 1870 at Bari, of working-class family, taught in a village school, and afterwards in a normal school in Milan. She first attracted attention by the revolutionary

spirit of two volumes of lyrics, *Fatalità* and *Tempeste*, expressing the bitter sufferings of the poor. Later works, such as *Maternità*, have not advanced her reputation.

Negri Bodies. See HYDROPHOBIA.

Negri Sembilan ('nine states'), one of the Federated Malay States, itself a confederation of Sungei Ujong (q.v.), Jelebu, Johol, Rembau, and five smaller states; area, 2550 sq. m.; pop. 180,000; capital, Seremban (17,000). See MALAY STATES.

Negritos is the name given by the Spaniards to the Negro-like Aetas, who inhabit the interior of some of the Philippine Islands. Under the same name anthropologists class the pygmies of the Andaman Islands (q.v.), the Semang of the Malay Peninsula, and the Tapiro and others of New Guinea. All these peoples are dark-coloured, with somewhat broad heads, frizzly hair, a stature of 4 feet 6 inches to 5 feet. They are at the lowest stage of culture, living upon what they can find or shoot with bow and arrow. Differing from these are the Sakai, another jungle-folk of the Malay Peninsula, brown, longer-headed, wavy-haired, blowpipe-hunters, with some crude agriculture. These are classed with the Veddas, South Indian jungle tribes, Toala of Celebes, and Australians as Pre-Dravidians. From all these are to be distinguished the African Pygmies or Negrillos. See ETHNOLOGY, NEGROES.

Negroes (African), properly speaking the dark-skinned, tall, or medium natives of Africa south of the Sahara; in a wider sense it is sometimes taken to include (a) Hottentots, (b) Bushmen, and (c) Pygmies or Negrillos. The Hamites of North and North-east Africa are not of Negro stock, though in many cases a larger or smaller admixture of Negro blood may be observed or inferred. By some authors a Bantu racial type is distinguished; but it must be borne in mind that the term Bantu is properly used of language only, and that many physical types occur among Bantu-speaking peoples; where a Bantu type is spoken of it may be taken to mean a long-headed people of medium stature, some of whom show facial characteristics of a non-negro type, such as a narrow nose.

Physical.—(a) The Negro proper is characterised by a dark skin, woolly hair, thick lips, a broad nose, and dark eyes; he is seldom really black, but at most very dark chocolate-brown; there are also reddish and yellowish types in many tribes; the hair is almost invariably black, but sporadic cases of red hair occur; white hair is found in the old, sometimes also in younger men; the eyes are dark blue at birth, but soon become dark brown. In stature the Negro varies considerably; some of the West African tribes do not exceed 5 feet 4 inches, but the Nilotic tribes (Dinka, Shilluk, &c.) are 5 feet 9 inches and over, and on the Shari the Kumbra stand nearly 6 feet. The shape of the skull is very varied; singularly enough the two groups just mentioned stand at the two extremes, the proportion of head breadth to length being 85 in the Kumbra and under 70 in the Dinka. Generally speaking, East Africa is long-headed, the area from Tanganyika to Chad extremely round-headed, while the remaining tribes are less pronounced.

(b) The Hottentot is of medium stature and long-headed, but his skin colour is yellowish-brown; he is commonly regarded as of Hamitic origin. The Bushman is likewise yellow-skinned, but he is some eight inches shorter than the Hottentot, and in head-shape the male Bushman seems to be rounder than the male Hottentot, but to resemble the female Hottentot.

(c) The Negrillo, or Pygmy, is shorter still; in one case a full-grown woman stood only 4 feet 2 inches; he is on the whole round-headed, but there is some

evidence of a long-headed type; his skin is reddish-yellow, and there is more body hair than in the Negro proper.

The Hottentot was in possession of the Cape and South-west Africa at its discovery, with the Bushman in the hinterland; the Negrillo lives in groups in the area from the great Rift Valley to the Atlantic. It is probable, from the evidence of physical types and from ancient records, that his range was formerly much wider; there is perhaps a Pygmy substratum in West Africa as well as among many Bantu-speaking tribes.

History.—Historical records are almost wholly lacking before the Middle Ages; ancient Egypt gives some data, and Herodotus has given an account of 'Ethiopians' in the army of Xerxes. It is commonly assumed that the earliest population was in occupation in the Old Stone Age, but it is at present uncertain of what type the most ancient skulls (Boskop, Broken Hill, &c.) are; there are no data to show at what period the Bushman and Negrillo appeared on the scene, but they probably preceded the Negro type, and he in turn was before the Hamite in most areas. In classical times the distribution of types must have been much the same as in the present day; but it can be safely affirmed that the Bantu-speaking peoples had not reached South Africa, nor yet, probably, the Hottentot. The story of the Nasamonians, told by Herodotus, reveals the presence of Negrillos on the borders of the Sahara, shown by the testimony of Hanno to have been either narrower or further south, or both, than at the present day. Though the earliest mention of Ghana does not go back earlier than the 10th century, there is reason to suppose that this great empire was in existence at least six hundred years; it seems to have had as its capital a town named Kumbi, two or three hundred miles due west of Timbuktu, in an area that is now extremely arid, but El Bekri speaks of its fertile fields, and its fall in 1240 must have been due in the main to change of climate. Its earlier rulers are said to have been white; in the 10th century the empire covered a territory as large as Nigeria, and its fame penetrated to Bagdad; El Bekri attributes to it a force of 200,000 warriors. It reached its end through conquest by the Mandingo empire of Mali, the wealth of which will be gathered from the fact that one of its rulers went to Mecca in the 13th century, taking, according to Ibn Khaldoun, 60,000 carriers and 3500 lb. weight of gold dust as journey money. Passing over other empires in this area, mention may be made of Edo, or Benin, famed for its wonderful bronzes; the present ruler, under British control, is the thirty-fourth king of the Yoruba line, which came in about 1140 A.D.; the Portuguese visited Edo towards the end of the 15th century. There are many other lines of native rulers who can trace their genealogy back some three or four hundred years, and among ancient kingdoms may be mentioned Bornu (Kanuri), attacked by Mali in 1374, Gao, Cayer, Sine, Dahomey, the Yoruba states, &c. The states of Equatorial Africa (Congo, Lunda, the kingdom of Monomotapa, &c.), were vastly less important than Ghana or Mali.

Population.—Estimates of the population of negro Africa vary enormously owing to the great differences of density of population; some authors put the figure at the absurdly low figure of 40,000,000, others give over 120,000,000; it is probable that Nigeria is the most densely peopled area, and the Southern Provinces average about 100 per square mile, with extremes of 3.5 for mountainous districts and nearly 450 for highly cultivated areas. The total population of Nigeria may number 20,000,000, on an area of 330,000 miles; this is ten times as dense as the population of the colony

of Soudan Français (Haut-Sénégal-Niger). West of Chad the population is about 35,000,000.

Non-Bantu languages occupy an area of about 2½ million miles, Bantu languages rather more; allowing 20 and 15 per square mile, a figure of 100 million is reached, which may be regarded as a minimum.

Language.—The term tribe is vaguely used, usually of a language unit; it is probable that there are at least 800 'Sudanic' and 300 Bantu languages. If the languages of Bushmen, Pygmies, and Hottentots are excluded, South Africa is the domain of the Bantu family, and the area from five degrees north of the Equator to the edge of the Sahara is occupied by Sudanic tongues, which are again divisible into classifying (with a syntax resembling Bantu), and non-classifying, which range from isolating tongues largely monosyllabic, like Ewe, to speech forms in which prefixes and suffixes are freely used. From the standpoint of etymology Sudanic and Bantu are related, for a large percentage of word roots are common to both, though they are, in the former, mainly monosyllabic, in the latter dissyllabic. Bantu languages are as nearly related as the different Germanic tongues of Europe; but the languages of the Sudan present great diversity. The main divisions are: West, Central, and East Sudanic (non-classifying), and the Middle Zone, mainly in mountainous, coastal, or otherwise uninviting regions, with Bantu-like syntax. Musical tones like those of Chinese are common both to Bantu and Sudanic languages. In addition to ordinary speech forms are found sacred and trade languages, and 'back slang.' Where language areas are small it is common to find people who speak three, four, or more languages with ease.

Religion.—No part of African anthropology has suffered more from distortion and inadequate presentation than the religion of the Negro, which is for many writers summed up in the word 'fetichism,' usually with a completely wrong meaning. Fetichism is properly the doctrine of spirits embodied in material objects, not the belief in the magical virtue of material objects in themselves. Such beliefs play a certain, often very subordinate, part in native beliefs, but they are nowhere predominant, and the word is better avoided as hopelessly ambiguous.

A certain number of authors have given adequate delineations of the religious beliefs and customs of individual tribes, but they are few in number. No generalised account can be given, for the simple reason that such an account must either be so much qualified as to lose its value, or so much cut down as to be comparatively meaningless; but a summary of some forms of African religion will make this diversity clear. It must be understood that such a summary is mainly concerned with the externals of the creeds; it is not impossible that there is much agreement in the ends which the native aims at—probably the preservation of life would cover the meaning of many practices.

There can be little doubt that the religions of Africa have undergone great changes; for Sierra Leone we have early records, which show that polytheism ruled where we now find belief in a single god with numerous nameless spirits, many of them localised; it is quite clear which form came first, but there is often a tendency to suppose that the simpler must precede the more complex.

There has been some controversy as to the beliefs of the Bantu-speaking tribes, more especially in the east and south-east; it has been argued that their religion is exclusively ancestor-worship without anything that can be called a supreme god; it is quite certain that a cult of ancestors bulks largely in their religion, but that is true of

many other parts of Africa. It seems probable that this cult has in some places obscured an earlier belief in a supreme being, often a sky-god.

On the other hand, it is probable that some of the supreme gods have come to occupy that position owing to alien influences, though this does not exclude the possibility that an indigenous figure of the same order has been supplanted.

At the present day the Temne of Sierra Leone believe in Kuru (Masaba) whom, owing to Islamic influence, they identify with Allah; no other named gods appear to be recognised, even among non-Mahomedan Temne; but they recognise the existence of numerous nameless *krifi* (spirits), good and evil, who have to be propitiated. There can be no doubt that to-day Kuru means sky; but an early voyage records that Cru was a single, very old tree; other gods of the same period were Benthema (the sun), Ymell (god of war). Of a wholly different type is the religion of the Yoruba, who recognise a sky-god, Olorun, but hardly worship him; they have also a host of other gods, some declared to be the descendants of Obatala, created by Olorun, and of Odudua, his wife. Their neighbours, the Edo, have a sky-god, Oisa, and below him a number of demi-gods (*ebo*), supposed to be transformed men. Different again is the Ibo creed, which sets Chuku (perhaps of alien origin) at the head, with non-human demi-gods (*alose*) below him, and also recognises protective deities, such as Chi.

Belief in the gods mentioned above is limited to a single tribe, but in other parts of Africa the same name is found common to many tribes; Nzambi (or a similar name) occurs among the Herero of South-west Africa, on the Congo, perhaps on the Gold Coast (Onyame), and among tribes west of Chad. Another name, chiefly East African perhaps, is Mulungu, which is the name given by the Zulu to the spirits of the dead; he is perhaps a generalised ancestor.

Traces of dualism (good and evil gods) are found here and there in West Africa; dualism is, however, mainly found among the Hottentots, Masai, and other tribes of non-negro speech; among the Bantu-speaking peoples it is reported only from Nyasaland.

It is commonly but erroneously supposed that the Negro is addicted to the worship of idols; there are many tribes which have no figures, human or otherwise, to which they offer worship; the wooden idols seen in museums are usually subordinate figures; it often happens that a special ceremony is needed, to make them efficacious in native eyes, before they are used as talismans.

Side by side with this kind of religion is the worship of ancestors, sometimes remote, sometimes only the immediate ancestors; in some tribes the main object is to appease or keep in good humour the spirit of the departed, but in others the main motive is to secure the welfare of the deceased or offer him a token of affection.

Habitations.—The dwelling of the Negro varies widely both in form and materials, ranging from the bee-hive huts of South Africa with wooden framework covered with grass, to the huge earth 'castle' of the Dagari and other tribes of the Black Volta River, which will house over a hundred and fifty persons, without counting cattle. The other main types are the round hut with conical roof, used in East Africa and the greater part of the Sudan, and the rectangular hut with gable or pyramid roof, found in the Congo and along the Guinea coast. Exceptional forms are in use among the Edo, who make houses with roofs covering the walls and passages, but leave the centre of each room open to the air; near Victoria Nyanza is found the *tembe*, a rectangular hut with

flat roof covered with a layer of clay. Pile dwellings are found sporadically.

The type of the village or town and its size are equally varied; huts may be ranged in one or more streets, sometimes radiating from a centre, or may be scattered irregularly over a wide area. In Sierra Leone it is rare to find a score of huts in a village, but in the Yoruba country there are native towns with over a hundred thousand inhabitants.

Dress.—There are some African tribes who still go wholly unclothed, like the Lobi and Birifo of the Black Volta; in other cases, like the Sara of the Shari River, an apron is worn behind; but the great majority of tribes wear something which the European would class as clothing, even if it is only a T bandage passing between the legs; where Mahomedanism has spread there is a tendency to wear a dress which completely covers the body. Cotton is grown in many parts, and, especially in West Africa, has probably replaced bark cloth. In the Sudan, East and South Africa, on the other hand, skin and leather were the accepted material for clothing before the introduction of European cloth. In the Congo palm fibre was largely worn; skirts of grass were also in use, especially among women.

At the present day ornaments are commonly of metal or glass, the latter in the form of imported beads; but side by side with these are found seeds, teeth, shells, strips of fur, &c. In the hair are used bone or metal pins; combs are made of wood or ivory.

Hairdressing.—Both for men and women there are an extraordinary number of styles of hairdressing in use, some dictated by custom, some by individual fancy; the latter often bear witness to earlier customs which have gone out of fashion. Some tribes shave the head completely; others only in part; others let it grow and interweave false hair, or vegetable filaments with it, or cover it with clay or other materials. Some construct sugar-loaf chignons, others have masses of hair resembling tam-o'-shanters. A result, perhaps of hair fashions, is the use of 'wooden pillows,' widely used in the Zambezi region, and sporadically in other parts.

Mutilations.—There are few Negro tribes but make use of some form of bodily mutilation; circumcision is practised in many parts—the central Guinea coast and the region from the Zambezi to Abyssinia being the chief exceptions. Operations on the teeth are also frequent, such as knocking out upper or lower incisors, chipping the incisors to a point, removing the sides in the middle of the tooth, but leaving the cutting edge intact, &c. Tribal marks, that is tatuing, or scarring of the face or body according to the tribal method, are largely used—in East Africa the lip-plug, a disk of wood sometimes three inches in diameter, is inserted in the lower lip; other tribes distend the lobes of the ear with discs of wood; occasionally the nose is pierced.

Food.—No general statement can be made as to the food of the Negro; the Pygmies and Bushmen are hunters, though the former obtain vegetable products from neighbouring negro tribes; the Hottentots and Herero live on the coagulated milk of their cattle to a large extent; but apart from these exceptions the native of Africa is in the main a vegetable feeder. There is, however, no one vegetable product in universal use, and the main food varies from one area to another. A general survey is the more difficult because we find cases, like the Konde, who form an islet of banana eaters, amid an ocean of tribes that subsist on millet and other cereals. Generally speaking, there are five main vegetable foods: yams, rice,

cereals such as millet and maize, manioc (cassava), plantains, or bananas. Of these, rice is mainly used in the extreme west, though it is also used in East and South Africa; yams are the food of the middle belt of Nigeria and adjacent parts; bananas are in use in Uganda and French Congo, and have been replaced in the Congo by manioc, introduced from America, which is also important in parts of Nigeria. For the remainder of Africa cereals of one sort or another form the staple food; as a curiosity may be noted the fact that the food of the Lango, near Victoria Nyanza, is a slightly fermented drink prepared from millet; they also make use of fresh or butter-milk. In West Africa the non-negro Fula alone use milk. It may be noted that the yield of native cattle is small, and in most cases they are soon dry.

It must not be supposed that the vegetable foods are consumed without any relish; dried fish, 'meat' sauce, palm oil, pepper, &c., are in use in various parts. After a sacrifice the flesh of fowls, goats, or cattle is eaten, though the portion which falls to each man is a scanty one. In many areas dependence upon one staple food means that before the new harvest is ready a 'hunger time' has to be endured, owing to the fact that the staple (e.g. yams) will not keep more than a certain length of time, or because not sufficient crops of cereals are raised; there are areas in which the population is dependent on roots and wild products at such a time. This is, however, often a result of improvidence, for other districts eke out their sustenance by maize, &c., planted at such a time that it is ripe when other supplies are beginning to fail.

Although each household is in the main self-supporting, it is usual, in areas where the market is known, for a small daily market to be held which, like the more important weekly market, is entirely devoted to the sale of food products. Ants, beetles, &c., are not despised as food by many tribes.

Domestic Animals.—Although there are few wholly pastoral tribes in Africa, domestic animals of one sort or another are seldom or never wholly unknown. In many parts dogs are eaten, even when they are also the hunters' aids. Cattle, where they are not kept either for milk or meat, may play a considerable part in tribal life as a means of exchange, especially when it is a question of purchasing a wife; edible domestic animals of all sorts are in demand for sacrifices. In addition to cattle, of which there are several breeds, and even more widely found, are goats and fowls; sheep are rarer, pigs only in certain areas. Milk and butter are in use only in the east and south, apart from such cases as the non-negro Fulani; the milk of goats is probably seldom or never used by non-pastoral tribes. Eggs are seldom eaten, and, among such tribes as permit the use of them, they are often forbidden to women. It may be noted in passing that some of the pastoral tribes draw blood from their living cattle for food purposes.

Hunting.—With the diminution in the amount of large game animals has disappeared the possibility of making large use of them as food, even in areas where antelope, &c., were formerly numerous. In some parts of West Africa there are hunters' societies, but even there the economic importance of game is small. Generally speaking, where the bush is dense the hunter lies in wait for his game—for following the tracks is uncommon—and waits till luck sends him a victim. Where the country is more open there may be a battue, and the animals are either shot down with antiquated firearms, or driven into nets or traps. In some cases, as with the elephant-hunters of the Baganda, the hunters may not eat of the kill, which is sold to neighbouring tribes. Traps

are made both for large and small animals, even including mice.

Fishing.—Fish form a relatively important part of the diet of many tribes, even when they are remote from the sea or large rivers. In some cases a riverain tribe exchanges fish for the agricultural products of an inland people, or they may be sold, in a dried state, in the ordinary way in a market, which can at times be smelt a mile or more away, for the fish are seldom thoroughly cured. Fish are caught with rod and line (rarely), spears, nets, traps, weirs, &c., and when the water is low they are poisoned or stupefied in great numbers in the smaller rivers and streams, which are dammed for the purpose. The tribes of South Africa form an exception to the rest of Africa, and make no use of fish as an article of diet, but it was recorded in the 18th century that the Bushmen of the west did not reject them. Fishing is an important industry on the Niger, especially in the upper waters, where large fish are caught on their way up-stream in July and August, and small fish, not so big as sardines, in the later months of the year; in April, when the waters have fallen, leaving lakelets easily cut off by dams, hundreds of men join forces to drive the fish into traps, while women on the banks clean them and put them to dry in the sun.

Stimulants.—Intoxicating liquors seem to be universally known; they may be classified into several types, according to the materials used in preparation, which include grain, bananas, honey, &c. The sap of the oil palm and the raphia palm is also fermented; it is agreeable when fresh, but after fermentation is very intoxicating.

Tobacco is largely used, either for smoking or in the form of snuff; pipes are made of a leaf twisted into a cone, of wood, or of clay. A water pipe is also known, introduced from Asia, which is chiefly used for smoking hemp.

Weapons.—Native weapons have in many parts given way to firearms, usually of an antiquated type. The indigenous weapons of Africa were the spear and bow, each with several different types, the club, the sword, the throwing spear and the throwing knife, the last three in limited areas only. Practically the only defensive weapon of importance was the shield, and this was unknown over a large area on the west from the Congo to the Cape of Good Hope. The shields are of several different types—interlaced, solid wood, leather or skin, &c. As poisons for weapons use was made of strophanthus and other vegetable products, snake poison, and putrefying animal matter.

Music.—There is little printed information regarding the vocal music of the Negro, but though monotonous it reaches, at least in certain tribes, a high level, both as regards choral and individual performances; melodies reproduced by the phonograph have surprised professional musicians by the accuracy with which difficult intervals are sung. Musical instruments of importance are drums (wood, wood and skin, or pot and skin), sometimes with cords to change the pitch, flutes and whistles, harps, and other stringed instruments, including the one-stringed bow, xylophones made of resonant pieces of wood over calabash sounders, &c. It is seldom that instruments of different kinds are played together; an orchestra of drums, on the other hand, is by no means uncommon.

Agriculture.—Generally speaking, farms may be classified under two heads, some being cleared by the efforts of the unit to which it will belong, while in other areas a large social unit clears the ground, which is then sub-divided. In grass country the grass is burnt, and the ground broken up by the hoe—the universal implement in Africa, with, however, great variations in size, length of handle, &c. Before hoes were introduced, probably the

digging-stick was in use. In bush or forest the undergrowth is cut and allowed to lie for some weeks till it is dry, and then burnt; the big trees are burnt where they stand, ashes being the only fertiliser known in most areas.

In West Africa the farm is cultivated for one, or at most two years, and is then left for ten or more years, during which dense 'bush' (i.e. a growth of small saplings ten or twelve feet high) springs up. In other cases the main crops may be grown for two or three years, less important ones for a year or two more before abandonment. One result of this system is the rapid disappearance of real forest in many districts.

Work is by no means at an end after the seed is put in the ground, which is, of course, done by hand; yams, maize, and other crops need hoeing up, and two or even three weedings are needed if the crop is to do well. After the harvest grain is stored in granaries, raised above the ground to keep off rodents, &c., or in tall earthen receptacles, in holes in the earth, &c.; yams are hung upon frames, plaintains may be dried to make flour later, and so on. Generally speaking, agricultural work is, among the Bantu, the duty of the women, and men do not do more than clear the ground; but in other tribes all the heavy work may fall to the men. While the crops are growing children are on the watch to scare baboons, birds, antelope, &c., which do great damage; fences are sometimes erected, especially against the wary hippopotamus, which suspects a trap everywhere. Harvest work is usually done by both sexes; for all kinds of agricultural work it is in many places the practice for the work to be done by large numbers of people, whom the owner of the farm provides with food.

Industry.—Among important manufactured products may be mentioned iron, smelted from ore in some places, and everywhere worked by blacksmiths who are in some tribes pariahs, and in others enjoy special consideration; weaving, done by both men and women, the former manufacturing a long narrow band of cloth on a loom with treadles, the latter a short broad piece, large enough often to be used as a 'cover cloth' for an adult; other manufactured articles are baskets and mats, and objects made of wood, such as figurines, combs, masks, &c. In West Africa gold has been for ages an important product; the Carthaginians bartered from the tribes on the coast. Salt is also a product which is in great demand; it is prepared from wood ashes, or won from deposits. Pottery is an important industry, carried on mainly by women; except in Bornu and a few isolated areas the wheel is unknown.

Calendar.—In parts of West Africa and the Congo the week is known as a unit of time, and varies in length from three to seven days; occasionally units of ten or more days are in use, sometimes side by side with the week; the month, where it is known, is always lunar, and is counted from the appearance of the new moon. Many tribes have no idea of the length of the year, though, of course, agricultural operations make them aware of its existence.

Market.—It is probable that in West Africa and the Congo the week came into existence as the unit by which the market was regulated; large markets, attended by thousands of people, are a common feature of this area; but they are not confined to it, as the markets of Uganda were also most important. In some parts a market 'queen' presides over the market; or it may be regulated by a king or chief, or their representatives, who collect a tax of 5 or 10 per cent. on the value of the wares, and preserve order. Theft in the market was, especially in the Congo, severely punished. On the banks of the Niger monthly

markets were known, with smaller fortnightly assemblies—people would come several days' journey by canoe to attend them.

Currency.—In parts of West Africa gold dust, weighed in the balance, is used as money; but apart from this, the only precious metals in circulation are the coins of various European nations. Over large areas cowries, of two different sizes, are current in West Africa, and more rarely in Bantu-speaking tribes; iron, in many shapes, such as hoes, spear-heads, needles, &c., as well as brass rods, manillas, copper crosses, &c., are among the metallic forms of currency, pieces of cloth, skins, tobacco, &c., are also current; and large payments may be made by means of cattle—a favourite unit when a wife has to be acquired. When cowries were first introduced two shells were sufficient to purchase a wife in Uganda; even in recent times, not more than a century ago, a thousand cowries would purchase a tusk weighing sixty pounds; now a large cooking-pot costs two hundred cowries. On the west coast cowries may be worth no more than four hundred a penny. There is often a special kind of numeration in use for counting cowries.

Transport.—In pre-European days all transport was effected by human beings, usually males, and almost invariably the load was carried on the head, though some Sierra Leone tribes use 'hammers' supported by a head-band, and resting on the back. The load which a carrier could transport ten or fifteen miles a day was and is about sixty pounds; but native traders will often carry much more, and cover more ground. The only exception to this mode of transport was when river or lake made canoes possible; especially on the Niger large trading canoes were in use.

Canoes.—The dug-out is the normal African boat, ranging in size from a craft big enough for one man only to sea-going vessels, big enough on the west coast in former times for sixty or eighty men. The Bantu-speaking tribes had canoes on the lakes, but those of the south had not even ferry-boats on the rivers, which constituted great obstacles to migrations such as those of the Angoni; the Baganda canoe was remarkable because it was sewn together. Canoes are always propelled by paddles.

Kinship, Descent, &c.—Little is known of many tribes with regard to Consanguinity and Kinship (q.v.); but it is clear that some have the same kind of relationships as are found in Europe, while in other cases the classificatory system is in use. In the latter case we may find the 'global,' or great family, with a head of the family ruling over his brothers and cousins, their descendants of all generations, and an equal number of unfree. Under this régime brothers and cousins are called by the same term, as are sons, nephews, and the children of cousins. Every member of such a family remains in it as long as he lives, whereas in the 'little' family a man leaves it at marriage and begins a new family on his own account. Each member of a 'great' family owes to it a certain amount of work, and can demand from it support and succour; it is responsible for the debts of the bankrupt, and must pay the fines of the criminal. It often happens that there is no term for brother, but only for elder or younger brother; a word may mean sister when used by a woman, or brother when used by a man, but it cannot be used by a man of a woman. In a certain number of tribes a double system of descent is found, reckoned for some purposes through the father, for others through the mother.

Marriage.—Two sharply defined forms of marriage are found in Africa; in the first the wife remains in her own family and her children with

her, so that, if any of them die, it is incumbent on the woman's family to bury them; the children do not inherit from their father. This may be called 'free' marriage; it is still found in Dahomey and Nigeria, but has in most parts been superseded by 'bond' marriage, where the wife is purchased by the husband, enters his family, passes to his heir at his death, and bears children who may be his heirs. Betrothal may take place in infancy. There are impediments, such as those set up by consanguinity or kinship, by membership of the same totem clan or other social unit, &c. A man may have as many wives as he can get, the first being 'head' wife; but the details are too numerous to permit of a conspectus, and must be sought in anthropological works. The head wife usually occupies a favoured position, and may be her husband's deputy during his absence; she often wields authority over the inferior wives. The age when a girl goes to her husband is commonly soon after the age of puberty. Where there are a number of wives they commonly take turns to cook for the husband. Important chiefs may have several score of wives, and go on acquiring new wives till the end of their lives; as a result it is possible to find families of a hundred half-brothers and sisters. There is very little in the way of any actual marriage ceremony; the important element is often a sacrifice to the ancestors, performed long before the girl goes to her husband, and the wedding may consist in no more than a semi-ceremonial home-bringing of the bride by an escort, usually of the husband's family. Where betrothal has taken place in infancy it is usually possible for the girl, on reaching an age when she can exercise choice, to decline her suitor; in this case her family has to refund the value of the payments on account of bride-price; the same is the case when a 'bond' wife leaves her husband—in both cases a favoured man often finds the money. Generally speaking the Negro takes considerable pains in choosing a wife, making inquiries as to her family, &c. Although there is little which looks like love-making to European eyes, marriages of affection are probably not uncommon; it is probably rare for a wife to be really badly treated.

Disposal of the Dead.—The corpse is disposed of in a multitude of ways. It may be buried in the hut, which may remain in use or be deserted; it may be inhumed in the bush, by the wayside, in a cemetery appropriated to certain social units, &c., or it may be deposited in a tree, the bed of a stream, on a platform, or exposed. It may be mummified, dried over a slow fire, or eaten; the bones may be collected when the flesh is off them, or the head alone may receive special treatment. The grave may be lined with stones, have a side chamber, or a hood in which the head of the corpse goes, or the body may be put in a pot. Where the corpse has been buried funeral rites may still go on till after 'second burial,' a ceremony intended to send the soul of the dead man to his own place. During the burial customs there may be human or other sacrifices; the flesh of animals otherwise tabu may be eaten by the family of the deceased, and so on. Cremation is not absolutely unknown. Some tribes bury property with the corpse, and the wives of the deceased were formerly sent after him to attend him in the next world. On the grave are often offerings of food, &c., for the benefit of the deceased. Custom prescribes that certain relatives must mourn, especially the widow, lest the spirit of her dead husband haunt her.

Inheritance.—Property, especially in land, may be classified under three heads according to whether it is owned by the community, by a family, or by an individual. Individual property may pass to heirs in the male line, who are either

own children, brothers, or brothers' sons, or may go to the eldest among them. If uterine succession is the rule the heir is the sister's son; but hybrid systems are not uncommon and the nearest heir may be a brother (uterine), with a sister's son or daughter next in succession. The son of the head wife often takes a double, or at least a large, share where there is a division of property, but there are also cases in which the youngest son is in the favoured position. The wives of a dead man may pass under the same rule as the rest of the property, but the own mother of the heir is commonly excluded. Whoever buries a debtor may succeed to his liabilities.

Cannibalism.—The eating of human flesh was formerly widespread in Africa, and it is probably not yet extinct. Two kinds may be distinguished—the ceremonial meal eaten because of some magical virtue or other advantage to be gained; the other, food cannibalism, practised because human flesh tickled the palate. Witches, male and female, are frequently regarded as eaters of human flesh, and are compelled to undergo the ordeal of drinking poison.

War.—Before European domination brought peace to Africa some tribes were essentially warrior peoples, and depended on raiding for their subsistence, and certain states, like Dahomey, were essentially military in character. But in the case of many tribes war, properly so called, was hardly known. In the Ibo country one town might fight another over the abduction of a woman, and hostilities would go on for two or three years, ceasing in the heat of the day and in the farming season; then, two or three having been killed on each side, the contending parties would decide that enough blood had been shed, and make peace—needless to say there was never any question of either booty or increase of territory. In contrast with this picture may be considered the Baganda, who at the slightest pretext sent an expedition against another nation, and had an annual war against the Banyoro. Generally speaking, tribes whose territory was small were peaceful; but expanding peoples, like the Yoruba or Bantu, generally depended much upon their prowess in war.

Slavery.—When African slavery is spoken of it must be borne in mind that domestic slavery was a social practice which differed completely from the slavery to which the Negro was condemned when he was carried overseas. Where a slave was not sold away, and even in the frequent cases where prisoners of war formed the main mass of the unfree, the lot of the slave was by no means an unhappy one; he could marry a wife, and own property, even other slaves, who relieved him of the duty of working for his master; he was free in many cases at certain times or on certain days of the week, and some tribes permitted a slave to purchase his freedom with his savings. So contented were the slaves in some places that opportunities of escape would not be taken. In some tribes children or grandchildren of a slave became free, and 'house' slaves (i.e. those born in the house) could not be sold. In places a slave could, if he were ill-treated, transfer himself to a new master by performing the appropriate ceremony.

Folk-tales, Proverbs, &c.—Myths are rare among negro tribes, but they have a great wealth of tales and proverbs. In the former animals often figure largely, and there is often a cunning beast which outwits his brethren. In the Congo the proceedings at the trial of a law-suit were largely of the nature of citation of precedents, in the form of tales, and judgment might depend upon what the leopard once said to the elephant.

Bibliography.—No complete list of words can be given, but for a popular account of native life the

best work is A. Werner, *British Central Africa* (1906); Roscoe, *The Baganda* (1911), is more detailed; M. Delafosse, *Haut-Sénégal-Niger* (1912), is a summary of official information from a French colony; J. Spieth, *Die Ewe-Stämme* (1906), is a native account with parallel German translation.

NEGROES IN AMERICA.—Importation of slaves from Africa went on steadily from the early years of the 16th century, when it was begun by the Spaniards, even the good Las Casas recommending it in the interest of the native Indians. Both Queen Elizabeth and King James I. issued patents to English slave-trading companies operating between the coast of Guinea and the American colonies. England, by the treaty of Utrecht (1713), engaged to carry out the contract of the old French Guinea Company, and to import into the New World 130,000 slaves in the course of the next thirty years, and is said to have more than made good the engagement. In the United States the traffic was open and active until the passage of the act of 1794 prohibiting the importation of slaves into any of the federal ports. Long after this it continued to be a brisk business in the West Indies and South America. As late as 1840 there were seventy-five ships plying constantly between Brazilian ports and the African coast, bringing cargoes of 300 or 400 slaves at each trip. The principal points at which the slaves were obtained were along the coast of Guinea, especially on what was known as the Slave Coast, between the rivers Lagos and Assinie, where were the crowded marts of Waidah and Anamaboe, and again along the Angola coast, from 8° to 18° S. lat.

The folk-tales of the race in America are very numerous, the negro being a tireless talker and *raconteur*. Many of them reveal a high stage of the art of story-telling, as the Georgia tales collected by J. C. Harris and Colonel C. C. Jones. Many of them belong to the class of 'beast-fables,' similar to some which have been collected among the American Indians and the natives of the African continent, and such as were favourite staples of amusement in Europe during the middle ages. One of the principal figures is the rabbit (the 'brer rabbit' of the 'Uncle Remus' tales). He figures conspicuously not only in the southern United States, but in the West Indies and on the Amazon (Hartt), and as *tio conejo* ('uncle rabbit') in the folklore of the Venezuelan negroes (Dr Ernst). Along with story-telling, singing and music are favourite diversions of the coloured population. This tendency is a direct inheritance from their African ancestry. In Central America the negroes still employ the *marimba*, an African instrument with wooden keys placed over jars or gourds, the keys being struck with a stick. In the United States the violin, the fife, and the guitar are used, but the favourite is the banjo, an instrument modified from the guitars with grass strings used on the Guinea coast. The negro folk-music of America, however, is European in origin, though it has developed in its own way; and it has returned to Europe in coon-song and ragtime. No American negro composer has attained celebrity. (But see COLERIDGE-TAYLOR for an English-Sierra Leone mulatto.) Their songs are numerous, many of them of a religious character, others turning on the incidents of daily life. They are generally defective in prosody and without merit, being often little more than words strung together to carry an air. Paul Lawrence Dunbar (q.v.) was, however, a poet of some eminence. Frederick Douglass, Burghardt du Bois, and Booker T. Washington were all coloured men. And it should be remembered that in France Alexandre Dumas was a quadroon. The American negro has done nothing in the plastic arts to be set

against the wonderfully fine carvings of former ages in Guinea and elsewhere.

The social position of the members of the race in some parts of South America is little different from that of the whites. This is also theoretically the case in the United States since the civil war; but the natural sense of inequality between the two races makes itself felt. Some states have adopted voting qualifications, educational, proprietary, or other (such as the 'understanding clause' and the 'grandfather clause'), which practically disfranchise the negro; though the states have representation in congress in proportion to their population, including negroes. Many thoughtful and learned men see in the increasing coloured population a standing menace to the institutions and culture of their country. During and after the Great War economic forces drove many negroes into the towns of the north and west, and the coloured population of some of the southern states fell between 1910 and 1920. However distasteful this movement may be to the north, it has probably helped to slow down the increase of the coloured population of the United States; and the slowing down was already greater than among the whites.

See SLAVERY, UNITED STATES, BRAZIL, JAMAICA, LYNCH LAW, OBI, &c.; Williams, *History of the Negro Race in America* (1882); Clowes, *Black America* (1891); Thomas, *The American Negro* (1901); *The Negro Problem*, by negro authors (1904); Mrs Murphy, *Southern Thoughts for Northern Thinkers* (1904); Galloway, *The South and the Negro* (1904); Page, *The Negro, the Southerners' Problem* (1905); Sir H. H. Johnston, *The Negro in the New World* (1910); works by Booker Washington; Du Bois, *The Negro* (1915) and other works; Brawley, *The Negro in Literature and Art* (1910).

Negroponte. See EUBŒA.

Nehemiah was, according to the prophetic book named after him, a Jew who had for some time held the post of cupbearer to Artaxerxes [Longimannus], 'King of Babylon' (xiii. 6), when, at the winter-palace of Shushan or Susa, towards the end of the year 445, he was surprised and saddened with unexpected tidings of the very unprosperous state of Jerusalem. How or when the events now for the first time reported to him had happened is not related, but the result had been to leave the city impoverished and defenceless. In the following spring (444), having obtained leave of absence from court for a limited time, and full powers to act as governor-extraordinary of Judæa, he set out without delay for the city of his fathers. The first necessity was to have the walls rebuilt; on his arrival no time was lost in taking the necessary steps, and the entire structure was completed, in the face of much opposition, within fifty-two days from its commencement (vi. 15). His next care was to reinforce the population of the depleted capital by drafts from the surrounding districts, and in particular, it would seem, to bring back to town the Levites who, through non-payment of dues, had been compelled to abandon service at the temple and give themselves to field labour throughout Judæa. Arrangements having been made for the regular support of the sacred offices, the feast of the dedication of the walls was now gone about with great pomp and joy. It is to be presumed that Nehemiah returned soon afterwards to his duties at the Persian court. We read (xiii. 6; cf. v. 14) of a second visit of Nehemiah to Jerusalem, twelve years afterwards, on which occasion he either initiated or renewed and completed certain reforms which henceforth were among the most characteristic features of post-exilic Judaism. One of the most marked of these was the crusade against mixed marriages and the separation of the Jews of pure descent from the 'mixed multitude'

(xiii. 3). His cleansing of the temple, and expulsion of Tobiah from its precincts, ultimately led, it would seem, to the formation of the Samaritan community as a separate religious organisation. Another of Nehemiah's reforms was the stringent enforcement of a strict law of Sabbath observance. Others are to be found in the arrangements he made for the permanent maintenance of the temple worship and the support of the priests and Levites. In this connection, and as bearing on the criticism of the Pentateuch, Neh. x. 32 [33] ought to be compared with Ex. xxx. 13, Neh. x. 33 [34] with Ex. xxix. 38, 39, and Num. xxviii. 3, 4; also Neh. x. 37 [38] with Lev. xxvii. 32, and Neh. x. 36 [37] with Num. iii. 12, 13. How long Nehemiah's second visit to Jerusalem lasted we are not told, nor does authentic history record the time or place of his death. In the late apocryphal book of 2 Maccabees a spurious letter, purporting to date from the year 124 B.C., is preserved, where wonderful things are told as to Nehemiah's rekindling of the sacred altar-fire by means of 'naphthar,' and it is also said (2 Macc. ii. 13) that he founded a library in which he 'gathered together the acts of the kings, and the prophets, and of David, and the epistles of the kings concerning the holy gifts.' This last statement can only be used with great caution as bearing on the history of the canon.

The canonical Book of Nehemiah originally formed the closing chapters of the undivided work, Chronicles-Ezra-Nehemiah (see CHRONICLES), for which two of the most important original sources were the highly characteristic memoirs of Ezra and Nehemiah. These have been preserved, however, only in so fragmentary and dislocated form that it is exceedingly difficult now to gather from them the true order of the events to which they relate. The book in its present shape begins (Neh. i. 1-vii. 5) with Nehemiah's account of the building of the wall and the difficulties he had to encounter. The depleted state of the city had suggested to him a census of Judæa, and in this connection is given the list of those who had come up with Zerubbabel nearly a century before (vii. 6-73 a); this list, apart from very numerous and considerable textual variations, is identical with that in Ezra ii. The reader might now expect to find a corresponding census for Nehemiah's own time, but instead of this the next three chapters give an account of the reading of the law by Ezra, the celebration of the feast of tabernacles, the fast and repentance of the people, and the solemn sealing of the covenant to observe the law. These chapters are continuous with Ezra x. In Neh. xi. the interrupted narrative is resumed, or rather the place of narrative is taken by a series of name lists (inhabitants of Jerusalem, heads of houses in Judah and Benjamin, priests, and Levites). Chapter xii. 27-43 then gives Nehemiah's description of the dedication of the walls, and the rest of the book (xii. 44-xiii. 31) consists of the account of the reforms he effected in the spirit of the covenant as contained in x. 30-39. It is very likely that the editor of Chronicles-Ezra-Nehemiah had before him two distinct documents relating to Ezra and Nehemiah respectively, but that into the first of these between Ezra x. 44 and Neh. vii. 73 b (originally continuous) he judged it expedient to introduce from the second a section of Nehemiah's memoirs (Neh. i. 1-vii. 5) in order to prepare the way for the mention of Nehemiah in Neh. viii. 9 and x. 1 [2]. The work mentions Jaddua, who was high-priest in the days of Alexander the Great, and also Darius, the last of the Persian kings (xii. 22). It cannot, therefore, have been compiled earlier than 333 B.C., and probably it ought to be dated at least half a century later. In the gradual compilation of the Jewish canon, the Ezra-Nehemiah section of

the larger book was first added to the list of authoritative writings, some account of the times subsequent to the captivity being plainly required. The need for a second history, parallel with that contained in the 'former prophets,' was not so obvious; Chronicles, therefore, the remaining portion of the work, was the very last to take a place among the Old Testament Scriptures.

See further the histories by Ewald, Stanley, Wellhausen, H. P. Smith, and S. A. Cook (*Ency. Brit.*, 'Jews,' 'Palestine'). For introductions and commentaries, see (besides the general handbooks on the Old Testament) Ryle (*Cambridge Bible*, 1901), T. W. Davies (*Century Bible*), Batten (*International Critical Commentary*, 1913), C. C. Torrey, *Ezra Studies* (1910), and Cook (*Ency. Brit.*, vol. x. p. 108, and '1 Esdras' in Charles's *Apocrypha and Pseudepigrapha*).

Neidpath. See PEEBLES.

Neilgherry Hills (properly *Nilgiri*; Sansk. *nīla*, 'blue,' and *giri*, 'mountain'), a mountainous district in the south of India, rising abruptly from the plains to the height of 6000 feet, though individual peaks shoot up to 8760 feet. The mass is entirely isolated, with the exception that a precipitous granite ridge leaves its western face and connects it with the Western Ghāts. The surface consists of grassy uplands with large groves of forest trees; but the lower slopes are heavily timbered. The Neilgherry Hills are inhabited by five distinct tribes, of whom the Todas are the most interesting. They speak a Dravidian dialect and practise polyandry; in 1881 there were 675; in 1921, 640. The men are tall and athletic, with Roman noses, black bushy beards and eyebrows, but they are dirty in their habits. Their sole occupation is tending cattle. Owing to their great elevation, the Neilgherry Hills have a delightfully cool climate, and are much resorted to on this account by invalided Europeans, the principal station being Ootacamund (q.v.). See H. B. Grigg's *Manual of the Nilgiri District* (1880); Rivers's *The Todas* (1906).

Neisse, a town of German Silesia, is situated in a broad valley on the Neisse, an affluent of the Oder, 50 miles SE. of Breslau. It manufactures linen and chemicals, and has great wool-markets. Pop. 30,000. Neisse was formerly the chief town of a principality, and residence of a prince-bishop.

Nejd. See ARABIA, WAHABIS.

Nekrasoff, NIKOLAI ALEXIEVITCH, a Russian lyrical poet, was born in Podolia in 1821, entered the army, but soon devoted himself to literature, editing a newspaper and a monthly magazine. He died 8th January 1877. Belonging to the realistic school, he gave powerful expression to the popular aspirations and social tendencies of his race in a series of poems that have been often re-edited.

Nélaton, AUGUSTE, surgeon, was born at Paris, 18th June 1807, studied there, and, after serving as surgeon in various hospitals and lecturing at the faculty of medicine, became in 1851 professor of Clinical Surgery, and in 1866 surgeon to the emperor. He became a member of the senate in 1868, and died 21st September 1873. Besides his great *Éléments de Pathologie Chirurgicale* (5 vols. 1844-60), he wrote on tumours of the breast, and the operation for cataract.

Nellore, capital of a Madras district, on the right bank of the Pennar, 107 miles N. of Madras. In 1787 a pot filled with imperial Roman gold coins and medals was found here, under the ruins of a small Hindu temple. Pop. 36,000.

Nelson, chief centre of the Kootenay silver-mining region, British Columbia, on a branch of the Kootenay Lake, having connection with the Canadian Pacific Railway; pop. 5000.

Nelson, a municipal borough of Lancashire (Nelson and Colne parliamentary borough), with great cotton-works, 3 m. N. of Burnley; pop. 40,000.

Nelson, the capital of a provincial district in New Zealand, is situated at the north end of South Island, at the mouth of the Maitai, a small river at the head of Blind Bay. The situation is very beautiful, on a flat, hemmed in by rugged hills and amidst almost tropical luxuriance. The harbour is sheltered and accessible to ships drawing 18 feet; and there is regular steam communication with Sydney and Melbourne. The city was founded in 1841; its water-supply is good. There are a cathedral, a literary institute and museum, public hospital, asylum, and (near by) research institute. The manufactures of the town comprise cloth, leather, soap, and jam. Pop. 10,000.

Nelson, HORATIO, VISCOUNT NELSON, English admiral, was born on 29th September 1758, at Burnham Thorpe in Norfolk, of which parish his father was rector. His mother, daughter of Dr Suckling, prebendary of Westminster, was related to the Walpoles. He entered the navy in 1770, under the patronage of his uncle, Captain Maurice Suckling; made a voyage to the West Indies in a merchant-ship; served in the Arctic expedition of 1773, and was afterwards sent to the East Indies in the *Seahorse*. Two years of the climate severely tried his constitution, never very strong, and he came home, invalided, in September 1776. In April 1777 he passed his examination, and by the interest of his mother's family was at once promoted to be lieutenant of the *Lowestoft* frigate, with Captain Locker. In her he went to Jamaica, where he was taken by the admiral into the flag-ship, and on 8th December 1778 was promoted to command the *Badger* brig, from which, six months later, he was posted to the *Hinchinbrook* frigate.

In January 1780 he commanded the naval force in the expedition against San Juan; in the heavy boat-work up the pestilential river his health broke down, and he returned to England in an apparently dying condition. A few months' rest and careful treatment, however, restored him; and in August 1781 he commissioned the *Albemarle*, in which, after a winter in the North Sea, he went to North America, where he joined the squadron under Lord Hood, and made the acquaintance of Prince William Henry, afterwards William IV., with whom he always maintained the most cordial relations. In the spring of 1784 he was appointed to the *Boreas* frigate, again for service in the West Indies, where, by enforcing the Navigation Act against the Americans, he roused the ill-will of the merchants, which took effect in numerous actions for damages. The law, however, was clear on the point, and Nelson's proceedings were sustained, though not without causing him much trouble and annoyance.

Whilst on this station he married Mrs Nisbet, the widow of a Dr Nisbet of Nevis, niece of Mr Herbert, the president of the island; and on the *Boreas* being paid off, in December 1787, he with his wife retired to Burnham Thorpe, where he lived for the next five years. His frequent applications for employment were unsuccessful, till, on the imminence of war with France in January 1793, he was appointed to the *Agamemnon* of sixty-four guns, in which he accompanied Lord Hood to the Mediterranean. When Toulon was given up to the allies Nelson was ordered to Naples to urge the necessity of troops being sent at once to their assistance; on his return he was employed in the blockade of Corsica, and in the following spring commanded the naval brigade which largely contributed to the reduction of Bastia and of Calvi,

where an unlucky blow from a bit of gravel, scattered by a shot, destroyed the sight of his right eye. In 1795 he was with the fleet in the two actions fought by Admiral Hotham outside Toulon. In both the French were defeated with some loss, but they were allowed to escape, and Nelson in his private letters expressed an angry opinion that more might and ought to have been done.

In the autumn of 1795 Hotham was succeeded by Sir John Jervis, and during the whole of 1796 the strictest blockade of Toulon was enforced, Nelson being for the most part, as in preceding years, with a small squadron in the Gulf of Genoa, where he put a stop to all coasting traffic, and commanded the road along the shore so completely as to warrant his assertion that, had he had an adequate force, the invasion of Italy would have been impossible. Towards the close of the year Spain concluded a treaty of alliance with France, and sent her fleet into the Mediterranean to co-operate with the French. Jervis thus found himself opposed by very superior forces; and, with Spain and Italy both in hostile hands, his position was no longer tenable. He withdrew the troops from Corsica, and retired to Gibraltar, and afterwards to Lisbon. He was, however, determined that the Spanish fleet, which had been instructed to join the French at Brest, should not pass; and, on its endeavouring to do so, met it off Cape St Vincent on 14th February 1797, and inflicted on it a signal defeat. This was rendered more decisive by the action of Nelson, who, having been appointed commodore, with his broad pennant on board the *Captain*, was in the rear of the line, and, interpreting a manœuvre of the Spanish admiral as an attempt to reunite the two divisions of his fleet, which Jervis had separated, wore out of the line to meet him, and for nearly half-an-hour withstood, single-handed, the attack of the whole Spanish van. When support arrived and the Spaniards fled, the *Captain* had suffered severely; and Nelson, being unable to join in the pursuit, let his ship fall foul of the Spanish *San Nicolas*, which he boarded and took possession of, and, leading his men across her deck to the *San Josef*, took possession of her also.

Nelson's conduct on this occasion deservedly won for him the cross of the Bath; and, being promoted in due course to be rear-admiral, he continued with the fleet off Cadiz till, in July 1797, he was sent with a small squadron to seize a richly-laden Spanish ship which had taken refuge at Santa Cruz. He was instructed to levy a heavy contribution on the town if the treasure was not given up; but the troops which he had asked for were not granted, the ships were powerless, and the landing force at his disposal was quite inadequate. With it, such as it was, however, the attack was made on the night of 21st July; but in the darkness the boats missed the mole, and landing irregularly, were repulsed with severe loss. Nelson himself had his right elbow shattered by a grape-shot. He was carried on board his ship, where the arm was amputated, but on rejoining the fleet he was compelled to return to England.

In the following March, 1798, he hoisted his flag on board the *Vanguard* of seventy-four guns, and sailed from St Helens to rejoin the fleet off Cadiz. He was immediately sent into the Mediterranean in command of a small squadron, with orders to ascertain the object of the French armament at Toulon. The secret was, however, too well kept; and the *Vanguard*, being dismasted in a violent gale, was obliged to put into San Pietro off Sardinia to refit, while the French expedition sailed on its way to Egypt. On 7th June Nelson was reinforced by ten sail of the line; but his frigates had all parted company, and, under some

misapprehension of orders, did not rejoin him. He was thus left without means of learning anything about the French further than that they had sailed from Toulon. His hope to get news at Naples proved vain, and it was only when he arrived off Messina that he heard that the French had captured Malta, but had sailed again some days before. Their destination was unknown; he conjectured that it might be Egypt, and he hastened thither, only to find that there was no trace of them. He had in fact passed within a few leagues of them, but without seeing them. He returned by the coast of Asia, put into Syracuse, where he watered, and was meditating going up the Archipelago to Constantinople, when he at last learned that, after all, they had gone to Egypt. Thither he immediately followed, and on the evening of 1st August found their fleet lying at anchor in Aboukir Bay. His plans had long before been formed and discussed with the several captains under his orders, everything was ready, and no explanatory signals were needed. His fleet was numerically inferior to that of the French, and became still more so by the accident of the *Culloden* getting aground and being unable to take any part in the battle; but the wind was blowing along the French line, and, by concentrating his attack on the weather end of it, it was crushed by superior force, while the leeward-most ships were unable to render any assistance; and thus, creeping gradually down the line, he captured or destroyed the whole, with the exception of the two rear-most ships, and two of the frigates, which fled.

Never, in recent times, had there been a victory so complete, so overwhelming; and when Nelson with his shattered fleet returned to Naples he was the object of an enthusiastic adoration which knew no bounds. The queen, in her intense hatred of the murderers of her sister, welcomed their conqueror with all the ardour of a passionate nature, and Lady Hamilton (q.v.), the wife of the English ambassador, fell on his breast in a paroxysm of hysterical rapture. A woman of extreme beauty, winning manners, and shady antecedents, first the mistress and then the wife of Sir William Hamilton, she enslaved Nelson by her charms, and the two became bound by a liaison which death only severed. At home Nelson was raised to the peerage by the title of Baron Nelson of the Nile; parliament voted him a pension of £2000 a year, and the East India Company awarded him a sum of £10,000. Turkey and Russia sent him handsome and costly presents, and the king of Naples conferred on him the title of Duke of Bronte, in Sicily, with an estate valued at £3000 a year, though during Nelson's life its revenues seem to have been in abeyance.

The government of Naples had already concluded an alliance with Austria and declared war against France; but the French army swept away the Neapolitan troops almost without resistance, and the Neapolitan Jacobins received their French brethren with open arms. For the king and his court safety was only in flight, and Nelson conducted them to Palermo. Afterwards, returning as the king's representative, he sternly annulled the convention which Cardinal Ruffo, contrary to the king's express orders, had made with the rebels; he forced the traitors to surrender at discretion, and he promptly hanged Caracciolo (q.v.), one of their leaders, who had added perjury to treason, and having accepted a command as commodore in the king's navy had betrayed his trust, and waged war against the authority he was pledged to maintain.

The affairs of Naples were not yet regulated, the outposts held by the French and their sympathisers were not yet all reduced, when, on July 19, 1799,

Nelson received an order from Lord Keith, the commander-in-chief in the Mediterranean, to bring or send the greater part of his force to Minorca, which he conceived to be threatened by a joint attack of France and Spain. Nelson refused to obey the order; and when it was repeated in still more positive terms, he contented himself with sending Sir John Duckworth, his second in command, while he himself remained at Naples or Palermo, and controlled the blockade of Malta which was carried on unremittently during the whole time. The Admiralty censured him for his disobedience; and indeed it can scarcely be maintained that the affairs of Naples were of such paramount importance as to justify this extraordinary breach of discipline, the motives of which have been much discussed. Perhaps the true explanation of his conduct is that a severe wound in the head, which he had received at the Nile, had seriously affected his general health, and caused a depression of spirits which it needed some violent stimulus to overcome. Happy at last in the capture of the two ships which had escaped from Aboukir Bay, he obtained leave to resign his command, which the state of his health rendered irksome, and made his way home overland, by way of Vienna and Dresden, in company with Lady Hamilton and her husband, for whom he professed and appears to have truly entertained a real affection and esteem. He arrived in England in November 1800. The four months spent on the journey had done much to re-establish his health, and he immediately volunteered for active service. His meeting with his wife could not possibly be a happy one; and after an angry interview they parted never to see each other again.

On 1st January 1801 Nelson was promoted to be vice-admiral, and a few days later was appointed second in command of the expedition ordered to the Baltic, under Sir Hyde Parker. He hoisted his flag in the *St George*, but that ship being too large for the approaches to Copenhagen, he moved into the *Elephant* when the attack was determined on. The whole conduct of this attack was entrusted to Nelson, with the smaller ships of the fleet, Parker, with the others, remaining at anchor some miles distant. After a furious combat of from three to four hours' duration, the enemy's ships were subdued. The shore batteries still continued to fire, till Nelson sent a flag of truce on shore to point out that the worst sufferers from the continued engagement were the crews of the beaten ships, which received a great part of the fire of both parties. A suspension of hostilities was agreed on to permit of the prisoners being removed; and this led to an armistice, which the news of the czar's death shortly afterwards converted into a peace. Nelson, who was raised a step in the peerage and became a viscount, succeeded Parker as commander-in-chief; but, his health having given way, he was permitted to return to England. He arrived in the beginning of July, and was at once ordered to undertake the defence of the coast, in view of the preparations for invasion which were being made in France; and though he failed in an attempt to destroy the flotilla collected in Boulogne, his watch was so vigilant that the boats never ventured from under the protection of their chains and batteries.

On the renewal of the war Nelson was at once sent out to the Mediterranean, where, with his flag in the *Victory*, he cruised for more than eighteen months in front of Toulon, drawing back occasionally to Madalena for water and refreshment. During one of these absences, in March 1805, the French fleet put to sea under the command of Vice-admiral Villeneuve, and got clear away to Gibraltar, to Cadiz, and to Martinique, where they expected to be joined by the fleet from Brest.

Nelson, however, though delayed for six weeks by his ignorance of where Villeneuve had gone, was only twenty days behind him; and Villeneuve, deceived as to the English numbers, and unwilling to risk an engagement which might frustrate his ulterior object, hastily returned to Europe. Nelson again followed, again outsailed his enemy, and arrived off Cadiz some days before the French approached the shores of Europe. Then, conceiving that Villeneuve's aim might be to overpower the fleet off Brest, he went north and reinforced it with most of his ships, returning himself to England. It was but for a few weeks. Within a fortnight it was known that Villeneuve had gone to Cadiz, and Nelson was ordered to resume the command. He did so on 25th September, and for the next month kept a close watch on the port, while his fleet was being gradually increased in numbers. He was especially desirous that he should have sufficient force. What he wanted was not merely an honourable victory gained by an inferior fleet, but the annihilation of the enemy. Villeneuve was meantime urged by positive and repeated orders to put to sea, and on 20th October, having learned that some of the English ships had gone to Gibraltar, he reluctantly came out. Of French and Spanish ships combined there were with him thirty-three; with Nelson there were twenty-seven.

At daybreak on the 21st the two fleets were in presence of each other off Cape Trafalgar, and Nelson, who several days before had given out and explained his plan of attack, at once made the signal to bear up towards the enemy. The wind was very light, and it was noon before the lee division of the fleet, under Collingwood in the *Royal Sovereign*, broke through the rear of the Franco-Spanish line. Nelson, with the other division, had reserved to himself the duty of over-awing the van, till, convinced that they had no immediate intention of turning to support their rear, he bore up and threw himself on their centre. As the *Victory* passed astern of Villeneuve's flagship, she fell foul of the *Redoutable* of seventy-four guns, and her quarter-deck became exposed to the musketry fire from the *Redoutable's* tops. Nelson, while standing speaking to Captain Hardy, fell mortally wounded by a shot on the left shoulder, which, striking obliquely downwards, passed through the spine. He was carried below, and died some three hours later, just as the battle ended in the decisive victory of the English. The enemy's fleet was annihilated.

Nelson's body was brought home, and, after lying in state at Greenwich, was interred with much pomp in the crypt of St Paul's. In the cathedral above a gorgeous monument has been erected to his memory, and numerous others throughout the land bear witness to the deep feeling which his splendid services awakened.

His Life by Clarke and M'Arthur (2 vols. 1809) is written with more credulity than critical accuracy. Southey's famous Life (2 vols.) dates from 1813. The best record of Nelson's services is his *Dispatches and Letters*, edited by Sir N. Harris Nicolas (7 vols. 8vo, 1844-46); there are a selection from the *Letters and Dispatches* (1886) and a Life (1896) by the author of the present article (Sir J. K. Laughton); a Life by Admiral A. T. Mahan (1897; revised 1899); and the *Last Diary* (ed. G. Hudson, 1917). See also Jeaffreson's *The Queen of Naples and Lord Nelson* (1889) and *Lady Hamilton and Lord Nelson* (1888); and Mrs Gamlin's *Nelson's Friendships* (1899).

Nelson, ROBERT, was born in London on 22d June 1656, a rich Turkey merchant's son, and, after a brief space at St Paul's school, removed with his widowed mother to Dryfield in Gloucestershire, where he was brought up by Dr George Bull.

In 1680, the year of his election to the Royal Society, he set out with Halley on a twenty months' tour in France and Italy, returning from Italy with Lady Theophila Lucy (1654-1705), a widow, and daughter to the Earl of Berkeley, who in 1683 became his wife, and who soon after was converted to Catholicism by Cardinal Howard and Bossuet. Her ill-health had taken them again to Italy at the time of the Revolution; but Nelson was from the first a (passive) Jacobite, and on his return to England in 1691 he joined the Nonjurors. He was received back into the Established Church in 1710, though he still would not join in the prayers for Queen Anne; and he died at Kensington on 16th January 1714. One of the earliest members of both the S.P.C.K. and S.P.G., he was author of five devotional works, the best known *Festivals and Fasts* (1703).

See Lives by Teale (1840-46) and C. F. Secretan (1860).

Nelson River issues from the north end of Lake Winnipeg in Canada, and, after a north-easterly course of 400 miles through Manitoba, falls into Hudson Bay at York Factory, in the estuary of Port Nelson. It is navigable for 127 miles from its mouth, though as yet only some 70 or 80 miles for large steamers. See also HUDSON BAY.

Nelumbo (*Nelumbium* or *Nelumbo*), a genus of aquatic Nymphæaceæ with exalbuminous seeds and distinct carpels, the latter buried in cavities of a large fleshy receptacle. The flowers, remarkable for their beauty, and the leaves are very like those of water-lilies. Much developed and widespread in Tertiary times, the genus has but two survivors. *Nelumbium nuciferum* (or *Nelumbo nucifera*), found in the warm parts of Asia, the north of Africa, and the north of Australia, is the Egyptian Bean of Pythagoras, the *Lotus* and *Tamara* of the Hindus, and the *Lien-Hoa* of the Chinese. For the ancients it was an emblem of fertility; with it the Egyptians decorated the heads of Isis and Osiris. The Hindus hold it sacred, and with them it is the floating shell of Vishnu and the throne of Brahma. The Tibetans embellish their temples and altars with it. It is also much esteemed and cultivated in the East for its seeds, roots, leaf-stalks, and flower-stalks, all of which are eaten. It has been used as food by the Egyptians from remote antiquity. The seeds are in size and shape like acorns, with a taste more delicate than that of almonds. The

root contains much starch, and a kind of arrowroot may be obtained from it; and powdered it makes excellent soup with milk or water. Great quantities are pickled with salt and vinegar, and eaten with rice. The flowers are generally rose-coloured, seldom white. The

ancient Egyptian mode of sowing this plant, by enclosing each seed in a ball of clay and throwing it into the water, is practised at the present day in India.—*N. luteum* is a North Amer-



Nelumbium luteum.

ican species, with yellow flowers, extending almost as far north as Philadelphia. The farinaceous roots are agreeable when boiled.

Nemathelmia, or NEMATHELMINTHES (Gr. *nēma*, 'a thread,' and *helmins*, 'an intestinal worm'), a general name applied to the threadworms or nematodes, such as *Ascaris* (q.v.), *Guinea-worm* (q.v.), *Trichina* (q.v.), to the somewhat distinct Gordiidae or hair-eels, and to the more remotely allied Acanthocephala or *Echinorhynchus* (q.v.).

Nematodes. See THREADWORMS, PARASITIC ANIMALS.

Nemea, anciently the name of a deep and well-watered valley of Argolis, in the Peloponnesus, between Cleonæ and Phlius. It lies north and south, and is from two to three miles long and more than half a mile broad. It possessed a sacred grove, with a magnificent temple of Zeus, and was celebrated for the games called the *Nemean Games*, one of the great national festivals of the Greeks. See ATHLETIC SPORTS.

Nemertea, an important class of 'worms,' the members of which are mostly marine. They are unsegmented, covered with cilia, and often brightly coloured. Their habitat is usually in sand or mud, but many are able to swim, while a few are commensals. In diet they seem to be mainly, if not wholly, carnivorous. The body is very extensible, and in *Lineus maximus* may measure 15 feet in length. Most of them break readily and even spontaneously, the fragments being in some cases able to form a fresh head and body. Among their remarkable characters may be noted the presence of a long protrusible offensive proboscis which lies quite apart from the gut in a special sheath along the back, and the occurrence of two curious ciliated pits, perhaps respiratory in function, opening on the sides of the head, and sometimes reaching as far inwards as the brain. Two nerve cords extend from the brain along the sides of the body, occasionally approaching one another ventrally or even dorsally. The sexes are separate, and there is frequently a remarkable metamorphosis in development. According to Professor Hubrecht, the nemerteans exhibit in the proboscis, its sheath, and the two head-slits distinct affinities with vertebrates.

Nemesis, according to Hesiod, the daughter of Night, was originally the personification of the moral feeling of right and a just horror of criminal actions—in other words, of the conscience. Afterwards, when an enlarged experience convinced men that a divine will found room for its activity amid the little occurrences of human life, Nemesis came to be regarded as the power who constantly preserves or restores the moral equilibrium of earthly affairs—preventing mortals from reaching that excessive prosperity which would lead them to forget the reverence due to the immortal gods, or visiting them with wholesome calamities in the midst of their happiness. Hence originated the latest and loftiest conception of Nemesis, as the being to whom was entrusted the execution of the decrees of a strict retributive providence—the awful and mysterious avenger of wrong, who punishes and humbles haughty evil-doers in particular. Nemesis was thus regarded as allied to Atë (q.v.) and the Eumenides (q.v.).

Nemi, LAKE OF, an extinct crater, 20 miles S. of Rome, accounted for its beauty the gem of the Alban Mountains. There was here, 3 miles from the ancient city of Aricia, a famous temple of Diana. Renan's *Prêtre de Nemi* (1885) gave the place renewed interest; and Sir J. G. Frazer's *Golden Bough* (1890; 3d ed. 1911-15), a profound study in comparative religion, starts from an exposition of the

strange custom described by Strabo and Pausanias as still in force in their days, that the high-priest, who was called 'King of the Grove' (*Rex Nemorensis*), was a fugitive slave who had secured the post by killing his predecessor, thenceforward inheriting the like risks.

Nemophila, a genus of herbaceous annuals belonging to the Hydrophyllaceæ, with pinnatifid leaves and conspicuous flowers. Natives of North America, they are cultivated in European gardens, the *N. insignis* being prized for its showy flowers, blue with a white centre.

Nemours, an ancient town of 5000 inhabitants in the French department of Seine-et-Marne, 40 miles SE. of Paris by rail, gave a ducal title to the second son of Louis-Philippe (1814-96).

Nenagh, a market-town of County Tipperary, 28 miles NE. of Limerick; pop. 4800.

Nendrum, a monastery on Mahee Island, in Strangford Lough, believed to have been founded about 450 A.D. The site had been forgotten, but excavations have revealed remains of early Christian and pagan times. See Lawlor, *Monastery of St Mochaí* (1925).

Nennius, the reputed author of a *Historia Britonum*, evidently of Cymric origin. It gives the mythical account of the origin of the Britons, the Roman occupation, the settlement of the Saxons, and closes with the twelve victorious battles of King Arthur. The manuscripts, of which none is earlier than the end of the 10th century, are so confused and so largely interpolated that many critics were inclined to deny all authenticity to it. But Zimmer showed that though the longer prologue and other parts are to be rejected, the nucleus is the work of a Welshman of the close of the 8th century, whose own authority is slight. The most important part is the *Genealogie Saxonum*, based on an earlier Strathelyde writer. For the rest he follows Gildas, Eusebius, Prosper of Aquitaine, and three or more Irish authors. The text was edited by Stevenson for the English Historical Society in 1838; but the best edition is Mommsen's (in *Mon. Germ. Hist.*, xiii. 1898). See De la Borderie, *Historia Britonum* (Paris, 1883); works by Skene and Rhys; Zimmer, *Nennius Vindictus* (1893); Lloyd, *History of Wales* (1911); and Williams, *Christianity in Early Britain* (1912).

Neocomian. See CRETACEOUS SYSTEM.

Neo-Darwinism, **Neo-Lamarckism**. See DARWINIAN THEORY, WEISMANN, HEREDITY, LAMARCK.

Neodymium. See DIDYMIUM.

Neolithic. See STONE AGE.

Neon (Ne; atom. number 10), a gas discovered in air by Sir W. Ramsay and Mr Travers in 1898, and shown by Sir J. J. Thomson, by his positive ray method, in 1913 to be a mixture of two isotopes, of atomic weights 20 and 22. See ARGON, ATMOSPHERE.

Neoplatonism, the last form of Hellenic philosophy, the system of an illustrious succession of ancient philosophers who claimed to found their doctrines and speculations on those of Plato. Strictly speaking, however, the Platonic philosophy expired with Plato's immediate disciples, Speusippus and Xenocrates. Neoplatonism is an attempt to combine Plato's doctrine of the Ideas, developed by Aristotle, and supplemented with an ethical system akin to that of the Stoics, with the oriental doctrine of Emanation; it does for Hellenism something like what Philo did for Judaism. Such amalgamation came about most naturally in Alexandria. Placed at the junction of two continents, Asia and Africa, and close to the most cultivated and intellectual

regions of Europe, that celebrated city naturally became a focus for the chief religions and philosophies of the ancient world. Here the East and the West, Greek culture and oriental enthusiasm, met and mingled; and here Christianity sought a home, and by the liberality of its sympathies strove to quell the myriad discords of Paganism.

Authorities have differed as to how much should be included under the term Neoplatonism. By some it is used to designate the whole new intellectual movement proceeding from Alexandria, comprising, in this broad view, the philosophy of Philo-Judæus and of Numenius the Syrian; of Christian Fathers like Clemens Alexandrinus and Origen; of the Gnostics; and of Ammonius Saccas and his successors. But the best authorities restrict the application of the term to the fourth of these series. Plotinus, its real founder, resuscitated Plato; Proclus gave the world another Aristotle; in the person of Julian the Apostate Neoplatonism became master of the world, and for three centuries it was a formidable rival to Christianity. The Neoplatonists aimed at constructing a religion on a basis of dialectics. They strove to attain a knowledge of the Highest, and the way in which they endeavoured to accomplish this was by assuming the existence of a capacity in man for passing beyond the limit of his empirical knowledge, and acquiring an intuitive knowledge of the absolute, the true—that which is beyond and above the fluctuations and dubieties of ‘opinion.’ This impersonal faculty is called *Ecstasy*. By means of it man—ceasing, however, to be individual man—can identify himself with the Absolute (or Infinite). Plotinus, in fact, set out from the belief that ‘philosophy’ is only possible through the identity of the thinker, or rather of the subjective thought, with the thing thought of, or the objective thought. This intuitive grasp or ‘vision’ of the Absolute is not constant; we can neither force nor retain it by an effort of will; it springs from a divine inspiration and enthusiasm higher and purer than that of poet or prophet, and is the choicest ‘gift of God.’

The god of Plotinus and the other Alexandrians is a mystical Trinity. The Divine Nature contains within it three Hypostases (Substances); its basis, if we may so speak, is Unity or Primitive Light. This Unity is not itself any *thing*, but the principle of all things; it is absolute good, absolute perfection; and, though it is utterly incapable of being conceived by the understanding, there is that in man which assures him that it—the incomprehensible, the ineffable—*is*. From Unity, as the primordial source of all things, emanates Pure Intelligence (*Nous*), its reflection and image, that by which it is intuitively apprehended; from Pure Intelligence, in turn, emanates the ‘Soul of the World,’ whose creative activity produces the souls of men and animals, and ‘Nature;’ and finally, from Nature proceeds ‘Matter,’ which, however, is subjected by Plotinus to such refinement of definition that it loses all its grossness—though he is no dualist, and glories in the beauty of the world. Unity, Pure Intelligence, and the World-Soul thus constitute the Plotinian Triad, with which is connected, as we have seen, the doctrine of an eternal Emanation. Human souls, whose source is the Pure Intelligence, are—by some mysterious fate—imprisoned here in perishable bodies, and the higher sort are ever striving to reascend to their original home.

The most distinguished pupil of Plotinus was Porphyry, who mainly devoted himself to expounding and qualifying the philosophy of his master. In him we see for the first time the presence of a distinctively anti-Christian tendency. Neoplatonism, which can only be properly understood when we regard it as an attempt to place

Paganism on a philosophical basis—to make the Greek religion philosophical, and Greek philosophy religious—did not *consciously* set out as the antagonist of Christianity. Neither Ammonius Saccas nor Plotinus assailed the new faith; but as the latter continued to grow, and to attract many of the most powerful intellects of the age into its service, this latent antipathy began to show itself. Porphyry wrote against Christianity; Iamblichus, the most noted of his pupils, did the same. The latter also introduced a theurgic or ‘magical’ element into Neoplatonism, teaching, among other things, that certain mystical exercises and symbols exercised a supernatural influence over the divinities. Magic and spiritualism are always popular, and it is therefore not wonderful that Iamblichus should have had numerous followers. Aedesius succeeded to his master’s chair. From the school of one of his disciples, Maximus, came the Emperor Julian, whose patronage for a moment shed a gleam of splendour over Neoplatonism, and seemed to promise it a universal victory.

After a succession of able but not always consistent teachers, among whom is to be reckoned the noble Hypatia, we reach Proclus, the last great Neoplatonist, who belongs to the 5th century, a man of prodigious learning, and of an enthusiastic temperament, in whom the pagan-religious, and consequently anti-Christian, tendency of the Neoplatonic philosophy culminated. His ontology was based on the Triad of Plotinus, but was considerably modified in detail; he exalted ‘Faith’ above ‘Science’ as a means of reaching the Absolute Unity; was a believer in Theurgy, and so naturally laid great stress upon the ancient Chaldean oracles, Orphic hymns, mysteries, &c., which he regarded as divine revelations, and of which he considered himself—as, indeed, he was—the last great ‘interpreter.’ His hostility to the Christian religion was keen; in its success he saw only the triumph of a vulgar popular superstition over the refined and beautiful theories of philosophy; it was as if he beheld a horde of barbarians defacing the statues and records of the Pantheon. The disciples of Proclus were numerous, but not remarkable for talent. Perhaps the ablest of his successors was Damascius, in whose time the Emperor Justinian, by an arbitrary decree, closed the schools of the heathen philosophers. Neoplatonism soon ceased to exist as a system; but it served as a schoolmaster to bring the mediæval thinkers to Plato and Aristotle, it served as the nurse of Christian mysticism, and it had helped to mould the mind of Augustine. From a scientific point of view it was retrogressive, perverse, absurd; yet in the moral and religious sphere it maintained a high and holy ideal, and fostered a firm belief in that which is above the empirical.

See T. Whittaker, *The Neo-Platonists* (1918); Zeller, *Ueberweg*, and other historians of philosophy; Herzog-Hauck *Realencyklopädie*; the church histories; Kingsley, *Alexandria and her Schools*, and *Hypatia*; Bigg, *Christian Platonists of Alexandria* (1885); Simon, *Histoire de l’École d’Alexandrie* (1845); Vacherot, *Histoire critique de l’École d’Alexandrie* (1851); and the articles in this work on PLATO, STOICISM, PHILO, ORIGEN, Gnostics, Plotinus, Porphyry, Iamblichus, Proclus.

Neo-Pythagoreanism stood to Pythagoras somewhat as Neoplatonism did to Plato, and was an Alexandrian development under oriental influences. It originated in the first half of the century before Christ, and was accordingly the predecessor of Neoplatonism. Neo-Pythagoreans may be divided into two groups, according as their aims were mainly practical—the purification and ennobling of life by asceticism, including theurgy, or more modestly metaphysical—basing their views on the Pythagorean theory of numbers (see PYTHA-

GORAS). Of the former school Apollonius (q.v.) of Tyana is the most conspicuous example; of the latter, Moderatus of Gades, Nicomachus of Gerasa (2d century A.D.), Archytas (q.v.), and Sextius. See the works cited at NEOPLATONISM.

Neozoic (Gr., 'new life'), a term introduced by Edward Forbes to include all the strata from the Trias to the most recent deposits. Few geologists have adopted the term; the systems in question being generally divided into the groups of Secondary or Mesozoic, Tertiary or Cainozoic, and Quaternary or Post-Tertiary.

Nepal, an independent kingdom of India, lying on the southern face of the Himalayas, is bounded on the N. by Tibet, on the S. and W. by the United Provinces and Bengal, and on the E. by Sikkim, a protected state. Long. 80° 6'—88° 14' E. It is 512 miles in length, by 70 to 150 in breadth. Area, 54,000 sq. m.; pop. of about 5,500,000. The northern parts of the state embrace the main range of the Himalayas (q.v.), with its offset spurs, on which stand the great peaks of Everest, Diwalagira, &c. On the south of the state lies the Terai. The intervening territory consists of mountain-ridges, embracing several valleys drained by the Kurnali, Gandak, Kosi, and other rivers. The climate of course varies greatly according to the altitude; the principal valley, in which stands the capital Khatmandu (q.v.), has a climate like that of southern Europe. The soil is very fertile, in some districts producing three crops in the year. The hillsides are terraced and the land is irrigated. Rice, opium, rape, linseed, tobacco, and various cereals and pulses are the more important products. Several minerals, as copper, iron, sulphur, exist, but are little worked. The forests contain valuable timber trees. Nepal has extensive trading relations with the provinces of British India and with Tibet. The valleys are inhabited by numerous different hill-tribes, partly aboriginal, partly of Mongolian or Chinese descent; but the dominant race are the Gurkhas (q.v.), whose ancestors came to the Himalayan slopes from Rajputana in the 12th century, though it was not until 1769 that they made themselves masters of Nepal. They rapidly subdued the hill-valleys to east and west of them, and, after a war with China (1789-92), on account of Tibet, in which the Gurkhas were worsted, and a period of great internal disorder, Nepal came into conflict with the Indian Government. War followed; in 1815 Sir David Ochterlony defeated the Gurkha armies in the west, and peace was agreed to; but, the treaty not having been signed by the king of Nepal, a British force, 33,000 strong, advanced in the succeeding year to within three days' march of Khatmandu, and compelled the Gurkhas to sign the treaty. Since that they have ceased their encroachments on British territory, and during the Mutiny voluntarily sent to the assistance of the British a force which rendered useful service in the reduction of Oudh. The real ruler of the country is the prime-minister; Sir Jang Bahadur held this office from 1846 to his death in 1877, and was succeeded by his son. But he was slain and supplanted by Bir Shamsheer, the head of a rival faction, in 1885. Bir Shamsheer's brother, Chandra Shamsheer, became minister in 1901, and attended the coronation durbar at Delhi as a guest of the Government of India in 1903. A new treaty of friendship was concluded between the governments of Nepal and Great Britain in December 1923.

Nepenthes. See INSECTIVOROUS PLANTS.

Nepheline (Gr. *nephelē*, 'a cloud,' in allusion to the mineral becoming cloudy when immersed in a strong acid), a rock-forming mineral of some importance. It is colourless, white or yellowish, and usually crystallises in hexagonal prisms with

various modifications. It has a hardness of 5½ to 6, and sp. gr. of 2½ or thereabouts. It occurs in igneous rocks rich in soda but with medium to low percentages of silica. Thus it is an essential constituent of phonolite, nepheline tephrite, and nepheline basalt. These rocks are found, for example, among the products of igneous activity of Carboniferous and Permian times in the midland valley of Scotland, as in the phonolite of Traprain Law and the nepheline basalt of Chapel Ness, Fife. Elæolite (Gr. *elaion*, 'oil') is a variety of nepheline with a greasy lustre, which seldom assumes a crystalline form. It is dark greenish, gray, or brown in colour, and appears to occur only in plutonic rocks, as in the syenites of Frederiksvärn and Laurvig in Norway.

Nephelium. See LITCHI.

Nephrite, a name given to compact, fine-grained varieties of tremolite and actinolite which are minerals belonging to the group of monoclinic amphiboles. Tremolite is a calcium-magnesium silicate, actinolite a calcium-magnesium-iron silicate; the former is white, the latter green in colour. Like the pyroxene, jadeite, with which it is often confused, nephrite is exceedingly tough. It has a splintery fracture and a glistening lustre. The hardness ranges from 6 to 6½, and the density from 2.96 to 3.1. See JADE.

Nephritis (Gr. *nephros*, 'kidney'), inflammation of the Kidneys (q.v.).

Nepomuk (or POMUK), JOHN OF, the patron saint of Bohemia, who is honoured as a martyr of the seal of confession, was born at Pomuk, a few miles SE. from Pilsen, about 1330. Having studied at the university of Prague and taken holy orders, he held various ecclesiastical offices in Prague, and was appointed confessor to Sophia, wife of King Wenceslaus IV. For refusing to betray to this monarch the confession of the queen John was put to the torture, then tied hand and foot, and flung into the Moldau, in March 1383. His memory was cherished with peculiar affection by the Bohemian people, and in 1729 he was canonised by Pope Benedict XIII. His memory is celebrated on 16th May. By some historians two distinct personages of the same name are enumerated—one, the martyr of the confessional, the other, a victim to the simoniacal tyranny of Wenceslaus; but the identity of the two is sustained by Palacky, *Geschichte von Böhmen*, iii. 62. In 1855 Abel tried to prove that John of Nepomuk was a merely Catholic transformation of the people's darling, the heretical John Huss. See Wratistaw's *Life, Legend, and Canonisation of St John Nepomucen* (1873).

Nepos, CORNELIUS, a Roman historical writer, was a native of Pavia, as Mommsen thinks, of Hostilia (now Ostiglia), as its citizens believed they proved by erecting a statue in 1868. He was the contemporary and friend of Cicero, Atticus, and Catullus, and was probably still alive in 25 or 24 B.C. The ancients ascribed to him the following works: *Chronica*, *Exemplorum Libri*, *Lives of Cato and Cicero*, and *De Viris Illustribus*. The last is supposed to have consisted of sixteen books, but only twenty-five brief biographies of warriors and statesmen, mostly Greeks, have survived. These biographies are untrustworthy as history, but are written in a clear and elegant style, although affected archaisms and euphuistic mannerisms are not unfrequent. Until the middle of the 16th century they were generally ascribed to Æmilius Probus (4th century); but in 1569 the famous Dionysius Lambinus claimed them as part of the lost work of Cornelius Nepos. Other good editions are those of Fleckeisen (1884), Browning and Inge (1888), Lindsay (N.Y., 1895), and Nip-

perdey (10th ed. 1896). See FREUDENBERG'S *Questions historice* (1839).

Nepotism (Ital. *nepote*, 'a nephew'), a word used to signify the system or custom practised by several popes subsequent to Innocent VIII. of granting high honours, dignities, offices, pensions, and the like to their family relations, generally their nephews, altogether irrespective of merit.

Neptune, the Italian god of the sea. Attempts have been made to show that his worship goes back to Aryan times, by identifying his name with the Sanskrit and Iranian Apām Napāt, 'offspring of the water.' But this is one of those unfortunate identifications which show that comparative mythologists are not always comparative philologists. Further, as there is nothing whatever to make it in the least probable that Neptune was ever anything but a sea-god, and as the primitive Aryans were not acquainted with the sea, it is evident that he cannot have been an Aryan deity. Indeed, as it was not until after the Italians had entered Italy that they became at all familiar with the sea, it was probably not until after they had settled in Italy that they made acquaintance with Neptune. Nor in all probability was he their own invention. We may conjecture that he was borrowed by them from the Etruscans, a maritime nation, who worshipped as their sea-god Nethuns or Nethunus. Had the Italians never come in contact in historical times with the Greeks, Nethunus or Neptunus would have remained a mere abstraction, like all other Italian deities, who were rather *numina* than personal beings. But communication with Greece resulted in the Italians identifying their god of the sea with Poseidon (q.v.), the Greek god of the sea.

Neptune. See PLANETS.

Neptunist Theory. See GEOLOGY.

Nerbudda (more correctly NARBADA), a river of India, rises on the Amarkantak plateau, 3493 feet above sea-level, in 22° 41' N. lat., 81° 49' E. long., and flows west, through the Central Provinces, past Jabalpur (190 miles from its source), through the great depression between the Vindhya Mountains on the north and the Satpura Mountains on the south, known as the Valley of the Nerbudda, and reaches the Gulf of Cambay half-way between Baroda and Surat. It has a total length of 800 miles, and drains 36,400 sq. m. It is navigable as far as Broach, 30 miles from its mouth. The river ranks as a sacred stream in the eyes of the Hindus; some have held it likely to supersede the Ganges in sanctity. It is regarded as a meritorious act to walk from the sea to its source and back again alongside the river.

Nerchinsk. See NERTCHINSK.

Nereid. See NYMPH.

Nereis, a common genus of marine worms or Chaetopods, the members of which live in the sand or more freely in the sea. See CHAETOPODS, and WORMS.

Neri, ST PHILIP, the founder of the Congregation of the Oratory, was born at Florence, 21st July 1515. His uncle wished to make him his heir; but the youth, abandoning all worldly pursuits, left his family and betook himself in his eighteenth year to Rome. A Florentine gentleman gave him a small room as a lodging and a daily allowance of meal. Philip spent most of his time in visiting the sick, in instructing the poor and ignorant, and in solitary prayer in the catacombs. It was not till 1551 that he was persuaded to become a priest. He now took up his quarters in the little church of S. Girolamo, and, gathering round him a number of disciples, started the exercises of devotion which made his name famous. At

first these simple services or prayer-meetings were held with a few young men in his own room. In 1558 they were transferred to an oratory which he was permitted to build over the nave of the church. These daily services, which were a great novelty at the time, consisted of three sermons of about half an hour's duration, delivered in a familiar style, and interspersed with vernacular hymns, reading, and prayers. The preachers were for the most part laymen. During the day Philip took many of his penitents round the hospitals. His object was to make religion attractive, especially to the young. At the carnival or in holiday seasons he instituted musical entertainments and the acting of religious dramas. At other times he took numbers of men in procession through the streets on a pilgrimage to the seven churches, alternately singing hymns and praying in silence. This work was more fully developed in Rome, whither in 1564 Neri was summoned by the Florentines settled there, who put under his charge their church of San Giovanni dei Fiorentini, and beside it built for him in 1574 an oratory or mission-hall. Having had some of his companions ordained priests, he established them here as a community. One of these was Cesare Baronio, the historian of the church, and afterwards cardinal. Ten years later the community, now much increased in number, moved to S. Maria in Vallicella, on the site of which Philip built a larger church, known as the Chiesa Nuova, or New Church. Here the institute of the Oratory received the formal approbation of the pope, and here Philip died, 25th May 1595.

A notable phenomenon connected with his life is one which is to Philip what the stigmata were to Francis of Assisi—a strange palpitation of the heart and fracture of the ribs attributed to the supernatural effects of divine love—which came upon him suddenly one day at prayer in the catacombs. Philip was canonised with Ignatius Loyola and others in 1622.

Philip's literary remains consist of a few letters (8vo, Padua, 1751) and some sonnets printed in the collection of the *Rime Oneste*. See the lives by Gallonio (1600), and by Bacci (1622; trans. by Faber, 1849); *The Spirit and Genius of St Philip Neri*, by F. W. Faber (1850); the life by Mrs Hope (1859), and that by Archbishop Capececiatello (1879, 1884; trans. 1882, 1894); and the articles in Wetzer and Welte and in the *Catholic Encyclopedia*. For the Congregation of the Oratory in Italy, France, and England, see ORATORY, NEWMAN, FABER.

Néris-les-Bains. See MONTLUÇON.

Nero, the last of the Cæsars and the mystic antichrist of primitive Christian tradition, Roman emperor from 54 to 68 A.D., was born at Antium, on the coast of Latium, 15th December 37, and was the son of Cn. Domitius Ahenobarbus and of the younger Agrippina, the daughter of Germanicus Cæsar, and sister of Caligula. His mother became the wife of the Emperor Claudius, who adopted him (50), his name, originally L. Domitius Ahenobarbus, being changed to Nero Claudius Cæsar Drusus Germanicus. After the death of Claudius (54) the Prætorian Guards, at the instigation of Afranius Burrus, their prefect, declared him emperor, instead of Claudius's son Britannicus, and their choice was acknowledged both by the senate and by the provinces. His reign began with the semblance of moderation and good promise, under the guidance of Burrus and his tutor Seneca the philosopher; but the baleful influence of his mother, together with his own moral weakness and sensuality, frustrated their efforts, and he soon plunged headlong into debauchery, extravagance, and tyranny. He caused the young Britannicus, the son of Claudius, to be treacherously poisoned in order to please his infamous and ambitious mistress Poppæa Sabina. To marry her

he divorced and put to death his neglected wife Octavia, the sister of Britannicus. The affairs of the empire were at this time far from tranquil. In 61 an insurrection broke out in Britain under Queen Boadicea, which was suppressed by Suetonius Paulinus. Next year saw an unsuccessful war against the Parthians in Armenia. At home the emperor was lampooned in verse; and even Seneca, though no rigid moralist out of his books, thought it only decent to remove from court. In July 64 occurred a great conflagration in Rome, by which two-thirds of the city was reduced to ashes. Nero himself is stated by all authorities later than Tacitus to have been the incendiary. But he found a convenient scapegoat in the mysterious sect of the Christians, many of whom were put to death with unheard-of cruelties, such as being wrapped in cloth steeped with pitch, and set on fire in the imperial gardens. Moreover, he rebuilt the city with great magnificence, and reared for himself on the Palatine Hill a splendid palace, the famous 'golden house,' and in order to provide for this expenditure and for the gratification of the Roman populace by spectacles and distributions of corn Italy and the provinces were plundered without ruth. A conspiracy against Nero in the year 65 failed, and Seneca and the poet Lucan fell victims to his vengeance. In a fit of passion he murdered his wife Poppæa, by kicking her when she was pregnant. He then offered his hand to Antonia, the daughter of Claudius, but was refused, whereupon he caused the too fastidious lady to be put to death, and married Statilia Messallina, after putting her husband to death. He also executed or banished many persons highly distinguished for integrity and virtue. His undignified vanity led him to seek distinction as a poet, a philosopher, an actor, a musician, and even a charioteer, and he received sycophantic applause, not only in Italy, but in Greece, to which, upon invitation of the Greek cities, he made a visit in 67. But in 68 the Gallic and Spanish legions, and after them the Prætorian Guards, rose against him to make Galba emperor, and Nero fled from Rome to the house of a freedman, Phaon, about four miles distant. The senate now declared him an enemy of his country, and the trembling tyrant saved himself from execution by suicide, 11th June 68. His last words throw light on his pitiful vanity and on the cruel irony of fate that placed him on a throne—'What an artist is lost in me!'

See articles **ROME**, **SENECA**, **ANTICHRIST**; Wolfe Capes, *Early Roman Empire* (1876); Merivale's *Romans under the Empire* (new ed. 1865); and B. W. Henderson's *Life and Principate of the Emperor Nero* (1903).

Neroli, OIL OF. See **ORANGE**.

Nertchinsk, a town of eastern Siberia, on the Nertcha, a tributary of the Shilka (which is a head-stream of the Amur), 875 miles E. of Irkutsk. The district of which it is the centre yields silver, lead, zinc, tin, and gold; and the town is a trading centre for Russians, Mongols, Turkomans, and Tunguses, exchanging tea, gunpowder, tobacco, and furs. Pop. 10,000.

Nerthus. See **HERTHA**.

Neruda, JAN. See **CZECHOSLOVAKIA** (*Literature*).

Neruda, WILMA. See **HALLÉ**.

Nerva, M. COCCÆUS, a Roman emperor, elected by the senate after the murder of Domitian, 18th September 96 A.D. He was born in 32, of a family belonging to Narnia, in Umbria, and twice held the honour of consulship before his election to the dignity of emperor. He displayed great wisdom and moderation, rectified the administration of justice, and diminished the taxes; but find-

ing himself, on account of his advanced age, not vigorous enough to repress the insolence of the Prætorian Guards, he adopted M. Ulpius Trajanus, then at the head of the army of Germany, who succeeded him on his death, 27th January 98.

Nerval, GÉRARD DE, the adopted name of Gérard Labrunie, one of the most attractive but ill-starred figures among the French Romanticists, was born at Paris, May 21, 1808, son of an officer in the Grand Army. He was educated along with Gautier at the Lycée Charlemagne, and early took to letters, publishing at twenty a translation of *Faust* which pleased Goethe, and gave his choruses to Berlioz. Desultory work, a love-affair cut short by death, fits of restless travel, of dissipation, and of gloom that at times deepened into mental darkness, and at last death, almost certainly by his own hand, 25th January 1855, sum up the wretched story of his life. He moved in a romantic dream-world all his days, squandered money when he had it prodigally upon *bric-à-brac*, read deeply in Greek, Italian, German, English, and Arabic, and wandered carelessly over Italy, Germany, Greece, Syria, Palestine, and Egypt. Gérard de Nerval wrote admirably alike in prose and verse, his style ever delicate, natural, and original, informed with a subtle personal charm of a quite remarkable character. But his travels, criticism, plays, and poems, good literature as they are, are far less interesting than his *Aurélien, ou le Rêve et la Vie* (1855), an experience of his own madness. 'This strange work,' says Andrew Lang, 'does for insanity what the *Dream of Gerontius* has done for death.' In *Les Illuminés, ou les Précurseurs du Socialisme* (1852), he discusses the mysticism of certain highly endowed men in its relation to mental alienation. But his most delightful work will be found in his fantastic short tales, which have an exquisiteness of their own that approaches near perfection. These are the *Contes et Facéties* (1852), and the semi-autobiographic series of *Filles du Feu*, containing *Sylvie, Angélique, Jenny, Octavie, Isis, Emilie, Corilla* (1856). Another book of singular interest is the mélange entitled *La Bohème Galante*. Some of his most charming poems are graceful adaptations of French peasants' folk-songs, the beauty of which he had ears to hear.

His works were collected in 1868. See Andrew Lang in *Fraser* (1873); and works by Ferrières (1906) and Marie (1915).

Nervii, a powerful and warlike people of the ancient Gallia Belgica, whose territory stretched from the Sambre to the ocean, not subdued by Cæsar without an obstinate resistance.

Nervous Diseases. See articles in this work on Alcoholism, Aphasia, Apoplexy, Appetite, Brain, Chorea, Cretinism, Delirium, Delirium Tremens, Epilepsy, Headache, Hydrocephalus, Hypochondriasis, Hysteria, Insanity, Locomotor Ataxia, Meningitis, Myelitis, Neuralgia, Paralysis, Sciatica, Spinal Cord, Sunstroke, Tetanus, &c.

NERVOUSNESS is a term somewhat vaguely used, both popularly and by medical men, to express an unduly excitable condition of the nervous system, manifested by unusually ready manifestation of emotion—e.g. starting at slight causes—by morbid sensitiveness, by unreasonable apprehension, by trembling of muscles, and in many other ways. The condition may be natural, or produced by ill-health or acute disease. It is more common in children than in adults, and in the female sex than the male. Care should be taken to improve the general health by good nutrition, regulation of the bowels, open-air exercise, bathing, change of air and scene, and the ordinary tonic remedies; stimulants and drugs should be avoided save under the special direction of a medical man.

Nervous System, the mechanism by which an animal acquires a knowledge of the external world, and by means of which the great functions of the absorption of food, the elimination of waste products from the body, the respiration, circulation, and muscular action, are regulated and controlled. In its simplest form, in some of the lowest animals, it consists merely of nerve-fibres going to and from a small group of nerve-cells; but from this elementary condition there is an ever-increasing degree of complexity till its highest development, which alone is included in the following description, is reached in man. In the articles on Birds, Fishes, Reptiles, Mollusca, &c., will be found paragraphs on the nervous systems of the various classes of animals.

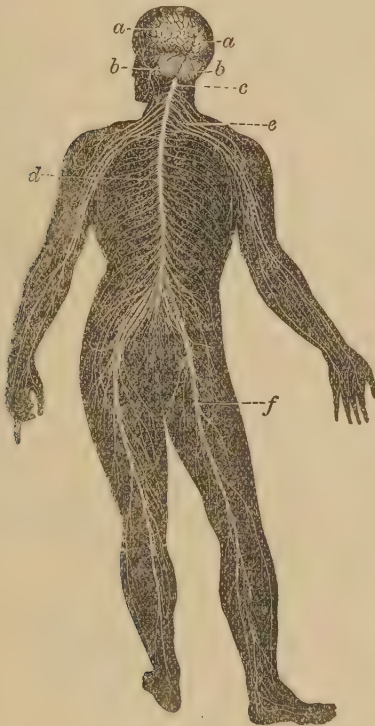


Fig. 1.

a, cerebrum; *b*, cerebellum; *c*, medulla oblongata; *d*, spinal cord, from which the spinal nerves arise; *e*, brachial plexus; *f*, sciatic nerve.

The nervous system is composed of a series of organs—nerve-cells, nerve-fibres, and nerve end-organs. The nerve-cells are situated for the most part in the brain and spinal cord, but also in other parts of the nervous system. Their function is either to receive, to send out, or to modify as they transmit, nervous impulses. The nerve-fibres transmit nerve impulses to and from the nerve-cells. For this reason groups of nerve-cells are often conveniently spoken of as nerve centres, their relation to the nerve-fibres being analogous to that of a telegraph-office to the wires connected with it. The end-organs are the special structures for receiving impressions, such as the various organs of special sense, smell, sight, hearing, taste, touch (see NOSE, EYE, EAR, TASTE, TOUCH), and for transforming outgoing impulses into muscular contractions or secretion, &c. The nerve-fibres thus connect either an end-organ with a nerve centre, or two nerve centres with each other. These three sets of organs, nerve centres, fibres,

and end-organs, are grouped into two great systems—the *cerebro-spinal* (fig. 1) and the *sympathetic* (fig. 10) system. The former is composed of the brain, spinal cord, and the cranial and spinal nerves respectively connected with them. The sympathetic system is formed by a double chain of small swellings, called ganglia, on either side of the front of the spinal column, and connected with each other, with the spinal nerves, and the internal organs by fine nerve-fibres (figs. 7 and 10).

The nerves are whitish cords varying greatly in size. They are composed of nerve-fibres which are bound together by fibrous tissue. This forms a sheath on the outside (the *perineurium*), and sends processes inwards between the individual nerve-fibres (fig. 4 shows a transverse section of part of a nerve, with the bundles of connective tissue passing inward). In the spinal cord and brain the nerve-fibres are held together by a special kind of connective tissue, called *neuroglia*.

Structure of Nerve-fibres.—A fibre from a spinal nerve has the following structure. In the centre is a very fine fibre or thread called the *axis cylinder*. This runs without any interruption along the whole length of the nerve. It can be traced into a nerve-cell at one extremity, and into an end-organ at the other; and there is reason to believe that it is really an outgrowth from a nerve-cell. It is the essential constituent of a nerve, that namely along which the nervous impulse travels. The axis cylinder is in its turn composed of still finer fibrillæ, which may break up into finer nerve-fibres. Except at its origin and termination, the axis cylinder is covered by a tubular membrane called the *medullary sheath*, or the white substance of Schwann, a whitish substance of a peculiar fatty nature. This is interrupted at intervals of about $\frac{1}{16}$ th of an inch by constrictions which (fig. 2) pass completely through its thickness. When a nerve is stained with nitrate of silver a black colour is formed at the intersections, and for a short distance along the axis cylinder (see fig. 3, where two are represented). These interruptions are called *nodes of Ranvier*, after their discoverer, and are supposed to allow of the percolation of lymph to nourish the axis cylinder. When a nerve



Fig. 2.

Small part of a nerve-fibre with axis cylinder, surrounded by medullary sheath. The primitive sheath passes over the constriction in the medullary sheath.

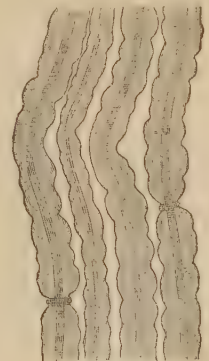


Fig. 3.

Nerve-fibres, stained with nitrate of silver, showing two nodes of Ranvier.

is divided transversely, and stained appropriately, the axis cylinder appears as a small point surrounded by a ring of the whitish medullary sheath (fig. 4). This sheath is enclosed by a continuous investment, the *primitive sheath*. This is colourless, and very delicate, and has a nucleus on its inner side corresponding to each segment of the medullary sheath. In the sympathetic system the medullary sheath is absent; while the fibres of the

brain and spinal cord retain the medullary sheath, but want the primitive membrane. The sympathetic fibres are often called gray or non-medullated; the others, white or medullated. The nerve-fibres in the limbs are about $\frac{1}{1000}$ th of an

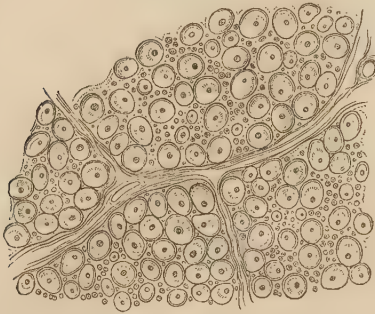


Fig. 4.

inch in diameter; in the brain they may be nearly ten times finer.

Nerve-cells vary in size and form. Some are bipolar, others multipolar (fig. 5, A and C). Many, especially in the cortex of the brain, are pyramidal in shape (fig. 5, B), with fine processes, termed *dendrons*, coming off at various points and breaking up immediately into smaller branches ending in fine twigs, and one special branch which becomes the *axis cylinder process* of the nerve fibre, termed briefly

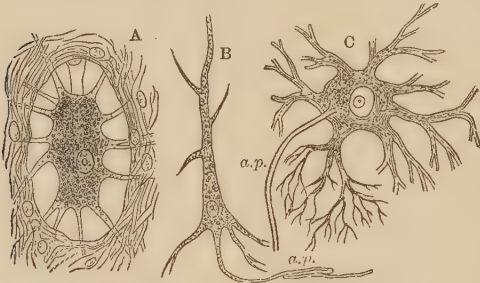


Fig. 5.—Nerve-cells:

A, from sympathetic ganglion; B, from cerebrum; C, from spinal cord; a.p., axis cylinder process.

the *axon*. The term *neurone* is applied to the complete nerve unit, i.e. the body of the cell and all its branches. Impulses reach a nerve-cell by the dendrons and pass out by the axon. Each neurone is anatomically independent of every other neurone; there is no true anastomosis of the branches from one nerve-cell with those from another, the arborisations interlace and intermingle, and nerve impulses are transmitted from one nerve unit to another through contiguous, but not through continuous, structures. This intermingling of arborisations is termed a *synapse*.



Fig. 6.

The various end-organs are described under the special sections. Fig. 6 shows the manner in which the fibres of a nerve end in a muscle.

The nerves arising from the brain are arranged

in twelve pairs. The first, or olfactory, is the nerve of smell. The second, or optic, is the nerve of sight. It arises from the retina, meets with its fellow in the optic chiasma, and is distributed half to each side of the brain, terminating partly in the corpora quadrigemina (for the reflex movements of the eye), and partly in the optic thalamus, passing thence to the occipital lobe of the cerebrum (for the sense of sight). The third or oculo-motor nerve arises under the corpora quadrigemina, and passes to all the muscles of the eye except two, which are supplied by the fourth and sixth pairs. The fourth nerve, arising immediately behind the third nerve, supplies the superior oblique muscle of the eye; while the sixth pair, arising from a nucleus near the middle of the floor of the fourth ventricle, supplies the external rectus muscle of the eye. The fifth pair has a very long origin from a point at the level of the third nerve down to the upper part of the spinal cord. It is the motor nerve to the muscles of mastication, and the sensory nerve to the face, front of the head, teeth, tongue, and is the nerve of taste of the anterior part of the tongue. It is this nerve which is concerned in neuralgia of the head and face and teeth. The seventh pair arises from the lower part of the pons Varolii (see BRAIN), and is the motor nerve to the facial muscles of expression. Injury to or disease of this nerve causes facial palsy, or Bell's paralysis. The eighth pair, or auditory nerve, supplies the internal ear. It is divided into two parts, one of which supplies the cochlea, and is the nerve of hearing proper, while the other supplies the semi-circular canals, and is concerned in the maintenance of the equilibrium of the body. The nerve arises from the lateral and posterior part of the pons Varolii and medulla oblongata. The ninth pair, or glosso-pharyngeal nerve, is the special nerve of taste, and supplies the hinder third of the tongue, with the taste bulbs of which it is connected. The tenth pair, or pneumogastric nerve, has a very wide area of distribution to the lungs, heart, stomach, &c.; it is partly motor and partly sensory in function. The eleventh pair, or spinal accessory nerve, is the motor nerve to the larynx, and to certain muscles in the upper part of the neck. These three nerves arise from a groove in the side of the medulla oblongata and upper part of the spinal cord. The twelfth pair, or hypoglossal nerve, is the motor nerve of the tongue. Its origin is near the floor of the fourth ventricle, close to the middle line, and it emerges from the anterior surface of the medulla oblongata in a shallow groove between the anterior pyramids and the inferior olivary body (see BRAIN).

The spinal nerves arise from the spinal cord in pairs, thirty-one in number, and are named according to their relation to the vertebrae—cervical, dorsal, lumbar, and sacral. Their mode of origin will be understood from fig. 7, which represents diagrammatically the first part of their course, and on one side their relations with the sympathetic system—C 1-8 represents the eight pairs of cervical nerves; D 1-12, the twelve dorsal pairs; L 1-5, the five lumbar pairs; S 1-6, the five sacral pairs and the coccygeal pair. Each spinal nerve arises by two roots, an anterior and a posterior (fig. 8, a and p; see also SPINAL CORD). These roots pass outwards, and unite before they leave the spinal canal. Before their union a small oval swelling is found on the posterior root, and is called its *ganglion*, g. The united nerve leaves the spinal canal by a small aperture between adjacent vertebrae. It almost immediately gives off a fine medullated nerve to its corresponding sympathetic ganglion, a branch which can be traced into one of the internal organs. It also receives from the ganglion a non-medullated or gray fibre, which is distributed to

the muscular coat of the blood-vessels, especially the arteries. The nerve thus altered passes outwards, dividing as it goes to send its ultimate branches into the fibres of the muscles, into the cells of the skin and connective tissues, tendons, and bones. In the dorsal region each nerve passes

to its distribution without entering into connection with its neighbours, but in the cervical, lumbar, and sacral regions the nerves split up and form new junctions with each other, or *plexuses* as they are called. (These are indicated in fig. 1, and on the right-hand side of fig. 7, but the detailed description of them is impossible within the limits of this article.)

Functions of the Spinal Nerves.

—Sir Charles Bell discovered that division of the anterior roots was followed by loss of power of voluntary motion, and that division of the posterior roots destroyed the power of sensation. He termed the anterior root motor, and the posterior sensory. It has since been ascertained that the anterior roots carry outwards other impulses that do not result in motion, and that the posterior roots carry inwards impulses which may not result in sensation. Therefore, it is more correct to term these roots respectively *afferent* and *efferent*. If the anterior root be divided between the point of its origin from the cells of the anterior horn of the spinal cord and its junction with the posterior root, the part unconnected with the cord will waste along the whole length of the nerve, and the muscles which it supplies will waste also. The

cells in connection with the anterior roots, therefore, not only send out motor impulses, but exert a nutritive or *trophic* influence on the nerve and muscle. Division of the posterior root beyond its ganglion is followed by wasting of the corresponding fibres of the nerve to their ultimate termination. If the root be cut between the ganglion and the spinal cord, the part attached to

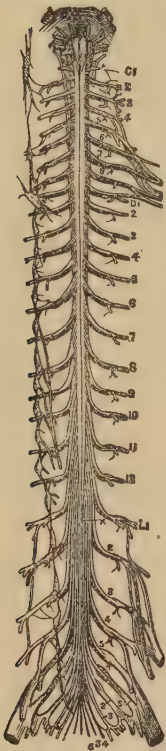


Fig. 7.



Fig. 8.

the ganglion remains unaltered, while that connected with the spinal cord wastes. This shows that the ganglion of the posterior root exerts a trophic influence on the fibres connected with it. If the nerve be divided after the junction of the two roots, the whole of the nerve farthest from the spinal cord will waste.

The afferent nerve impulses which pass along the posterior roots comprise those which give rise to the sense of touch, pain, and temperature, and to reflex movements of various kinds without necessarily exciting our consciousness, such as those concerned with the maintenance of the equilibrium

of the body, and with the functions of the internal organs.

Reflex Action.—The function of the nervous system is to bring any part of the organism into relation with any other part without the necessity of direct nervous connections from every part to every other part. It is like a telephone exchange where each subscriber has a central terminal which can be put into connection with that of any other subscriber. The nervous system, however, is more efficient, as the channels which bring in messages from different parts of the body (afferent fibres from sense organs) are different from the fibres (efferent) which convey messages outwards to organs which perform some action in response. The simplest mechanism consists of a sensory or receptive neurone and a motor neurone. This is a *reflex arc* in which a sensory impression gives rise to a motor response. It is the functional unit of the nervous system, as the neurone is the anatomical unit. As the organism increased in complexity, a third or association neurone arose which connected the neurones of one segment with those of another segment. The progress of the nervous centres in complexity and efficiency depends essentially on the formation of longer and longer association neurones which extend farther and farther from the original reflex arc, and thus the most highly developed part of the nervous system, the cerebral cortex, consists largely in man of association neurones.

A reflex arc usually consists of at least three neurones, a sensory, an association, and a motor (fig. 9). The simplest reflexes take place in the spinal cord, but the more highly complicated and specialised reflexes are carried out through the brain, which exerts a controlling influence upon all reflex response, inhibiting, exciting, changing excitation to inhibition, or *vice versa* as required, and thus constituting voluntary or volitional action. It is possible to explain the whole action of the nervous system as the result of the integration, co-ordination, interaction, combination, and adjustment of reflex activity.

The *sympathetic nervous system*, in contrast to the cerebro-spinal system which is under the control of the will, supplies those organs whose functions are not under voluntary control. It innervates the heart-muscle, the plain muscle in the walls of the blood-vessels, and in the walls of the other contractile viscera, such as the stomach, intestine, bladder, and reproductive organs, and supplies secretory fibres to the glands. It is not an independent nervous system, but an outflow from the cerebro-spinal, and is distinguished by its connections with neurones lying outside the latter, together with its formation of peripheral plexuses at the places of its distribution. It is entirely efferent. Its overflow from the central nervous system occurs at four regions, the mid-brain, the medulla oblongata, the dorsal and the sacral regions of the spinal cord. The cells of origin in the spinal cord are situated in the lateral horn of gray matter, and are known as the *intermedio-lateral*

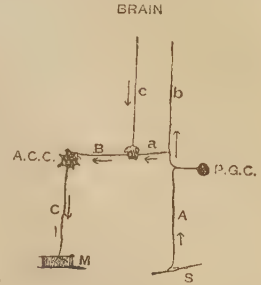


Fig. 9.

A, sensory neurone; a, sensory spinal connection; b, sensory pathway to brain; B, association neurone; C, motor neurone; c, motor fibre from brain; M, muscle; S, sensory end-organ; A.C.C., anterior cornua cell (motor); P.G.C., posterior ganglion cell (sensory); S-A-b, sensory connection with brain; c-B-C, motor pathway from brain; S-A-a-B-c, reflex arc.

tract (see SPINAL CORD). The outflow is by the anterior roots.

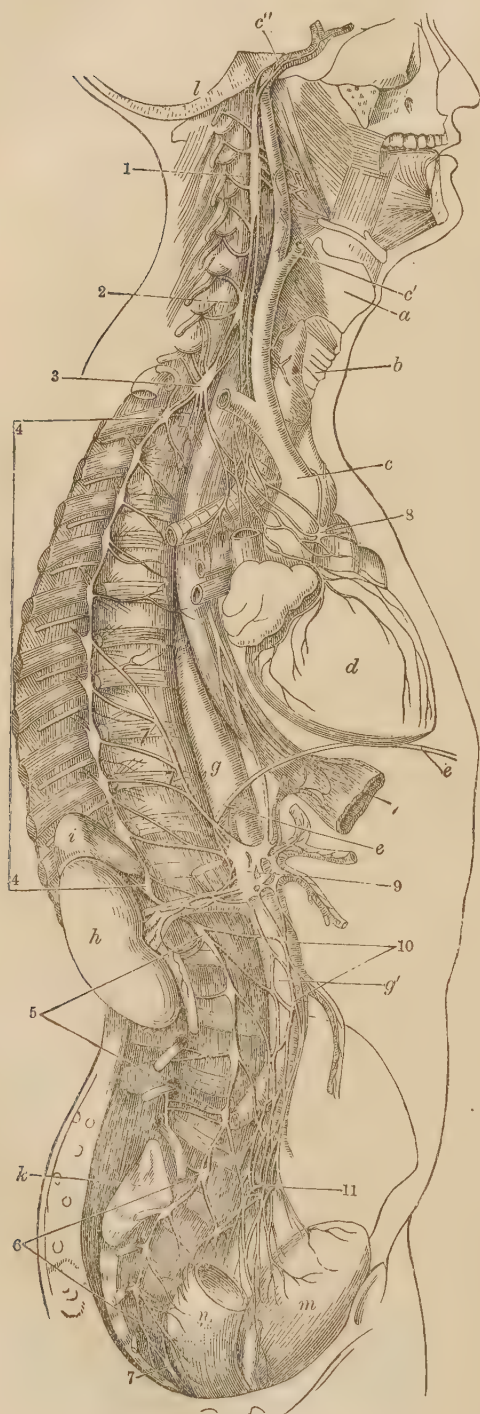


Fig. 10.—The Sympathetic Nervous System; the right lateral walls of the chest and abdomen, and the stomach, intestines, liver, spleen, and pancreas being removed to bring it in view:

1, 2, 3, the superior, middle, and inferior cervical ganglia; 4, the two lines from this figure include the twelve dorsal

ganglia; 5, include the four lumbar ganglia; 6, include the five sacral ganglia; 7, the ganglion impar; 8, cardiac plexus; 9, solar plexus; 10, aortic plexus; 11, hypogastric plexus; a, the larynx; b, the trachea; c, arch of the aorta; c', external carotid; c'', internal carotid; d, the heart; e, e, the diaphragm; f, the cardiac end of the esophagus; g, thoracic and abdominal aorta; h, the kidney; i, the supra-renal capsule; k, the sacrum; l, the section of base of the skull; m, the bladder; n, the lower portion of the rectum.

The sympathetic nervous system consists of a series of ganglia situated on either side of the spinal column along its whole length. In the dorsal, lumbar, and sacral regions the ganglia correspond in number to the vertebræ; but in the cervical region there are only three, of such large size, however, that they are generally supposed to represent the fusion of a number of ganglia. Below, the two chains unite in front of the coccyx in a single ganglion. These ganglia are formed of multipolar nerve-cells (fig. 5, A), and are united with each other by gray nerve-fibres. Each ganglion gives to its corresponding spinal (or cranial) nerve a gray non-medullated nerve, and receives from it a fine white medullated nerve. The fibres of distribution may be studied in fig. 10. They pass to the blood-vessels and to the mucous membranes and muscular coats of the various internal viscera, and become united with each other in fine networks or plexuses, on many of which nerve-cells or ganglia are situated.

The sympathetic chain is continued upwards as a fine plexus of nerves on the internal carotid artery, on the various branches of which it is distributed. From the superior cervical ganglion also fibres pass to the various arteries in the neck and face, and to form, along with the pneumogastric and glosso-pharyngeal nerves, the pharyngeal plexus on the muscles and mucous membrane of the pharynx.

From some of the cervical and upper thoracic ganglia fibres pass into the chest, to form also, along with the pneumogastric nerve, two important plexuses, named pulmonary and cardiac, from which branches pass to the lungs and heart, and undoubtedly influence their functions. From the thoracic ganglia also arise the three splanchnic nerves which pass into the abdomen to enter the solar or epigastric and the renal plexus. The solar plexus is situated at the pit of the stomach, and is connected with two large semilunar ganglia, which send branches to all the blood-vessels and to all the organs within the abdomen. It is owing to the relations and functions of the solar plexus that blows in this region are so dangerous. The hypogastric plexus arises from the lumbar ganglia, and sends branches to the blood-vessels and to the organs in the lower part of the abdominal cavity, more especially the organs of generation, the lower bowel, and the bladder.

In the more primitive animals the sympathetic system is less conspicuous, its place being taken by masses of cells known as *chromaffine* cells. These cells contain adrenalin, and are found best developed in man in the medulla of the suprarenal glands. The tone of the vascular system depends on a continuous outflow of adrenalin into the blood, the sympathetic nerves alone being unable to maintain this tone in its absence.

The tissues and organs supplied by the sympathetic system all possess two sets of nerve fibres. These are opposite in function, one set being motor, the other inhibitory. The motor or accelerator fibres arise exclusively from the dorsal outflow from the spinal cord, while the inhibitory fibres arise from the remaining three regions. The latter have been termed 'parasympathetic' in contrast to the former, to which the term 'sympathetic' is becoming restricted. The heart, for instance, is supplied by an accelerator group of

fibres which quickens its action, and by an inhibitory group which slows it; the blood-vessels are supplied by vaso-constrictor and vaso-dilator fibres, &c. The characteristic quality of the innervation of all these tissues is due to the fact that their functions are able to continue independently of the nervous system, although influenced by it.

Although the sympathetic and parasympathetic systems act separately from each other, and may be influenced independently by physiological stimulation and by drugs, and although their actions are antagonistic, it is possible they may both be controlled from some common centre. A disturbance of their normal balance, however, may lead to the ascendancy of either system, and a condition of hypertonus, either vagal or sympathetic, may result with characteristic symptoms of illness.

See Quain's *Anatomy*, vol. iii.; Sherrington, *Integrative Action of Nervous System*; Gaskell, *Involuntary Nervous System*; Keith Lucas, *Conduction of Nervous Impulse*; Schäfer, *Text-book of Physiology*.

Nesle, TOUR DE. The ancient castle of the noble family of Nesle stood, with its gate and tower, at an angle of the city wall of Paris, on the south bank of the Seine, where now stands the palace of the Institute. It came into the hands of the crown, was the scene of events recorded by Brantôme, and was bought by Cardinal Mazarin as the site for his college.

Ness, LOCH, a long, narrow lake of Inverness-shire, the second largest in Scotland, $6\frac{1}{2}$ miles SW. of Inverness. Lying some 50 feet above sea-level, it extends $24\frac{1}{2}$ miles north-north-eastward, and has an average breadth of 1 mile, with an area of $21\frac{1}{2}$ sq. m. It receives the Morriston, Oich, Foyers (q.v.), and other streams, and sends off the river Ness to the Moray Firth. It lies in the valley of Glenmore, on the line of the Caledonian Canal (q.v.), and is enclosed by steep mountains—the highest, Mealfourvie (2284 feet). Owing to its great depth (maximum 754 feet) it never freezes to any considerable extent. See FORT AUGUSTUS.

Nesselrode, KARL ROBERT, COUNT, Russian diplomatist, was born on the 14th December 1780, at Lisbon, where his father, a descendant of an ancient noble family on the lower Rhine, was then Russian ambassador. He gained in a high degree the esteem and confidence of the Emperor Alexander, and in 1814 he accompanied the Russian emperor to France, where he took a principal part in all the negotiations which ended in the peace of Paris; and he was one of the most prominent of the plenipotentiaries in the Congress of Vienna, and one of the most active diplomatists of the Holy Alliance. The Emperor Nicholas reposed in him the same confidence, and amidst the European convulsions of 1848 and 1849 Russia, under his guidance, refrained from interference, till an opportunity occurred of dealing a deadly blow to the revolutionary cause in Hungary. Being one of the chiefs of the moderate party in Russia, Nesselrode exerted himself to preserve peace with the Western Powers; and after the war had broken out in 1854 he undoubtedly strove for the re-establishment of peace. After the accession of Alexander II. he retired from the direction of foreign affairs, and was succeeded by Prince Alexander Gortschakoff, but retained the dignity of chancellor of the empire. He died 23d March 1862, and his autobiography appeared at Berlin in 1866, his *Lettres et Papiers* in 1904–11.

Nessus. See HERCULES.

Nestor, according to ancient Greek legend, the son of Neleus and Chloris, born in the Messenian Pylos, escaped destruction when Hercules slew all his brothers. He married Eurydice, by whom he became the father of a numerous family. In his youth he was distinguished for valour in wars with

the Arcadians, Eleians, and the Centaurs, and in his advanced age for wisdom. Although he was an old man when the expedition against Troy was undertaken, he joined it with his Pylians in sixty ships. Homer makes him the great counsellor of the Greek chiefs, and extols his eloquence as superior even to that of Ulysses. Nestor returned in safety to his own dominions after the fall of Troy, and continued for long to rule over the people of Pylos.—For the birds called Nestor, see KEA.

Nestorius, a native of Germanicia, a city of northern Syria, in the patriarchate of Antioch, was probably a disciple of the celebrated Theodore of Mopsuestia. Having received priest's orders at Antioch, he became so eminent for his zeal, ascetic life, and eloquence in preaching that he was selected by the emperor as patriarch of Constantinople (April 428). Soon after his consecration a controversy arose as to the divine and human natures of our Lord, in which Nestorius took a leading part. The presbyter Anastasius, having in a sermon denied that the Virgin Mary could be truly called the Mother of God (*θεοτόκος*), it being not God the Logos but only the human nature which had a mother and suffered pain and death, Nestorius warmly defended Anastasius, and elaborated his view into the theory which has since been known by his name. He held that Mary was the Mother of Christ (*χριστοτόκος*), or the Receiver or Conceiver of God (*θεοδέχχος*), and that, while the divinity of the Logos is to be distinguished from the temple of his flesh, yet there remained but one person in the God-man. By his antagonists he was accused of exaggerating the distinction of two natures into a co-existence of two persons (*προσώπων ἑνους*)—the human person of Christ and the Divine Person of the Word. A vigorous controversy ensued, which extended from Constantinople to the other patriarchates, and drew from Cyril of Alexandria a formal condemnation of the doctrine of Nestorius in twelve anathemas, and a similar condemnation, accompanied by a threat of deposition and excommunication, from Celestine, Bishop of Rome, unless he would withdraw the obnoxious doctrine. Nestorius remaining firm in his opinions, a general council was convened at Ephesus in 431, at which Cyril took the most active and prominent part, and in which, notwithstanding the absence of John the Patriarch of Antioch and his bishops, Nestorius was condemned and deposed. Considerable opposition was offered to this judgment for a time, but ultimately the emperor was led to side with Cyril. Nestorius was confined in a monastery, and, after four years, banished to Petra in Arabia. He next found shelter in the Greater Oasis in Upper Egypt, and, after several changes of his place of confinement, died in exile, time and place alike unknown. His *Bazaar of Heracleides of Damascus* shows that he must have been alive just before the Council of Chalcedon (451), and that he was himself opposed to the so-called Nestorianism that the Council of Ephesus condemned.

See Bethune-Baker, *Nestorius and his Teaching* (1908); F. Loofs, *Nestoriana* (1905), and *Nestorius and his Position in the History of Christian Doctrine* (1914); and his own *Bazaar of Heracleides* (ed. Bedjan, 1910; trans. Driver and Hodgson, 1925).

The sect of the NESTORIANS, formed in the 5th century, was, after its exclusion from the Roman empire, extended into Persia, India, and even China. The teachers who were driven out of Edessa (489) settled at Nisibis, which soon became an active centre of learning and missionary enterprise throughout Persia. Babæus, Bishop of Seleucia (498–503), assumed the title of patriarch, and under his successors the sect grew rapidly and produced many learned theologians and philoso-

phers, and not a few very eminent physicians. Under the rule of the khalifs the Nestorians enjoyed toleration, and spread in Arabia, Syria, and Palestine, and even to Samarkand, Herat, and China. The Prester John (q.v.) of romance was a Christian of this colour, and there is a tradition that Mohammed learned what he knew of Christianity from Sergius, a Nestorian monk. In the middle of the 13th century as many as twenty-five metropolitans owned the jurisdiction of the Nestorian patriarch, but after the persecutions of Tamerlane they dwindled away. Meantime the Roman Catholic Church had been active in missionary labours amongst them. In the 16th century a great schism took place, a portion renouncing their distinctive doctrine, and placing themselves under the jurisdiction of the Roman pontiff, to whom, under the title of Chaldean Christians, they have since remained faithful. Their patriarchs still bear the traditional name of Joseph. The others to the present day maintain their old creed and their ancient organisation. Their chief seat is Kotchanes, near Djulamerk, in the mountain-ranges of Kurdistan. They are at present a poor and illiterate race. Their patriarch since the close of the 17th century has borne the name of Simeon. The bishops are bound to observe celibacy, but marriage is permitted to the priests and inferior clergy. Their liturgical books recognise seven sacraments, but confession is infrequent, if not altogether disused. Marriage is dissoluble by the sentence of the patriarch; communion is administered in both kinds; and although the language of the liturgy plainly implies the belief in transubstantiation, yet that doctrine is not popularly held among them. The fasts are strict, and of very long duration, amounting to very nearly one-half of the entire year. They pray for the dead, but are said to reject the notion of purgatory, and the only sacred symbol which they use or reverence is the cross. The Nestorians of Kurdistan, like the Christians of the Lebanon, have suffered much from time to time through the fanaticism of the wild tribes among whom they reside. There has been among them since 1834 an active American mission, which has translated the Bible into their speech—a dialect of the old Aramaic.

There is another body of Nestorians who have existed in south India from the period of the early migrations of the sect, known as Syrian Christians or Christians of St Thomas (see THOMAS, CHRISTIANS OF ST), and works there noted.

See GREEK CHURCH; Maclean, *The Catholicos of the East and his People* (1892); Parry, *Six Months in a Syrian Monastery* (1895); Hefele's *Councils*; Perkins's *Residence of Eight Years in Persia among the Nestorian Christians* (Andover, 1843); Badger's *Nestorians and their Rituals* (1852); Anderson's *Oriental Churches* (1872); Dean Stanley's *History of the Eastern Church*; Wigram, *The Assyrian Church* (1910); Heazell and Margoliouth, *Kurds and Christians* (1913); and books on the Nestorian monument at Si-ngan-fu in China by Legge (1888), Havret (*Variétés Sinologiques*, 1898), Carus (1909), and Saeki (1916).

Nests, structures prepared for egg-laying, brooding, and nursing. The word is also applied to a shelter for the adult animals, apart from eggs or young. Nest-making reaches its finest expression in birds, but many other kinds of animals make nests—e.g. squirrels and harvest-mice, sticklebacks in the shore-pool and Antennarius among the Sargasso Weed, some spiders, and many insects like bees and wasps. See ANT, BEE, BIRD, &c.; Alfred Russel Wallace in *Contributions to the Theory of Natural Selection*; C. Lloyd Morgan's *Habit and Instinct* (1897); W. P. Pycraft's *History of Birds* (1910); J. Arthur Thomson's *Biology of the Seasons* (1911).

EDIBLE BIRDS' NEST, a nest chiefly composed by the consolidated whitish isinglass-like mucous secretion formed by the salivary glands of diminutive swifts belonging to the genus *Collocalia*. About a dozen species are known in the Indian and Australian regions; they nest in caves which are also tenanted by bats, and they fasten their saucer-shaped nests to the walls. In some species there may be an admixture of seaweed, lichen, moss, feathers, &c., along with the salivary secretion; or this may be the case when the bird makes a second nest after the first has been removed. The nests of the Esculent Swiftlet (*C. fuciphaga*) are particularly pure, and over 3½ millions have been known to be exported from Borneo alone.



The Edible Nest of the Swiftlet of South Java.

in one year. They are used in various Chinese 'birds' nest soups,' and are often said to be worth their weight in silver. The import to Canton has sometimes amounted to 25 million nests in a year. The birds are occasionally called Salangane, from one of the islands which they frequent. The nests have been analysed by Dr J. R. Green, who found that the chief constituent was allied to mucin. A similar material is secreted by many animals, and many swifts use it in glueing the materials of their nests. What is peculiar in *Collocalia* is that the secretion of the salivary glands is very copious. The persistent belief that the mucilage of the nest is partly extrinsic, and derived from seaweed, fish-spawn, and the like, seems unwarranted. See articles by Green, Layard, and Pryer in *Nature*, vols. xxx.-xxxiv.; Green in *Journal of Physiology*, vi. pp. 40-45; Pryer in *Proc. Zoological Soc.*, 1885, pp. 532-58; Annandale in *Chambers's Journal* (1901); McGregor, *Philippine Birds* (1909); and Newton's *Dictionary of Birds* (1896), p. 936.

Netherlands, the north-west corner of the great north European plain, a triangular region between France, Germany, and the sea, lying mainly in the basins of the Scheldt, the Meuse, and the lower Rhine, is now divided into nearly equal parts between the kingdoms of Holland and Belgium. The official designation of Netherlands is retained by what we commonly call Holland (q.v.), and under that head the early history common to the two is discussed; while the history of the 'Spanish Netherlands' falls mainly under the head of Flanders (q.v.) and Belgium (q.v.). The history of the Dutch and Flemish language and literature will be found under HOLLAND.

Netherlands Company. See JAVA.

Nethersole, ORGA, an actress born in London in 1870, who made her début at Brighton in 1887, and from 1889 played at the Garrick under John Hare. She became lessee and manager of the Court Theatre in 1894, subsequently managed the

Adelphi and Her Majesty's, and made tours in Australia and the United States, and played in Paris.

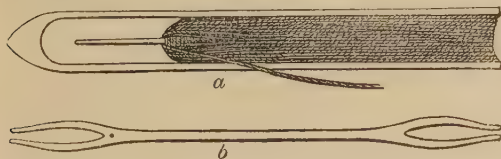
Néthou. See PYRENEES.

Netley, a place on the east side of Southampton Water, 3 miles SE. of Southampton, with a ruined Cistercian abbey, founded in the time of Henry III., and the Royal Victoria Hospital. The latter superb building (begun 1856) is for the reception of invalids from the army on foreign service, and from the troops serving in the adjoining military districts. The Army Medical School formerly attached has been superseded by the Royal Army Medical College in London.

Nets. A net is a kind of trap formed of string worked into open meshes and used for capturing fishes, birds, and other animals, and for other purposes. The string is knotted at the intersections so as to keep the meshes of their original size.

Remains of nets belonging to the stone age have been found at Robenhauseu and Vinelz in Switzerland. Not only do the paintings on ancient Egyptian monuments show that in the days when these were executed nets were in common use, but portions of actual nets of great age have been obtained in Egypt. They are also represented on the monuments of ancient Greece. The Eskimo and Tchukchis make nets of twisted sinew or of strips of seal-skin, and the Chinese construct fine nets from the cocoons of the wild silkworm, which are soaked in oil so as to render them barely visible. Silk nets also are used in Greece. In some parts of the world nets are made of the fibres of plants but little known; but in civilised countries the chief materials used in their construction are hemp and cotton, and to a less extent flax. More nets are now made of cotton than of hemp, because, although the former are less durable, they are of lighter weight, more easily managed, and a smaller number of corks and bungs suffices to float them.

The making of nets by hand is an extremely simple operation. Only two instruments are required—viz. a netting-needle like *a* in the figure, for meshes above one-half inch in width, or one like



b for meshes under this size, and a mesh-pin, which is simply a straight piece of wood of oval section and a few inches long, upon which the loops are formed. If the meshes are to be one inch from knot to knot, then the circumference of the mesh-pin requires to be two inches. There are two ways of forming the knots on hand-made nets (see KNOTS, figs. 11 and 13), but both are equally simple, and the whole process can be learned in a few minutes by seeing an operator at work. In some countries nets are still largely made by hand.

Netting-machines are now extensively used. The looms are of complicated construction, and it would require a considerable number of illustrations and detailed descriptions to give even a general idea of how they perform their work. One of the most successful of these is known as the Paterson net-loom. It was invented by James Paterson, brought into a more practical shape (1835) by Walter Ritchie, both of Mussel-

burgh, and since improved by Messrs J. & W. Stuart. (The knot made by this loom is the same as fig. 13 of KNOTS.) It works by a peculiar arrangement of hooks, needles, and sinkers. An improved form of a net-loom, on a different principle, invented by a Frenchman named Pecqueur, in 1840, was improved by MM. Baudouin and Jouannin.

A variety of nets are used by fishermen, but the principal kinds are the *seine*, the *drift-net*, the *moored-net*, and the *trawl* (see FISHERIES). The net used for taking the tunny in the Mediterranean is often nearly a mile long, and some Russian hand-made nets are 3000 feet in length. Means are adopted to increase the durability of cotton and hemp nets, especially of the former. One plan is to tar them; but, although this to some extent prevents the injurious action of sea-water upon them, it has the disadvantage of hiding faulty parts. They are, however, much more frequently 'barked' in an infusion of cutch (see CATECHU), which like tar lessens the action of salt water upon them and at the same time admits of the state of the meshes being better seen. A solution of alum is also useful in preserving the fibre of the string of which nets are made.

One or two kinds of nets are made for catching birds, such as *fly-nets* for waders frequenting the seashore, and *clap-nets* for small birds (see WILD-FOWL). Fine nets are used to capture insects, and by the inhabitants of some countries as a protection from mosquitoes.

Nettle (*Urtica*), a genus of plants of the natural order Urticaceæ, having unisexual flowers, the male and female on the same or separate plants; the male flowers with a 4-parted perianth and four stamens; the female flowers with a 2-parted perianth and a tufted stigma; the fruit an achenium. The species are herbaceous plants, shrubs, or even trees, many of them covered with stinging Hairs (q.v.), which pierce the skin when touched, and emit an acrid juice, often causing much inflammation and pain. When a nettle is grasped in such a way as to press the hairs to the stem no stinging ensues; but the slightest inadvertent touch of some of the species produces very severe pain. The acidity which is characteristic of all nettles, more or less, is by some said to be due to bicarbonate of ammonia, or according to others free formic acid being present in the limpid juice secreted by the glandular hairs of the leaves and stems. The stinging of the native nettles of Europe is trifling in comparison with that of *U. spatulata*, the *Devil's Leaf* of Timor. Of British species the most venomous, but the most rare, is the Roman Nettle (*U. pilulifera*); next to it is the Small Nettle (*U. urens*), frequent about towns and villages, and in waste and cultivated ground; whilst the least venomous is the most common and only perennial species, the Great Nettle (*U. dioica*), everywhere abundant, but particularly near human habitations, or their former sites, the desolation of which it may be said to proclaim. The roots of nettles, boiled with alum, afford a yellow dye; and the juice of the stalks and leaves has been used to dye woollen stuffs of a beautiful and permanent green. The young shoots of *U. dioica* have been much used in some parts of Scotland and other countries as greens, and their peculiar flavour is much relished by some, although, in general, the use of them is confined to the poor. They are valuable as antiscorbutics, but are gritty to the taste from the quantity of crystals (Cystoliths) contained. The stinging power of nettles is dissipated by boiling and drying. Their high value as food for swine and poultry, especially turkeys, is well known in many countries. The seeds

are extremely nutritious to poultry, and are given to horses by jockeys, in order to make them lively when they are to be offered for sale. The stalks and leaves of nettles are employed in some parts of England for the manufacture of a light kind of beer, called *Nettle Beer*. The bast-fibre of nettles is useful for textile purposes. Yarn and cloth, both of the coarsest and finest descriptions, can be made of it. The fibre of *U. dioica* was used by the ancient Egyptians, and is still used in Piedmont and elsewhere, as it has been in Germany since the Great War. It makes excellent gasmantles. When wanted for fibre the plant is cut in the middle of summer, and treated like hemp. The fibre of *U. cannabina*, a native of the south of Siberia, central Asia, is much used. The seeds and herbage of *U. membranacea* are used in Egypt as emmenagogue and aphrodisiac; and somewhat similar properties are ascribed to *U. dioica*.—The Dead-nettle (q.v.) is quite a distinct plant; so is the Nettle-tree (q.v.).

Nettle-cloth. See *BOEHMERIA*.

Nettlerash, or *URTICARIA* (Lat. *urtica*, 'nettle'), is the term applied to a common form of eruption on the skin. The eruption consists of wheals, or little solid eminences of irregular outline, and either white or red, or most commonly both red and white, there being a white centre with a red margin. The rash is accompanied with great heat, itching, and irritation, but is always aggravated by scratching; the appearance on the skin and the sensation being very much like the appearance and feeling produced by the stinging of nettles; and hence the origin of its names. The eruption is characterised by the extreme rapidity with which it appears and disappears; the whole duration of the attack may be a few hours or even less; but it is extremely apt to recur at regular or irregular intervals: it is very rare for the wheals to persist more than a day.

The disease may be either acute or chronic. In the acute form feverishness may precede the rash by a few hours, or may be altogether absent. The disorder is often connected with some derangement of the digestive organs, and may be traced to the imperfect digestion of special articles of food, such as oatmeal, the kernels of fruit, strawberries, cucumbers, mushrooms, and especially oysters, mussels, and crabs, which are eaten with perfect impunity by most persons. It may be brought on also by local causes of irritation, and frequently complicates other irritable diseases of the skin.

The chronic form is often very troublesome, and frequently comes on periodically in the evening. Cases are reported in which persons have been afflicted for ten years continuously by this form of the disease. It is characterised by constant recurrence during long periods, not by persistence of a single outbreak of the eruption. In the treatment of the acute form local causes of irritation must first be looked for and removed. Where it is brought on by some article of diet relief is often obtained by taking ten grains of bicarbonate of soda (baking-soda); but it may be necessary to administer emetics and purgatives, if vomiting and diarrhoea do not occur spontaneously. In the chronic form the patient should, in the first place, determine whether the rash is caused by any particular article of diet, and if this seems not to be the case an attempt must be made to improve the state of the digestive organs. A few grains of rhubarb taken daily, just before breakfast and before dinner, will sometimes effect a cure. Numerous other remedies have been recommended; perhaps the most generally useful is a powder containing rhubarb two grains, bismuth

carbonate twenty grains, and bicarbonate of soda ten grains. Although external applications are usually of little avail, dusting the itching surface with boric and talc powder sometimes affords temporary relief; and a still more useful application is a lotion composed of a drachm of the carbonate of ammonia, a drachm of the acetate of lead, half an ounce of laudanum, and eight ounces of rose-water.

Nettle-tree (*Celtis*), a genus of deciduous trees of the natural order *Ulmaceæ*, with simple and generally serrated leaves, considerably resembling those of the Common Nettle, but not stinging. The genus is distinguished chiefly by its fruit, which is a fleshy, globose, or sub-globose 1-celled drupe. The Common or European Nettle-tree (*C. australis*) is a native of the south of Europe, the west of Asia, and the north of Africa. It grows to a height of 30 to 40 feet, and is a very handsome tree, often planted along public walks in the south of France and north of Italy. The wood is very compact, very durable, and takes a high polish. It was formerly much imported into Britain for the use of coachmakers, and is used in Italy by musical-instrument makers for flutes and pipes. The flowers are inconspicuous, axillary, and solitary; the fruit black, resembling a small wild cherry, not eatable till after the first frosts, and then very sweet. The kernel yields a useful fixed oil. The tree succeeds well in the south of England. *C. occidentalis* is a native of North America from Canada to Texas, and is also called Hackberry. Its leaves are much broader than those of *C. australis*, its fruit very similar. It is a much larger tree, attaining a height of 60 to 80 feet. The Sugar-berry is *C. mississippiensis*. See also *LAPORTEA*.

Neu-Brandenburg, a town of Mecklenburg-Strelitz, is situated on Tollense See, 20 miles NNE. of Neu-Strelitz by rail; pop. 13,000.

Neuchâtel, or *NEUFCHÂTEL* (Ger. *Neuenburg*), a canton in the west of Switzerland, between the Lake of Neuchâtel and the French frontier. Neuchâtel lies in the midst of the Jura Mountains, four chains of which, running from north-east to south-west, traverse the canton, and are separated by elevated longitudinal valleys. The greater number of the numerous streams which water the canton flow into the Rhine; several are feeders of the Lake of Neuchâtel, which, lying 1420 feet above sea-level, and 472 feet deep, is 25 miles long by from 3 to 6 wide. The Thiele serves as its outlet, and carries its waters into the neighbouring lake of Bienne, and thence into the river Aar. Pop. of the canton (1870) 97,284; (1920) 131,349, of whom three-fourths speak French, and four-fifths are Protestants. Asphalt is exported; good wine, chocolate, electrical apparatus, and lace are made; but the speciality of the canton is watch-making. The history of Neuchâtel was identical with that of Burgundy till the 11th century; and after the principality had been for a time incorporated with the territories of the Counts of Chalon, to whom it had been granted in 1288 by Rudolph of Hapsburg, it passed to the House of Longueville. In 1707, on the extinction of the Neuchâtel branch of the latter family, some fifteen claimants came forward to advance more or less valid pretensions to the Neuchâtel territory. Frederick I. of Prussia, who based his claim to the principality of Neuchâtel on the ground of his descent from the first Prince of Orange, a descendant of the House of Chalon, was the successful candidate; and from his time it continued associated with Prussia, till 1806, when Napoleon bestowed it upon General Berthier; but in 1814 it was restored to the House of Brandenburg. A republican constitution was adopted in

1848, in spite of Prussian protest; and there was civil war in 1856. The connection with Prussia was wholly dissolved in 1857, and Neuchâtel is now a member of the Swiss Confederation.

NEUCHÂTEL, chief town of the canton, occupies a magnificent site on the north-west shore of the Lake of Neuchâtel, 85 miles by rail NNE. of Geneva. It is noted for its many charitable, educational, and artistic institutions, and has a château (restored 1866), a university (1909), a statue of Farel (1875), &c. There are manufactures of watches, jewellery, &c. Pop. 23,000.—The famous Neuchâtel cream-cheeses are made, not here, but at Neuchâtel-en-Bray, a small Norman town, 25 miles SE. of Dieppe by rail.

Neuhoff. See THEODORE (of Corsica).

Neuilly, or NEUILLY-SUR-SEINE, immediately north of the Bois de Boulogne, is practically a suburb of Paris. Near the Seine stood the Château de Neuilly, built by Louis XV., but burnt at the revolution in 1848. Peace with Bulgaria was signed in the Town Hall, 27th November 1919. Pop. 50,000.

Neumes. See MUSIC.

Neumünster, a prosperous manufacturing town of Holstein, 20 miles by rail S. by W. of Kiel. Its tanning industry is very important. Pop. 36,000.

Neunkirchen, a town of Rhenish Prussia (Saar basin), 38 miles SE. of Trier, has important coal-mines and iron-works; pop. 38,500.

Neunkirchen, a town of Lower Austria, 38 miles SSW. of Vienna, in a mining district, with iron-foundry and other industries; pop. 11,000.

Neu-Pommern. See NEW BRITAIN.

Neuralgia (Gr. *neuron*, 'nerve'; *algos*, 'pain') is a term employed to designate pain of a purely nervous character, usually unaccompanied by inflammation, fever, or any appreciable change of structure in the affected part. The pain, which occurs in paroxysms, usually followed by complete remissions, is of every possible degree and character, being described in different cases as piercing, tearing, burning, &c. These paroxysms may occur at intervals of a few seconds only, or they may take place daily or on alternate days, or they may be separated by much longer intervals, which are often, but by no means always, of a regular length. The pain is usually felt not only at the place where the nerves terminate, but along their course. It is usually confined to one side of the body, and is very rarely, if ever, quite symmetrical. In prolonged cases 'tender points' are developed along the course of the affected nerves. After the pain has subsided the painful parts are usually tender to the touch. Very frequently the sensibility of the skin supplied by the affected nerve is somewhat diminished. With the pain there is frequently spasmodic twitching of the adjacent muscles. The duration of the disease is very uncertain. The patient may have only a single attack, or he may be liable to recurring attacks for months, years, or even for his whole life; it is, however, very seldom that the disease occurs but once. Death scarcely ever results directly from this affection, but the pain may, by its severity and persistence, gradually undermine the constitution.

The disease may attack any part of the body where there are nerves; but in no part does it occur so frequently as in the face, its seat being in the facial branches of the fifth pair of nerves (the trifacial nerves; see NERVOUS SYSTEM). The most severe form of facial neuralgia, happily rare, is known as *tic douloureux*. 'The absolute suddenness with which the pain comes on is one of its most remarkable characters. The patient is per-

haps sitting quietly reading, when he jumps up from his seat, and rushes up and down the room with his hand forcibly pressed against his cheek. Or he may rock himself backwards and forwards in his chair, crying out or uttering deep groans. In ten or twenty seconds, or a minute at the longest, the paroxysm is over. It ceases as abruptly as it began.' 'The paroxysms may return every few minutes.' 'Sometimes remissions occur, the patient remaining free from the disease for several days together, or even for months. But presently it returns, and is as severe as ever.' 'A patient who suffers under *tic douloureux* acquires an expression of intense distress and suffering; his countenance is worn and wrinkled, and looks like that of a much older person' (Fagge, *Practice of Medicine*).

'The paroxysms of suffering in this frightful disease are apt to be brought on by apparently trivial causes—by a slight touch, by a current of air blowing upon the face, by a sudden jar or shake of the bed on which the patient is lying, by a knock at the door, or even by directing the patient's attention to his malady, by speaking of it or asking him questions about it. The necessary movements of the face in speaking or eating are often sufficient to provoke or renew the paroxysm. At the same time, firm pressure made upon the painful part frequently gives relief, and causes a sense of numbness to take the place of the previous agony' (Sir J. Watson).

Facial neuralgia of a less severe type than *tic douloureux* is very much more common, in fact it is by far the most frequent form of the disease; the reason probably being that the trifacial nerve, lying superficially, and being distributed over a part of the surface which is usually unprotected by any artificial covering, is very liable, for that reason, to be affected by exposure to atmospheric influences, which are undoubtedly to be included among the exciting causes of this disease. Amongst other seats of neuralgia may be mentioned the arm, especially the forearm, the spaces between the ribs, especially between the sixth and ninth, and the lower extremity, where it most frequently affects the sciatic nerve, giving rise to the affection known as *Sciatica*, which, however, not always being pure neuralgia, will be noticed in a separate article. The internal organs may also be the seat of neuralgia—e.g. the heart (some cases of *Angina Pectoris*, q.v.), stomach, or kidney.

The causes of neuralgia are various. Excluding inflammation of the nervous trunk or *neuritis*, the pain may be excited by a tumour pressing on the nerve or originating in its substance, or by roughness of a bony surface with which the nerve may be in contact, as when it passes through a foramen. Sometimes, again, irritation applied to one branch of a nerve will give rise to pain at the extremity of another branch of the same nerve, the sensation being reflected along the branch which is not directly exposed to the irritation. Thus, facial neuralgia very frequently depends upon diseased conditions of the teeth, even if they themselves are not painful. In this way we may explain the pain in the shoulder which often accompanies disease of the liver; the pain in the thigh, which is often associated with irritation of the kidney; the pain in the left arm, which is often coincident with disease of the heart, &c. Persons suffering from debility, *anæmia*, and a gouty or rheumatic constitution are so especially liable to neuralgia that these conditions, as also the presence of chronic malaria, must be placed among the predisposing causes. Amongst the exciting causes exposure to cold and wet, or to a cold dry east wind, is the most frequent; but fatigue, strong mental emotions, the abuse of tea, coffee, tobacco, and alcoholic drinks, a wound or bruise, the retrocession of gout,

rheumatism, or cutaneous eruptions, &c., occasionally suffice to excite the disease. The condition is often due to the effects of lead-poisoning, or of prolonged alcoholic indulgence, or it may follow some infectious disease like typhoid fever, diphtheria, &c.

Treatment.—In the first place, a careful search must be made for any possible local source of irritation; and next, hygienic conditions must be very carefully attended to; fresh air, regular bodily exercise, freedom from worry and overstrain of mind, plenty of sleep, an abundant supply of wholesome nourishment, are each essential. Fatty food, as cod-liver oil, butter, cream, is of especial importance.

Of drugs which give immediate relief to the pain, morphia, especially when administered hypodermically (q.v.), holds the first place. But it must be used with great caution, and not entrusted to the patient himself, lest a 'morphia habit' become established. Antipyrin, phenacetin, exalgin, and aspirin sometimes take the place of morphia, and are free from some of its disadvantages. Butyl-chloral and gelsemium are often useful in facial neuralgia. Bromides may give sufficient relief in milder cases. Relief from the suffering is often the first step towards recovery.

But in most cases some treatment is necessary to remove the constitutional state on which the neuralgia depends. Iron, quinine (especially when the pain recurs at regular intervals), arsenic, phosphorus, chloride of ammonium, are the medicines most generally useful. But the treatment must of course be adapted to the disorders, frequently digestive, present in each particular case.

Local applications can be of no permanent service in cases where the pain results from organic change, or from general constitutional causes; they will, however, often give considerable temporary relief. Amongst the most important local applications may be mentioned laudanum, tincture of aconite or aconitina ointment, belladonna-plaster, and chloroform (which should be applied upon a piece of linen saturated with it, and covered with oiled silk to prevent evaporation), mustard leaves or poultices, and small fly-blisters. The injection of cocaine or alcohol directly into the affected nerve sometimes effects a cure. Galvanism is also valuable.

Lastly, neuralgia, being a purely nervous affection, is often influenced by means calculated to make a strong impression on the mind of the patient; and hence it is that hypnotism and other applications which act more upon the mind than upon the body occasionally effect a cure.

In cases which have resisted all other modes of treatment surgical measures are sometimes necessary—viz. acupuncture, nerve-stretching (see under SCIATICA), or, in the last resort, removal of a portion of the affected nerve.

Neuritis, a term applied to inflammation of the nerves. The symptoms are those of neuralgia, with impairment of sensation, or localised paralysis, according as sensory or motor nerves are affected.

Neurone. See NERVOUS SYSTEM.

Neuroptera. See INSECTS.

Neu Sandec. See SANDEC (NEU).

Neusatz (Serb. *Novi Sad*; Magyar, *Ujvidék*), a town of Yugoslavia, on the left bank of the Danube, opposite Peterwardein (q.v.); pop. 40,000.

Neusiedler See (Magyar, *Fertő Tava*), a small lake on the frontier of Austria and Hungary, 22 miles SE. of Vienna. It is shallow (13 feet), and has lost much of its former area (133 sq. m.) by the draining of the adjoining marshes. From 1865 to 1870 it was dry. A canal carries flood water to the Rubnitz River.

Neuss, a town of Rhenish Prussia, near the Rhine, 4 miles W. of Düsseldorf. Its church of St Quirinus, a notable specimen of the transition from the round to the pointed style, was founded in 1209. Its west tower was accidentally burned down in 1914. Neuss has flourishing ironworks, foundries, flour mills, and manufactures of cottons, woollens, leather, paper, chicory, &c. In 1875-1919 the population grew from 15,600 to 40,000.

Neustadt, a town of Upper Silesia, 25 miles SW. of Oppeln. It is the seat of considerable industry, woollen and linen fabrics and carpets being the staple manufactures. Pop. 20,000.

Neustadt, or WIENER-NEUSTADT, one of the most beautiful towns of Lower Austria, is situated 32 miles S. of Vienna by rail. The town is overlooked by a large old castle, whose fine Gothic chapel (1460), rich in painted windows, is the burial-place of the Emperor Maximilian I. The old church dates from 1230, and was restored in 1890; a Cistercian abbey (1444) and a town-house are notable buildings. Locomotives and machinery, wire, bells, pottery, starch, leather, and ribbons are amongst the manufactures. The city, called the 'Ever-faithful,' was founded in 1192, and was rebuilt after a great fire in 1834. Pop. 37,000.

Neustadt-an-der-Hardt, a town of Rhenish Bavaria, at the foot of the Hardt Mountains, 20 miles W. of Speyer. Its church, with several curious monuments, dates from the 14th century. It manufactures paper, cloth, soap, wine, brandy, &c. Pop. 20,000.

Neustrelitz, capital of Mecklenburg-Strelitz, pleasantly situated in a hilly district, between two lakes, 62 miles NNW. of Berlin. Founded in 1733, it is built in the form of an eight-rayed star, and contains the palace, with magnificent gardens. Pop. 11,500.

Neustria, the name given in the times of the Merovingians and Carolingians to the western portion of the Frank empire, after the quadruple division of it which took place in 511. Neustria contained three of these divisions. It extended originally from the mouth of the Scheldt to the Loire, and was bounded by Aquitania on the S., and by Burgundy and Austrasia (*Francia Orientalis*) on the E. The principal cities were Soissons, Paris, Orleans, and Tours. See the historical maps at EUROPE.

Neutral Salts. See SALTS.

Neutrality. Neutrals are states which in time of war take no part in the contest, but continue pacific intercourse with both belligerents. The aim of the doctrine of neutrality is to reconcile the right of belligerents to carry on their warlike operations with the no less undeniable right of other nations to pursue peacefully their ordinary business. For many years after the rise of modern international law the conduct of warfare was discussed only with reference to belligerents, and no intermediate relation between an ally and an enemy was recognised. Not, indeed, till the middle of the 18th century did the terms 'neutral' and 'neutrality' come into general use; for not till then was a systematic effort made to regulate the relations of belligerents to nations standing aloof from the war, or to define their reciprocal rights and duties.

As between belligerent states and neutral states, the principles whence spring the complicated rules of modern neutrality are in themselves extremely simple. On the one hand, the neutral, being neither judge nor party, must show absolute impartiality in his dealings with both belligerents; on the other hand, the belligerent must pay scrupulous respect to the sovereignty of his neutral neighbours. Accordingly, throughout a

war, neutrals continue diplomatic intercourse with both belligerents. The Hague Conference of 1907 expressly provided in the fifth convention, dealing with land warfare, that the territory of neutral powers is inviolable, and in the thirteenth convention, dealing with maritime warfare, that any act of hostility, including capture and the right of search committed by belligerent warships in the territorial waters of a neutral power, constitutes a violation of neutrality, and is strictly forbidden. Further, it is not permissible for a belligerent to organise or fit out combatant forces within neutral territory, or to use neutral land or waters as a base of operations against the enemy. On the other hand, a neutral state is not permitted to give armed assistance or to supply munitions of war to either belligerent; nor to lend money to either side or guarantee such loan. Under the fifth Hague Convention of 1907, a neutral power is expressly prohibited from allowing the passage of the land forces of a belligerent across any portion of its soil; but the neutrality of a power is not affected by the mere passage through its territorial waters of warships or prizes belonging to belligerents. Moreover, a neutral state is entitled to permit the passage over its territory of sick and wounded belonging to the belligerent armies. When bodies of belligerent troops are driven by the enemy across neutral borders, the practice is for the neutral state to disarm them as soon as they cross the frontier, and to intern them in the neutral territory until the conclusion of the war. During the Great War aircraft and their crews landing on neutral territory were as a rule interned. Prisoners of war who escape to neutral territory are set at liberty. A neutral power is bound to prevent the setting up of a belligerent prize-court in its territory or the use of any part of its territory as an information station by a belligerent. A neutral state is entitled to exclude impartially belligerent warships from entering its ports, subject only to the exception that such ships, if driven by stress of weather or reduced to an unseaworthy condition, have a right to shelter. It is usual, however, for neutral powers, instead of exercising the right of exclusion, to permit the entry into their ports of belligerent warships of both sides. When such permission is granted it is incumbent on the neutral power, in fulfilment of its obligation to refrain from aiding or increasing the fighting strength of either belligerent, to regulate the length of stay allowed to belligerent warships and their prizes in its ports, and the amount and nature of the supplies or equipment that may be taken in and of the repairs that may be executed. In the case of the *Appam*, a British vessel captured by the Germans in 1916, and taken into a port of the United States with a prize crew on board, it was held by the Supreme Court of the United States that the vessel, not having been brought into the neutral port on account of unseaworthiness, stress of weather, or want of fuel or provisions, must be released to the British owners. Regulations made by a neutral state for the protection of its neutrality must be scrupulously observed by the belligerents; and, on the other hand, a belligerent injured by the failure of a neutral to fulfil the obligations laid on it is entitled to demand reparation.

The property of private citizens of neutral states, if situated in belligerent territory, may sustain incidental damage during legitimate warlike operations; and such damage does not entitle the neutral owner to compensation. Under the Right of Angary (Low Latin *angaria*, 'forced service,') the property of neutral subjects within the limits of belligerent authority may be requisitioned or utilised by the belligerent to the extent required by urgent

military needs, subject to the payment of compensation. Thus, in 1918 Great Britain, in pursuance of the right of angary, requisitioned neutral Dutch ships temporarily within its control, making full compensation. In the same year this course was also adopted in the case of Dutch ships by the United States, France, and Italy. The contention of the Dutch government that the right of angary was in disuse was unavailing. At sea the commercial interests of belligerent and neutral merchants are so interwoven that it is difficult to separate them and strike at an enemy without injuring a friend; hence ever and again have arisen bitter controversies regarding the extent of a belligerent's power over the property of neutral citizens at sea. Two distinct principles for regulating the maritime capture of neutral property have at different times prevailed. By the one principle, the nationality of the ship determined liability to capture, so that neutral goods on hostile ships were liable to confiscation, while hostile goods on neutral ships went free. By the other principle, the nationality of the property determined its liability, so that neutral goods went free even though found on hostile ships, and hostile goods were liable to seizure even though found on neutral ships. In 1856 the Declaration of Paris provided (Art. 2) that the neutral flag should cover an enemy's goods, except contraband of war; and (Art. 3) that neutral goods, except contraband of war, should not be liable to capture even under the enemy's flag. The law, as thus laid down, is the old rule, 'Free ship, free goods,' without the corollary, 'Hostile ship, hostile goods.' Attempts had frequently been made at an earlier period, particularly by Prussia in the Silesian Loan controversy and by the Armed Neutralities of 1780 and 1800, to incorporate this principle into international law. The rules of the Declaration of Paris, which had been regarded as an acknowledged part of the law of nations, were, however, treated with scant respect during the war of 1914-18. The methods of naval warfare adopted by Germany and Austria—their ruthless submarine policy, their indiscriminate use of mines, and their declaration of 'prohibited zones,' affecting neutral vessels and extending over wide areas of the open sea—rendered it necessary for Great Britain and France, as a measure of reprisal, to treat the second and third articles of the Declaration of Paris as no longer binding on them. Experience in the Great War having revealed the inadequacy of the existing rules for the protection of neutral commerce, it is generally recognised that there is an urgent need for the formulation of new rules or a modification of the old rules, to meet the changed conditions of naval warfare. The treaty between the British Empire, the United States, France, Italy, and Japan, signed at Washington on 6th February 1922, contains important provisions, accepted as binding as between the signatory powers, dealing with the use of submarines as commerce-destroyers, and designed to secure more adequate protection for the lives and property of neutrals at sea.

Belligerents have the right of intercepting, even on board neutral vessels, such articles as are deemed contraband of war. In the war of 1914-18 the list of articles falling within this description was enormously extended (see CONTRABAND). Another instance in which a belligerent is entitled to interfere with the ships and property of neutral citizens is furnished by the law of blockade (see BLOCKADE). Neutral merchantmen sailing under belligerent convoy render themselves liable to capture by the warships of the other belligerent. Again, if during a war ships belonging to neutral citizens perform certain kinds of services on behalf of one of the belligerents, the other belligerent is entitled to

confiscate these ships. Among such un-neutral services against which a belligerent is entitled to protect itself, are reckoned voyages specially undertaken with a view to the transport of passengers who are embodied in the armed forces of the enemy, or with a view to the transmission of intelligence in the interest of the enemy; voyages undertaken under the orders or control of an agent placed on board by the enemy government; and, generally speaking, any act done by a neutral vessel which puts her in the position of taking a direct part in hostilities. The repression of contraband, the enforcement of blockade, and the exaction of penalties for un-neutral service lie, by international law, with the belligerent alone, and not with the neutral. The aggrieved belligerent does not complain to the neutral state, but strikes at the neutral citizen directly by capturing his property and condemning it in his own prize court.

Many questions arise with respect to the extent of the obligations, imposed on a neutral state, of restraining the conduct of its own citizens, and of enforcing the due observance of neutrality on all persons within its jurisdiction. Citizens of a neutral state may legitimately do many things which the government of the state is not permitted to do. Thus a neutral state is under no obligation to prevent its subjects from lending money to, or taking stocks in loans issued by, belligerents. So, too, a neutral state is not bound to forbid the export or transit by its subjects of munitions of war, or other articles, for the use of one or the other of the belligerents. On the other hand, a neutral government has a duty to employ the means at its disposal to prevent the fitting out or arming of any vessel within its jurisdiction which it has reason to believe is intended to cruise or engage in hostile operations against a power with which that government is at peace. In recent times the tendency has been towards extending the measure of diligence required of neutral states in exercising surveillance over the acts of their subjects. The movement was commenced by the Neutrality Act of the United States, passed in 1794, and re-enacted, with additions, in 1818. The principles of these American statutes were adopted by Great Britain in the earlier Foreign Enlistment Acts, passed with a view to arming the British government with sufficient powers to enable it to fulfil the obligations of neutrality. But the events connected with the escape of the *Alabama* (see ALABAMA) and other Confederate cruisers during the American civil war revealed the inadequacy of the then existing law of Great Britain on the subject, and led to the passing of the more stringent Foreign Enlistment Act of 1870. In the Treaty of Washington, 1871, Great Britain not only accepted the principle that the failure of a neutral power to fulfil the obligations laid on it by international law gave rise to a claim for redress on the part of the belligerent injured by such negligence, but also consented to the application by the arbitrators of three new rules, known as the Rules of Washington. These rules were substantially adopted as universally binding in the Hague Convention of 1907, dealing with neutral rights and duties in maritime war.

A state may be neutralised in the sense that the condition of neutrality is imposed on it by international agreement. Three European states—Belgium, Luxemburg, and Switzerland—were formerly thus neutralised, their perpetual neutrality being guaranteed. The violation of the neutrality of Belgium by Germany in 1914 was the decisive consideration which led Great Britain, in fulfilment of her obligations under the international treaty, to enter into the Great War. By the Treaty of Versailles, 1919, Belgium and Luxemburg have

ceased to be neutralised states; and at the present time Switzerland is the only European state which occupies a position of guaranteed neutrality.

Neuve Chapelle. See WAR (GREAT).

Neuville, ALPHONSE MARIE DE (1836-85), French painter and illustrator, born at St Omer.

Neuwied, a town of Prussia, on the right bank of the Rhine, 8 miles below Coblenz, was capital of the mediatised principality of Wied; the castle of the princes has a beautiful garden, in which are many Roman antiquities discovered here. The town contains an important institute of the Moravian Brethren, and there are some minor manufactures. Pop. 20,000.

Neva, a river of Russia, flows westward from the south-west corner of Lake Ladoga to the Bay of Cronstadt, in the Gulf of Finland, passing through St Petersburg, and carries to the sea an enormous volume of water (greater than that of the Rhine) from the lakes Ladoga, Onega, Ilmen, and others. Its total length, with windings, is about 40 miles; in places it is over 4000 feet wide, elsewhere the channel is narrowed to 180 feet; and in one or two places the navigation is embarrassed by reefs and rapids. It is frozen on an average from 25th November to 21st April. By the Ladoga Canal the Neva communicates with the vast water-system of the Volga, and so joins the Baltic with the Caspian Sea. In strong westerly winds the waters are dammed back at the mouth, and the delta flooded.

Nevada, one of the Mountain states of the American Union, popularly 'Sage-brush State,' lies between Oregon, Idaho, Utah, Arizona, and California. Its greatest length from north to south is a little less than 500 miles, and its greatest width from east to west is more than 300 miles. In area (110,700 sq. m.) it is the sixth largest state of the Union; in population it is the lowest—(1870) 42,491; (1880) 62,266; (1900) 42,335; (1910) 81,875; (1920) 77,407. Nearly the whole of Nevada is included in the Great Basin (q.v.), once occupied by a great inland sea, and afterwards by several great lakes which have also disappeared. Some of the deepest depressions are yet marked by Walker, Humboldt, Carson, Pyramid, and Winnemucca lakes, and by other 'sinks' and *playas*. The ancient shore-lines are clearly visible in certain places, and the climate, now arid and nearly rainless, was once moist. The soil of the Great Basin at some time produced an abundant vegetation, whereas it is now almost totally unfit for agriculture, frowned upon by barren treeless mountains, and traversed by regions of nearly absolute desert. At present Nevada is a high plateau with an average altitude of 4000 feet, crossed by numerous ranges of mountains which as a rule are parallel and separated by valleys from 5 to 20 miles in width. Some of these valleys are barren and desolate; others, through which the rivers flow, have areas of arable land. The mountains contain rocks of every geological period; many of them are volcanic, and there are striking exhibitions of metamorphic rocks. In the valleys lie the sedimentary deposits of ages mixed with cinders and other volcanic products which fell in many cases on the surface of the extinct lake, and at the mouths of the cañons are vast moraines. The mineral production of Nevada, especially of silver, has been enormous (see COM-STOCK LODE). The production was at first so great as materially to change the value of the precious metals, and to promote Nevada hastily from an uninhabited desert to a state of the Union. Mining is still the chief interest, and the yield of silver, gold, copper, &c., is still considerable. A small area in the north is drained by the Owyhee River,

a tributary of the Snake, and another portion of the state in the south belongs to the Colorado valley. Otherwise Nevada lies wholly in the great basin of interior drainage, where none of the water reaches the sea. The streams disappear in the sand or flow into 'sinks,' salt or brackish lakes, or *playas*, which are shallow mud lakes that evaporate when the supply of water fails. The Humboldt River pursues a winding course of 350 miles. There are numerous hot springs, many of which are surrounded with incrustations of tufa, often in weird and fantastic forms. Some of the lakes are nearly saturated solutions of borax and salts of sodium and potassium, and in the valleys are tracts of glistening alkaline deposits, which mark the beds of extinct lakes.

The atmosphere is dry, remarkably clear in winter, but filled in summer with minute particles of dust, which produce endless and extraordinary effects of colour on the sunlight. The temperature is subject to extremes, and the rainfall is exceedingly light. It nowhere exceeds 15 inches, and scarcely averages more than 5 inches. Some sections receive no rain for several successive years. Sage-brush and other desert plants capable of enduring drought form the native vegetation. It has been estimated that with careful irrigation about 3 per cent. of the land may be successfully cultivated. The Mormons established a few temporary camps in 1848, and in 1850 a settlement was made at Genoa; but the real history of the state begins with the discovery of silver in 1859. Nevada was separated from Utah territory in 1861, and in 1864 was admitted to the Union as a state. There are seventeen counties in the state. The largest town is Reno (population, 12,000), on the Comstock Lode. Carson is the capital. Within the state there are over 2300 miles of railway. The public schools are under the control of a state board of education, and there is a state university at Reno. There are nearly 11,000 Indians in the state, mostly Pah-Utes and Shoshones, and the schools on the reservations are well attended.

Nevers, the capital now of the French department of Nièvre, and formerly of the province of Nivernais, is picturesquely seated on a hillside, 600 feet above sea-level, at the influx of the Nièvre to the Loire, 159 miles by rail SSE. of Paris. The *Noviodunum* of Caesar, it has been the seat of a bishop since 506; its beautiful cathedral, restored in 1879, belongs mainly to the 13th century. The stately *palais-de-justice*, dating from 1475, was formerly the castle of the Dukes of Nevers; and there are also a fine public garden, a bridge of fourteen arches over the Loire, a mediæval gateway, and a triumphal arch (1746) commemorating Fontenoy. The industries comprise the manufacture of cannon, iron cables and chains, porcelain (introduced by Italians about 1565), &c. Pop. 30,000.

Neville, RICHARD. See WARWICK (EARL OF).

Neville's Cross. See DAVID II.

Nevis, one of the Leeward Islands, 2 miles SE. of St Christopher (q.v.), with which it has been since 1882 administratively connected. It is circular, rises in the centre to a wooded ancient crater (3200 feet). The lower slopes are cultivated. Sugar-cane, cotton, coconuts, limes, and oranges are grown. The capital is the port of Charlestown (pop. 1000). Nevis was discovered by Columbus in 1498, and colonised by England in 1628. It was one of the principal slave marts in the West Indies. The island has suffered much at various times from hurricanes and earthquakes. Area 50 sq. m.; pop. 13,000.

Nevis, BEN. See BEN NEVIS.

New Albany, capital of Floyd county, Indiana, is on the north bank of the Ohio River, nearly opposite Louisville. The city is well built, and is the principal manufacturing town in the state. It contains rolling-mills, flour, woollen, cotton, and planing mills, &c. Pop. (1880) 16,423; (1920) 22,992.

New Almaden. See ALMADEN.

New Amsterdam. See NEW YORK, GUIANA.

Newark, (1) a port of entry and the capital of Essex county, New Jersey, is on the Passaic River, 9 miles by rail W. of New York. It is a handsome city, with several beautiful little parks and wide streets shaded with lines of elms. It produces brass and iron work, hardware and machinery, carriages, saddlery, boots and shoes, cotton thread, clothing, jewellery, &c., and has a long line of docks. Newark was settled in 1666 by a colony from Connecticut, and received a city charter in 1836. Pop. (1870) 105,059; (1900) 246,070; (1920) 414,524.—(2) Capital of Licking county, Ohio, off the Licking River (here crossed by four iron bridges), 33 miles by rail E. by N. of Columbus. Stoves and furnaces, boilers, machinery, wagons, flour, woollens, and glass-ware are among its manufactures. Pop. 27,000.

Newark-upon-Trent, a town of Notts, on a navigable branch of the river Trent, 18 miles by rail NE. of Nottingham and 120 N. by W. of London. It is approached from the north by a causeway, $1\frac{1}{2}$ mile long, constructed by Smeaton in 1770, and carried over the flat island formed by the Trent on the west and the Newark branch on the east. The fine parish church, built mainly between 1350 and 1489, has an octagonal spire 223 feet high, and contains a good brass of 1361. Other edifices are the town-hall (1805), corn exchange (1848), hospital (1881), coffee-palace (1882), free library (1882), and grammar-school, founded by Archdeacon Magnus in 1529. Newark has a very important corn-market and great malting industries, besides iron and brass foundries, manufactures of boilers and agricultural implements, and plaster of Paris works. Incorporated by Edward VI., it returned two members to parliament till 1885. Pop. (1851) 11,230; (1921) 16,957. A British town and Roman station, Newark in Saxon times became the seat of a castle, which was rebuilt in 1125 by Alexander, Bishop of Lincoln (hence the name *New Work*), and which long bore the name of the 'key of the north.' King John died in it (1216); and in the Great Rebellion it stood three sieges, in the second of which it was relieved by Prince Rupert (1644), whilst in the third it was surrendered to the Scots by order of Charles I., who had just delivered himself up (5th May 1646). It was then dismantled, and is now represented only by a very picturesque ruin, in a public garden.

New Australia, a pastoral and agricultural settlement in Paraguay, founded in 1893 by an Australian journalist, William Lane, and other Australians, as an experiment in Communism. See Stewart Grahame's *New Australia* (1910).

New Bedford, a city and port of entry of Massachusetts, is on the Acushnet estuary (here crossed by a bridge 4000 feet long), 3 miles N. of Buzzard's Bay and 56 miles by rail S. of Boston. Many of its private residences are very handsome, while the public buildings include a city hall of granite, a custom-house, a public library, and a fine high school. There is a broad drive (4 miles) round Clark's Point, at the extremity of which there is a strong granite fort. For a century (1755-1854) New Bedford was the chief centre of the American whale-fisheries; but this industry

has since declined, and the people have turned their attention mainly to manufactures. Besides several great cotton-mills, the city contains manufactures of drills, cordage, silk, rubber, glass, plated ware, &c. Pop. (1880) 26,845; (1900) 62,442; (1920) 121,217.

New Bern, a city and port of entry, capital of Craven county, North Carolina, is situated at the junction of the navigable Neuse and the Trent (here crossed by a long bridge), 107 miles by rail SE. of Raleigh. It exports cotton, lumber, and early vegetables for the North. It manufactures cotton-seed oil, wood-pulp, &c., and cans oysters. Pop. 12,000.

Newbery, JOHN (1713-67), a London bookseller, intimately associated with Dr Johnson, Goldsmith, Christopher Smart, Smollett, and many other men of letters, was descended from an old bookselling family, and born a farmer's son, in Waltham St Lawrence parish, Berks. He sold general wares at Reading, and about 1744 settled in London as a vendor of books and such medicines as Dr James's Powder—the panacea of Horace Walpole as of Goldsmith. He was the first to publish little books for children, and he was himself, in conjunction with Giles and Griffith Jones (1722-86), and perhaps Goldsmith, part author of some of the best of the series, as the histories of Goody Two-Shoes and Giles Gingerbread and the Travels of Tommy Trip. In 1758 he started the *Universal Chronicle, or Weekly Gazette*, in the numbers of which the celebrated *Idler* was first printed, and in 1760 *The Public Ledger*, in whose early numbers appeared Goldsmith's *Chinese Letters*, later reprinted as *The Citizen of the World*. He had a genius for advertising, even bringing in allusions to his books and wares in the text of his stories. Johnson sketched him humorously as 'Jack Whirler' in No. 19 of the *Idler*. In *The Vicar of Wakefield* he is immortalised as 'the philanthropic bookseller in St Paul's Churchyard, who has written so many little books for children. He called himself their friend, but he was the friend of all mankind.' See Charles Knight, *Shadows of the Old Booksellers* (1865); and Charles Welsh, *A Bookseller of Last Century* (1885).

Newbolt, SIR HENRY JOHN, poet, was born 6th June 1862 at Bilston, Staffordshire, son of the vicar; was educated at Clifton College and at Corpus Christi, Oxford; from 1887 to 1899 practised as a barrister; and from 1900 to 1904 edited the *Monthly Review*. He secured popularity by the patriotic ring and fervour of his verse in *Admirals All* (1897), *The Island Race* (1898), *The Sailing of the Long Ships* (1902), and other volumes, collected later as *Poems New and Old* (1912, 1919). He wrote also plays, prose romances, naval and military histories, *A New Study of English Poetry* (1917), and other works, and edited anthologies.—His daughter, MARGARET CECILIA FURSE, has published poems (*The Gift*, 1919).

New Britain, a manufacturing city of Connecticut, 9 miles by rail SW. of Hartford, engaged in the production of hardware, cutlery, locks, jewellery, hosiery, &c. It is a pleasant city, with large parks, and contains the state normal school. Pop. (1880) 11,800; (1900) 25,998; (1920) 59,316.

New Britain, by Germans called NEU-POMERN, an island of the Bismarck Archipelago, separated from the north-east coast of New Guinea by the Dampier Strait. The interior is almost wholly unknown. In the forest-clad interior there are several volcanoes, active and quiescent, the highest being the Father (7000 feet). The climate is hot and moist. Coconuts, yams, bananas, bread-fruit, betel-nuts, and the like are the chief

products. Fish are caught in great numbers. The natives, cannibal Melanesians, warlike, suspicious, and crafty, make handsome canoes, with sails and outriggers, earthenware vessels, baskets, mats, &c. The sling, stone axe, and spear are their favourite weapons. Area, 9600 sq. m.; pop. 50,000.

See Romilly, *The Western Pacific and New Guinea* (1886); Powell, *Wanderings in a Wild Country* (1883); Parkinson, *Im Bismarck-Archipel* (1887), and *Dreissig Jahre in der Südsee* (1909).

New Brunswick, a province of the Dominion of Canada, is bounded on the N. and NW. by the province of Quebec, from which it is separated by the river Restigouche; on the N. by the Chaleur Bay; E. by the Gulf of St Lawrence and Northumberland Straits—the latter separating it from Prince Edward Island; S. by the Bay of Fundy and part of Nova Scotia; and on the W. by the state of Maine, the boundary with the latter being the St Croix and St John rivers. It has an area of 27,987 sq. m.—rather smaller than Scotland. Its coast-line is 600 miles in length, interrupted only at the point of juncture with Nova Scotia, where an isthmus not more than 15 miles broad connects the two provinces, and divides the waters of Northumberland Straits from those of the Bay of Fundy, across which isthmus is the abandoned Chignecto Ship-railway. The surface of the country is generally undulating. There are low hills skirting the Bay of Fundy and the rivers of St John and Restigouche. A feature of the coast-line is the number of fine harbours, of great value for exporting the timber for which the country is famous.

Several important rivers traverse the province; among the principal is the St John, 450 miles in length, and navigable for vessels of 100 tons to Fredericton, the capital of the province, 80 miles from the sea. Above this point smaller craft ascend for 125 miles. The country drained by the St John and its tributaries comprises about nine million acres in New Brunswick, as well as eight million in Quebec and the state of Maine. The Miramichi River, 220 miles long and 7 miles wide at its mouth, is also navigable for some distance. The Restigouche is 3 miles wide at its entrance into the Chaleur Bay, and over 200 miles in length. The lakes are numerous but small, the largest being Grand Lake, 30 miles long and 3 to 7 miles wide, communicating with the St John River, 50 miles from the sea.

The population of the province at the census of 1881 was 321,129; of 1921, 387,876. In 1921 there were 170,531 Catholics, 86,254 Baptists, 47,020 Anglicans, 41,277 Presbyterians, and 34,872 Methodists. The population included 131,664 persons of English origin; 68,670 Irish; 51,308 Scottish; 1331 American Indians; 1698 Germans; 121,111 French. The principal cities are St John (47,166) and Fredericton, the capital (8114). The provincial government is administered by a lieutenant-governor, assisted by an executive council, and a legislative assembly of forty-eight members, elected by the people. The province sends ten members to the senate, and eleven to the Dominion House of Commons.

Like that of many other parts of Canada, the climate of New Brunswick is subject to extremes of heat and cold. If, however, the climate of a country is to be judged by its effects on animal life, that of New Brunswick may be pronounced one of the best in the world.

The educational institutions supported by law are the Provincial University at Fredericton, the training or normal school for teachers, and a complete system of free common schools. There are also universities at Sackville (Methodist) and St Joseph (Roman Catholic).

Agriculture is the chief industry in New Brun-

wick. Except a portion of country adjacent to the coast of the Bay of Fundy the soil is very fertile, and almost every kind of grain and roots can be grown. Attention has been paid to live-stock both by the government and private breeders; and the manufacture of butter and cheese has greatly increased. The province, owing to its cheap coal and proximity to the markets of the world, has also many advantages as a manufacturing country. The principal manufactures are sawn lumber, leather, cotton and woollen goods, wooden-ware, paper, and mill machinery. The manufacture of wood-pulp from spruce, a comparatively new industry, has grown to great proportions. There are indications of considerable mineral wealth, and a number of mines are being successfully worked. The fisheries are very valuable.

It is generally held that New Brunswick, as a part of Nova Scotia, was ceded by France to Great Britain by the treaty of Utrecht in 1713. The boundaries of Nova Scotia, however, were not well defined at that time, and the country along the St John River remained a subject of dispute which was not finally settled until the treaty of Paris in 1763 conceding and guaranteeing to Great Britain, in full right, Canada with all its dependencies. When in 1755 the memorable expulsion of the Acadians from Nova Scotia took place many of these people retired to what is now known as New Brunswick, and settled along the upper St John River, the Miramichi, and in the eastern parts of the province. The first British settlers in the province emigrated from Scotland to the Miramichi district in 1764; and in 1783, at the close of the American revolution, when the exodus of the loyalists from the United States took place, a large body settled near the present city of St John and along the St John River. For the map, see CANADA.

New Brunswick, capital of Middlesex county, New Jersey, is at the head of navigation on the Raritan River, 31 miles by rail SW. of New York, and is the terminus of the Delaware and Raritan Canal. It contains Rutgers College (1771), connected with which are the theological seminary of the Dutch Reformed Church, an observatory, and a state agricultural college and model farm. New Brunswick is noted for its great india-rubber factories, and has also iron and brass foundries, and manufactures of hosiery, needles, paper-hangings, &c. Pop. 33,000.

Newburgh, a royal burgh of Fife, near the Firth of Tay, 11 miles ESE. of Perth. It arose in connection with the neighbouring Benedictine abbey of Lindores (c. 1196); and near it is also the famous Macduff Cross. Pop. 2000.

Newburgh, a city of Orange county, New York, is on the west bank of the Hudson (here $1\frac{1}{2}$ mile wide), 57 miles by rail N. of New York, amid the grand scenery of the Highlands. Its handsome edifices, villas, and gardens, rising 300 feet from the river, command a noble prospect. The city has, besides foundries, shipyards and powder-mills, manufactures of woollen and cotton goods, machinery, felt, plaster, &c. Large quantities of butter, grain, flour, and coal are shipped. Newburgh was the scene of the disbandment of the American army, 23d June 1783; and 'Washington's Headquarters' is preserved as the property of the state. Pop. 30,000.

Newbury, a thriving market-town of Berkshire, on the 'swift' Kennet, 17 miles W. by S. of Reading and 55 from London. Its gray old church, restored in 1867, is a fine Perpendicular edifice, with a noble tower added in 1510 by John Winchcombe or Smallwoode, otherwise 'Jack of Newbury,' a famous clothier, who sent a hundred of his own

men to fight at Flodden. The large Italian corn exchange was built in 1862, in which year was started a great yearly wool-market; later are the handsome municipal offices and the grammar-school, though this claims King John for its founder (1216). Newbury—'new' only as distinguished from the old Roman station of *Spinæ* (now Speen)—besides has many ancient and wealthy charities. It was incorporated by Elizabeth in 1596. Pop. (1801) 4275; (1851) 6574; (1921) 12,290. Two hard-fought battles took place here, one between Charles and Essex, on 20th September 1643; the other between Charles and Manchester, on 27th October 1644. The advantage of the first was, on the whole, on the side of the king, but it cost the lives of Lords Falkland (q.v.), Carnarvon, and Sunderland, to whom a memorial was erected in 1878. The second would have been a decisive royalist defeat but for Manchester's hesitancy.

Newburyport, a city and port of entry of Massachusetts, on the south bank of the Merrimack, 3 miles from its mouth, and 37 miles by rail NE. of Boston. A long, shady High Street, with a pond of six acres, is its chief ornament. Cotton, shoes, combs, &c., are manufactured. Pop. 16,000.

New Caledonia, an island of the South Pacific Ocean, belonging to France, and lying midway between the Fiji Islands and the east coast of Queensland. The Loyalty Islands, Isle of Pines, and some others, with a total area of 1250 sq. m., are politically dependent upon New Caledonia. This principal island is about 250 miles in length, 30 in average breadth, and has an area of 6450 sq. m. The long axis runs from north-west to south-east; the interior is greatly broken by irregular mountain-chains (highest point, Mount Humboldt, 5380 feet). Below the bare summits are well watered, thickly wooded, and vegetated slopes. The entire island is surrounded by coral-reefs. There are good harbours on the east coast, but the only one used is Nouméa, with railway connections on the south-west coast. The vegetable products include coconuts, coffee, maize, tobacco, manioc, rice, cotton, fruits, &c. But the most valuable natural products are minerals, especially nickel, with chrome, copper, manganese, cobalt, antimony, &c. There are several useful timber-trees. Cattle-raising is of some importance. Turtle and fish are abundant. Locusts frequently devastate the crops. Besides the smelting of the minerals, meat is preserved and sent to France, and some soap and tapioca are manufactured. Nickel, cobalt, chrome ore, silver, lead ore, preserved meat, copra, coffee, &c., are exported. The total population is about 50,000, of whom some 28,000 are Melanesians and Polynesians, 19,000 Europeans. Nouméa (the capital) has a pop. of 10,000. The island was discovered by Captain Cook in 1774, and was annexed by France in 1853. She used it as a convict station, but the practice of sending convicts there was practically abandoned by the end of the 19th century. The aborigines are a mixture of two types, one resembling the Polynesians, the other the Papuans. They were formerly cannibals, and delighted in war, yet were hospitable, and skilful tillers of the soil. They live now chiefly on vegetable food. Leprosy is a scourge amongst them. See French works by Lemire (1878-1904), Bernard (1895), and Vallet (1920).

New Castle, capital of Lawrence county, Pennsylvania, on the Shenango River, 50 miles by rail NNW. of Pittsburgh, contains a college, large rolling-mills, foundries, and manufactures of nails, furnaces, and flour; pop. 45,000.

Newcastle, a port of New South Wales, 75 miles NE. of Sydney by rail, at the mouth of the

Hunter River. It is the chief port of the north coast, coal and wool the main exports. The harbour, which is defended by a fort, is dangerous during storms from the ESE. Pop. with suburbs, 90,000.

Newcastle, DUKES OF. See CAVENDISH and PELHAM.

Newcastle-under-Lyme, a parliamentary and municipal borough of Staffordshire, on the Lyme brook, 16 miles NNW. of Stafford. Pop. (1801) 4604; (1921) 20,418, parl. borough 64,409. The aspect of the town was much improved by the widening of the main thoroughfares, and the erection of public buildings, notably the town-hall (1890) and the high school (1876). The latter was reconstructed under a new scheme in 1874 from the amalgamation of various ancient charities (the earliest founded 1602). The parish church, partly Early English and partly Decorated, was rebuilt in 1876 from designs of Sir Gilbert G. Scott, and has a quaint old square tower of red sandstone with pinnacles, and a fine peal of bells. The manufactures include brewing, malting, and the making of fustians, chemicals, paper, and army clothing, whilst the surrounding district is noted for its potteries and coal-mines. Of the castle, from which the town derives its name, all traces have entirely disappeared; it was built by Edmund, Earl of Lancaster, the youngest son of Henry III. Newcastle returned two members to parliament from 1353 to 1885, since that time one.

Newcastle upon Tyne, a city and county of itself, seated on the north bank of the Tyne, 275 miles from London. The city, the seat of a bishopric founded in 1882, has had a Lord Mayor since 1906, and returns four members to parliament. Pop. (1801) 28,294; (1841) 71,850; (1901) 215,328; (1921) 274,955. The annexation in 1904 of the urban districts of Benwell and Fenham and part of the rural district of Kenton increased the area of the city by 50 per cent.

During the Roman occupation of Britain the high ground overlooking the river in the neighbourhood of the castle was the site of the military station of Pons Ælii. The 'Roman wall' would probably form its northern boundary. Soon after the abandonment of Pons Ælii by the Romans the Angles took possession of it. Subsequently it appears to have been a monastic settlement, and at the time of the Conquest was known as Monkchester. Pandon, which until 1299 was a vill quite distinct from Newcastle, is supposed to have been the place where, about 653, Pæda, son of Penda, king of the Middle Angles, and Sigebert, king of the East Angles, were baptised by Bishop Finan. When the Conqueror arrived at Monkchester in 1072 there was nothing to be seen of the bridge above water, and the town was too small or impoverished to victual his army. Robert Curthose, on his return from an expedition against Malcolm in 1080, constructed a fortress here, which was named the New Castle. The south postern is probably a fragment of his work. William Rufus is stated—on doubtful authority—to have rebuilt the castle, and to have granted to the inhabitants of the growing town many privileges and immunities. He besieged the castle in 1095. The present keep—one of the most perfect examples of a Norman stronghold in the kingdom—was built between 1172 and 1177 at a cost of £911, 10s. 9d., and the Great Gate of the castle—the Black Gate as it is now called—in 1247, at a cost of £514, 15s. 11d.

In the time of the first three Edwards the town was enclosed by a wall, 8 feet thick and over 12 feet high, which embraced in its circuit the monasteries of the Black, the White, and the Grey Friars, the Benedictine nunnery of St Bartholomew, together with the vill of Pandon. The levies for

the Scottish wars were usually directed to assemble at Newcastle. In 1644 Newcastle, which had declared for the king, was besieged for ten months by the Scots under General Leslie. Its resistance is commemorated in the motto 'Fortiter Defendit Triumphans.' Events of tragic importance in the annals of the town were the visitations of Asiatic cholera in 1831 and 1853, and the great fire which destroyed much of the old town in 1854.

The city occupies a striking and picturesque site, being built for the most part on steep slopes and gently rising ground. It abounds in contrasts, such as the grim old keep and the High Level Bridge; the modern Grey Street and the ancient Side; the stately stone buildings erected by Grainger and the half-timbered Elizabethan houses with projecting stories and latticed casements; the Elswick Works, considerably over a mile in extent, and Jesmond Dene, one of the loveliest ravines in the country; the closely-packed hillsides and the rolling expanse of common called the Town Moor.

The principal remains of antiquity in Newcastle are the Norman keep; the Black Gate; the cathedral of St Nicholas; the churches of St John and St Andrew; portions of the Edwardian walls, with the Durham, Heber, Mordaunt, and Plummer towers, and the Sally-port Gate; part of the Black Friars Monastery; fragments of the houses of the Austin Friars and the Friars of the Sac; and several mansions of the 16th and 17th centuries. The church of St Nicholas, now the cathedral, is said to have been founded by Osmund, Bishop of Salisbury, in 1091. This early structure was destroyed by fire in 1216. The present building belongs to the Decorated and Perpendicular periods; the nave and transepts dating from 1359, the chancel from 1368, and the tower with its beautiful architectural crown from about 1435. All that remains of the previous edifice is some masonry above the arcades, together with an Early English pillar built up in the north-east pier. The reredos, erected in 1888, is of fine unpolished Uttometer alabaster with splayed screens of Caen stone. In canopied niches around the central figure of Christ are statues of Northumbrian saints and the four evangelists. St John's Church, built in the latter part of Henry I.'s reign, contains much of the original Norman work, with Early English, Decorated, and Perpendicular additions. St Andrew's Church dates from about 1175 to 1185, and retains some interesting Transitional features. All-Saints' Church was rebuilt in 1786–90 on the site of the church of All-Hallows, founded in the 12th century. There are many other places of worship in the city connected with the Established Church; the Roman Catholics have several churches, one being the cathedral of St Mary, erected in 1844 from the designs of Pugin; and the various other religious bodies are well represented.

The central part of Newcastle with its stately and ornate buildings is a monument to the genius of Richard Grainger (1798–1861), a man of lowly origin, educated at St Andrew's Church School, who, by his vast building schemes, quite changed the appearance of his native town. Grey Street and Grainger Street, built in 1834–38, are the finest thoroughfares in the city. Monuments have been erected to Earl Grey (1838), George Stephenson (1862), Queen Victoria, Lord Armstrong, Joseph Cowan, as well as South African and Great War Memorials. The town-hall, built in 1863, stands near the cathedral. Associated with it are the corporation offices and the corn-market. Other public buildings are the guildhall and exchange on the Sandhill, the former (which occupies the site of the hospital of St Catharine) dating from 1658, the Moot Hall (1810), the general post-office (1876), the central police-courts (1874), the gaol

(1823-28), the Wood Memorial Hall (1870), the Trinity House (chapel, c. 1651; hall, 1721; almshouse, &c., 1782-95), the Old Assembly Rooms (1774-76), the Grand Assembly Rooms, the (branch) Bank of England (1834), the Royal Arcade (1831-32), the Butchers, Fruit, Flower, and Vegetable Markets (1835), covering an area of 13,906 sq. yds., and the barracks (1806). There are several theatres in Newcastle. The museum of the Natural History Society, erected in 1883-84, contains valuable collections of British birds, fossils from the Coal Measures, and a unique series of Bewick's drawings. The Literary and Philosophical Society (1793) has an important and voluminous library. The public library (1881) with its various branches is well stocked.

Institutions in Newcastle affiliated to the university of Durham are the College of Medicine (1851), the College of Science (1871), and the Armstrong College (1906). The Royal Free Grammar-school, founded in 1525, stood from 1870 in Westmoreland Road. It now occupies new buildings of a most complete kind, with large playing-fields at Jesmond. Among the various benevolent institutions in Newcastle are the Royal Victoria Infirmary (1751), now situate on the Castle Leazes, the Hospital of the Holy Jesus (1681), the Keelmen's Hospital (1701), the Trinity Almshouses (incorporated 1492), the Northern Counties Institution for the Deaf and Dumb (1861), the Fleming Memorial Hospital (1887), and the Northern Counties Orphan Institution (1876), the Home for Crippled Children, Gosforth (1888), the Maternity Hospital, the Eye Infirmary, the Throat, Nose, and Ear, and other hospitals.

The public pleasure-grounds of Newcastle are Town Moor (987 acres), Castle Leazes, and Nuns Moor, the Leazes, Elswick, Brandling, Heaton, and Armstrong Parks, the Cruddas recreation-ground, and Jesmond Dene. Armstrong Park and Jesmond Dene Newcastle owes to Lord Armstrong.

Newcastle is connected with Gateshead by four bridges: (1) the High Level Bridge, described in the article BRIDGE. (2) The Swing Bridge, erected 1868-76, on the site of the Roman, mediæval, and 18th-century bridges. (3) The Redheugh Suspension Bridge, erected 1868-71, is 1453 feet in length, its height from high-water mark to the under side of the arch being 87 feet. (4) A railway bridge opened in 1906 (see BRIDGE). A new high-level bridge for pedestrian and vehicular traffic is in course of construction. The port of Newcastle is a very ancient and important one. The river is navigable by large vessels to Elswick. Since it came under the jurisdiction of the Tyne Commissioners improvements on a large scale have been made. The corporation quays are 6800 feet in length, and vessels of large size can be moored in safety. As early as the 13th century the chief trade of Newcastle was coal. Thereafter, with the increasing development of the coalfields of Northumberland and Durham, especially after the coming of a new industrialism in the later 18th and early 19th century, the trade grew progressively in importance, the town being famed proverbially as a place of coal export. Among other exports relatively of minor importance are various local manufactures (see below), together with many of the industrial products of northern England. Imports are chiefly of foodstuffs and of raw materials for the large industrial region for which the town is the centre.

Apart from the mining of coal in the neighbourhood, shipbuilding and engineering (marine and locomotive engines and machinery) are the primary industries of Newcastle, the town in both these activities ranking among the first in the country. The production of heavy ordnance is also of much

importance. Stimulated by an abundant fuel supply, there is a great variety of lesser manufactures—chemicals, colours, tar products, glass, bricks, fireclay goods, earthenware, iron and steel and lead goods, grindstones, &c. The most important works at Newcastle are those of Sir W. G. Armstrong, Whitworth & Co., Limited, founded in 1847. They comprise blast-furnaces, engine-shops, foundries, and steel-works, with shipbuilding yards at Elswick and Walker. The firm builds many ships of war. From the engine-works of R. Stephenson & Co. (founded by George Stephenson in 1824), and R. W. Hawthorn, Leslie & Co., locomotive and marine engines have been sent to all parts of the world. Newcastle is the birthplace of Lords Eldon and Collingwood, Mark Aken-side, Charles Hutton the mathematician, and Lord Armstrong.

See Gray's *Chorographia* (1649); and the histories of the town by Bourne (1736), Brand (1789), an anonymous writer—supposed to be the Rev. John Baillie (1801), E. Mackenzie (1827), Welford (3 vols. 1884-87), R. J. Charleton (1885), J. R. Boyle (1890), and Hearnshaw, *Newcastle upon Tyne* (1924).

New Church. See SWEDENBORG.

New-chwang, or NIU-CHWANG, a city of Manchuria, on the river Liao, 20 miles from its mouth and 120 from Mukden. By the treaty of Tientsin (1858) New-chwang was opened to foreign trade. From the accumulation of alluvial soil in the lower reaches of the river vessels are obliged to load and discharge at Ying-tzu, at its mouth. It is there the Europeans are settled, and they call Ying-tzu by the name of the treaty-port New-chwang—which latter is now a greatly decayed place. Ying-tzu exports beans, silk, ginseng, skins, horn, oil, rice, millet, and coal. The port, which is closed four or five months with ice, was captured by the Japanese in 1895; but Russia, taking practical possession of Manchuria (q.v.), connected New-chwang with the Siberian railway, and dominated till the city was again taken by the Japanese in 1904. Pop. 60,000.

Newcomb, SIMON, astronomer, was born at Wallace, Nova Scotia, 12th March 1835, graduated in 1858 at the Lawrence Scientific School at Harvard, was a teacher in Maryland, and in 1861 became a professor of Mathematics in the United States navy. He was appointed at once to the naval observatory at Washington, and in 1877 was placed at the head of the office of the official *American Ephemeris and Nautical Almanac*. He organised the government expedition to observe the transit of Venus in 1874, and in 1882 observed the transit at the Cape of Good Hope. In 1884 he undertook, in addition, the duties of a chair in the Johns Hopkins University. He made notable additions to astronomical science. Not to speak of tables of the constants of astronomy, of the motions of the moon and of eight major planets, and hundreds of articles in scientific journals, his publications include *Popular Astronomy* (1878); *Calculus* (1884); *Principles of Political Economy* (1887); *Elements of Astronomy* (1900); *The Stars, a Study of the Universe* (1902); *Astronomy for Everybody* (1903); *Reminiscences of an Astronomer* (1903); *Compendium of Spherical Astronomy* (1906). He died 11th July 1909.

Newcomen, THOMAS, the inventor of a Steam-engine (q.v.), was born at Dartmouth sometime in the month of February 1663, and died in London in August 1729. In 1705, along with Cawley, a Dartmouth glazier, and Savery, the manager of a Cornish mine, he obtained a patent for what is now known as the atmospheric steam-engine. Some six years later his invention was brought into use for pumping water out of mines.

Newdigate, SIR ROGER (1719-1806), was born and died at Arbury in Warwickshire, having sat for many years in parliament as member for Middlesex and the university of Oxford. He was a great antiquary, but now is chiefly remembered as the endower of the Newdigate prize poem at Oxford, winners of which have been Heber (1803), John Wilson (1806), Milman (1812), Hawker (1827), Lord Selborne (1832), Faber (1836), Stanley (1837), Ruskin (1839), Shairp (1842), M. Arnold (1843), Sir E. Arnold (1852), J. A. Symonds (1860), W. J. Courthope (1864), W. H. Mallock (1871), Sir Rennell Rodd (1881), Laurence Binyon (1890), and Lord Warkworth (1892).

New England, a collective name given to the six Eastern States of the United States of America—Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, and Connecticut—embracing an area of 65,000 sq. m. The people, distinctively known as Yankees, are celebrated for industry and enterprise. The joint population in 1920 was 7,400,000; this is almost one-fourteenth of the entire population of the republic, while the area of New England is less than one-fiftieth of the total area of the United States. For the influence of the Puritans who settled here, see Fiske, *The Beginnings of New England* (1889).

New Forest, a triangular district of south-west Hampshire, 9 miles SW. of Southampton, bounded W. by the river Avon, S. by the Solent and English Channel, and NE. by Southampton Water. It measures about 14 by 16 miles. The district seems to have been wooded from the earliest times; but its present name dates from the year 1079, when the Conqueror made a 'mickle deer-frith here,' afforesting the manors, lay and religious, but without expropriating the owners or removing homes or churches. This afforestation was enforced by the savage 'Forest laws,' and regarded as a piece of detestable tyranny; and the violent deaths met by two of his sons (one killed here by a stag, the other by an arrow) were looked on as judgments. The deer were removed under an act of parliament (1851); and under another of 1877 the New Forest now is managed by the court of Verderers as a public pleasure-ground and cattle-farm. Enclosed plantations occupy about one-fourth of the entire area, the remainder being open woodland, bog, and heath. The principal trees are oaks and beech. The former were once much used as timber for the navy; the mast of the latter still feeds large herds of swine. There is also a herd of small, rough-coated ponies. The hollies, the rhododendrons, and therewith the general absence of underwood, give a beautiful park-like aspect to the forest, points within which or on whose verge are Lyndhurst, Beaulieu, and Lymington.

Newfoundland (*Newfundland'*), an island and British dominion in North America, not incorporated with the Dominion of Canada, lies at the mouth of the Gulf of St Lawrence. In shape the island resembles an equilateral triangle, of which Cape Bauld on the north, Cape Race on the south-east, and Cape Ray on the south-west form the angles. It is 370 miles in length, 290 miles in breadth, and has an area of 40,200 sq. m.—a fifth less than England. 'The coast of Labrador from the entrance of Hudson Strait to a line to be drawn due north and south, from Anse Sablon on the said coast to the fifty-second degree of north latitude, and all the islands adjacent to that part of the said coast of Labrador,' is claimed as constituting a dependency of Newfoundland. The boundary with Quebec is disputed. Quebec in 1925 refused to buy Newfoundland's Labrador territory, in whole or in part. During the fishing season in each year about 30,000 in-

habitants of Newfoundland visit Labrador, and live about its harbours, either on shore or in their vessels, for about three months in each year. The population of Newfoundland with its part of Labrador (pop. 3634) amounted in 1901 to 220,249; in 1921 to 263,033 (including 3774 in Labrador). Of these 86,576 were Roman Catholics, 84,665 Anglicans, and 74,207 Wesleyan Methodists.

The island, as seen from the sea, presents a wild and sterile appearance. Its surface is diversified by mountains, ponds, and lakes. The mountains in the Avalon Peninsula (stretching south-east from the main portion of the island, and connected with it by an isthmus of only about 3 miles in width) rise in some cases to over 2000 feet above sea-level. The number of the lakes and 'ponds' is remarkable, and it has been estimated that about one-third of the whole surface is covered with fresh water. The coast-line is everywhere deeply indented with bays and estuaries. These bays vary in length from 25 to 70 miles, are of great breadth, and are lined—as indeed the whole coast is—with excellent harbours. The rivers are narrow and winding. Much of the soil is productive, and there is considerable cultivation along the seaboard of the settled districts, but careful exploration has shown that the best land and timber are in the river-valleys and upon the west coast. Large tracts of very good timber, chiefly pine and spruce, exist in several parts of the island. The great body of the people being employed either in the fisheries or in establishments connected with them, little attention used to be paid to the culture of the soil. In 1845 the only crops raised were oats and hay; but now apples, small fruits, potatoes, turnips, hay, carrots, clover, barley, and oats are cultivated with success. The island possesses many minerals. Iron is worked mainly as yet on the east coast. The chief seat of copper-mining is around the shore of Notre Dame Bay. The ore is found in connection with the serpentine rocks, which are spread over an area of 5000 sq. m. Gold has been found. Rich deposits of lead ore exist in several places. Gypsum and marbles are plentiful. Roofing-slate is found. Coal and iron exist side by side near the west coast, and coal in the interior. Mining in several parts of the island was long hampered by claims set up by the French to a right to use the strand for drying fish 'free from interruption' by the colonists. A great variety of valuable fish is found in the waters of the colony and its dependency, but cod, herring, and salmon are the most important. The capture of seals (harp and hood) and the canning of lobsters also add to the resources of the Newfoundlanders. The skins are sent to the United States and Great Britain; the 'fat' is made into seal-oil, which is used for soap-making, lighting, and lubricating. There are fine pine-forests in the north, and extensive sawmills and pulp and paper factories have been established. The schools are denominational (Church of England, Roman Catholic, and Methodist).

The people chiefly depend for a livelihood upon the product of the cod-fisheries, of which there are three distinct branches—namely, the Labrador fishery, the shore fishery, and the bank fishery. Dried cod-fish and cod-oil are exported. The shore fishery is prosecuted along the whole coast-line in Newfoundland, and is the mainstay of the very large portion of the population who from poverty, age, or disinclination refrain from going either to the Labrador or bank fishery, or divide their time between farming and fishing. The bank fishery is prosecuted upon the Banks, so called, which lie to the southwards of Newfoundland. These Banks are submarine plateaus extending over a tract averaging about 600 miles in length and 200 miles

in breadth. The depth of water over the Banks varies from 100 to 600 feet, and the most productive ground is known as the Grand Bank. American, Canadian, and French fishermen also resort to these Banks to fish, the French using their islands, St Pierre and Miquelon, as a base of operations. After cod the chief export is pulp and paper; next comes iron ore.

The principal imports come from Canada, the United States, and Britain; the principal exports go to Britain, Canada, Spain, Portugal, the United States, Italy, and Brazil.

The trans-insular railway was completed in 1897, with branches to important towns and settlements. The total length of railways is about 950 miles. Communication between coast towns and with the continent is maintained by a fleet of excellent steamers in connection with the railway.

The present form of government, established in 1855, consists of the governor, an executive council or cabinet, a legislative council (appointed by the crown), and a general assembly of thirty-six members (elected by the people). Every male of twenty-one years of age, a British subject and two years a resident in the colony, is entitled to vote at elections.

Of the Beothucks who inhabited Newfoundland before the Micmacs and the white men came, little is known. A very tall, somewhat fair race, they hunted and fished, smeared themselves with red ochre, carved skilfully, used stone adzes and utensils of birch-bark and soapstone but no pottery, and were not quite extinct till 1829. The early history of Newfoundland is involved in obscurity. It was discovered 24th June 1497 by John Cabot, and the event is thus noticed in the accounts of the privy-purse expenditure: '1497, Aug. 10. To hym that found the New Isle, £10.' It was visited by the Portuguese navigator, Gaspar de Cortereal, in 1500; and within two years after that time regular fisheries were established on its shores by the Portuguese, Biscayans, and French. In 1578, 400 vessels, of which fifty were English, were engaged in the fishery. Sir Humphrey Gilbert (q.v.), with his ill-fated expedition, arrived in St John's Harbour, August 1583, and formally took possession of the island in the name of Queen Elizabeth. In the return voyage the expedition was scattered by a storm, and the commander lost. In 1621 Sir George Calvert (afterwards Lord Baltimore) settled in the great peninsula in the south-east, and named it the Province of Avalon. The history of the island during the 17th and part of the 18th century is little more than a record of rivalries and feuds between the English and French fishermen; but by the treaty of Utrecht (1713) the island was ceded wholly to England, the French retaining certain privileges in connection with the catching and drying of fish on the coast extending from Cape Bonavista on the east to Point Riche on the west. By the treaty of Versailles (1783) the boundaries were so changed as to extend from Cape John on the east to Cape Ray on the west, and at the same time the French were promised 'freedom from interruption by the competition of the British.' Friction arose over disputed rights, but, under the Anglo-French Convention (1904), France renounced the privileges given by the treaty of Utrecht, but retained for her subjects, on an equality with British subjects, rights of fishing within the treaty waters in the fishing season. In 1886-1904 French fisheries on the Banks were crippled by an act restricting the taking and export of bait from Newfoundland waters. By the treaty of 1818 American fishermen enjoyed certain rights in these waters. In 1905-6 acts of the colonial government imposing restrictions upon American vessels brought about a dispute with the

United States almost as soon as that with France had been settled. The Hague Tribunal decided in 1910 that Great Britain had a right to make reasonable regulations. If necessary a mixed commission should determine what is reasonable.

See J. G. Millais, *Newfoundland and its Untrodden Ways* (1907); W. Fraser Rae, *Newfoundland to Manitoba*; Murray and Howley, *Geological Survey of Newfoundland* (1881); Hatton and M. Harvey, *Newfoundland* (1883); M. F. Howley, *Ecclesiastical History of Newfoundland* (1888), and *French Treaty Rights* (1890); J. P. Howley, *The Beothucks* (1915); Prowse, *A History of Newfoundland*; Lord Birkenhead, *History of Newfoundland* (1920). See also LABRADOR; and for map, see CANADA.

Newfoundland, a breed of dogs originally introduced into England from the island of Newfoundland, where they were used for draught purposes. As the mastiff at that time was scarce, and the St Bernard had not yet appeared in England, the Newfoundland became exceedingly common, but has since been eclipsed in popularity by these breeds. The Newfoundland is a large and imposing dog, mild in expression, but showing great strength. The head should be large, with ears falling close; neck long, if possible; loins strong and well ribbed up, a point seldom seen; tail long and powerful, as it is much used in swimming; coat long and wiry; colour, black without any white markings. Much discussion was caused by Landseer's well-known picture of a black and white dog entitled 'A Distinguished Member of the Humane Society' (1838). An attempt was made to prove that the black and white dog was the true Newfoundland; but it is now generally regarded as a cross from the black. The black and white variety, now known as the Landseer Newfoundland, has been kept pure for many generations; it is now almost as pure, and certainly as handsome, as the original variety. The Newfoundland is a splendid water-dog, and takes to the sea at an early age. He is also a natural retriever, and, though himself too heavy for field work, has been extensively used to found the ordinary retriever. From his formidable appearance, combined with docility and intelligence, he makes a capital watchdog, for which purpose he is extensively used.

Newgate, a historical London prison, stood at the western extremity of Newgate Street, opposite the Old Bailey. The exterior presented high dark stone walls, without windows. It was long the chief criminal prison of city and county, but it ceased to be a debtors' prison in 1815, and after 1849 it was only used for prisoners awaiting trial. The earliest prison here was in the portal of the *new gate* of the city as early as 1218; and hence the name. About two centuries afterwards it was rebuilt by the executors of Sir Richard Whittington, whose statue with a cat stood in a niche, till its destruction by the great fire of London in 1666. The edifice—that best known in history—was re-erected in 1780, but the new buildings were greatly damaged by fire in the Gordon Riots of that year (see Boswell's *Johnson* under that date), when 300 prisoners, felons as well as debtors, were released and let loose upon the public. This awful scene is described by Dickens in *Barnaby Rudge*. After the passing of the Prisons Bill in 1877 Newgate, being considered a very costly and redundant establishment, was gradually disused, and in 1902-3 was completely demolished. The *Newgate Calendar* contains biographical notices of the most notorious murderers, burglars, thieves, and forgers who have been confined within its walls. See Griffiths, *Chronicles of Newgate* (1884); Ch. Gordon, *The Old Bailey and Newgate* (1903).

New Granada. See COLOMBIA.

New Guinea, formerly known as Papua (Papoo'a), an island of Australasia, the largest in the world except the Australian continent, from which it is separated by the shallow island-studded Torres Strait, 80 to 90 miles wide at its narrowest part. There is now no doubt that the two regions at one time, probably during the Miocene epoch, formed continuous land, and an upheaval of less than sixty fathoms would suffice again to unite them. The hundred-fathom line, as determined by Wallace, would also include the insular groups of Jobi, Biak, Suk, Mafor (Nufor), and Amberpon in Geelvink Bay; Aru, near the south-west coast; Mysol, Salwatty, Batanta, and Waiju at the north-western, and the Louisiade and D'Entrecasteaux Archipelagoes at the south-eastern extremity of New Guinea. But elsewhere the mainland is washed by deep waters, ranging from 500 to 1300 fathoms on the south-eastern and northern seaboard. It is disposed in the direction from north-west to south-east, stretching from Cape Goede Hoop ('Good Hope'), just south of the equator ($0^{\circ} 19' S.$ and $132^{\circ} 30' E.$), for about 1500 miles to South Cape, over 700 miles below the equator ($10^{\circ} 34' S.$

and $150^{\circ} 48' E.$). But owing to its extremely irregular shape, somewhat resembling a huge saurian, the width varies from under 20 miles at the narrowest parts of both extremities to 480 miles at the broadest part, about $141^{\circ} E.$ long., giving a total area roughly estimated at 330,000 sq. m., or six times as large as England. The island thus forms three somewhat distinct geographical divisions—a large central mass from which two peninsulas project south-east and north-west. The south-east peninsula is defined by Huon and Papua Gulfs on the north and south coasts, while the north-west peninsula is separated into two secondary members by the Macuer Inlet, which penetrates from the south-west side to within 20 miles of Geelvink Bay on the north-west coast.

Much of the interior is still a *terra incognita*; but the more salient physical features of the island have already been roughly determined. It is essentially a mountainous and even an alpine region, being traversed in its entire length by lofty ranges, by far the highest in the Oceanic world, and in some places rising more than 1000 feet above



the snow-line. These ranges, which in the two peninsular regions form single continuous systems, develop in the broader central parts two or more parallel chains with a general south-easterly trend, at many points approaching close to the coast-line, and elsewhere enclosing extensive rugged plateaus. Thus, the Arfak Hills of the north-west peninsula (10,000 feet) are continued in the central region by the Charles-Louis range, which, varying in height from 4000 feet to 9000 feet, stretches into the Snowy (Nassau) range, where Mount Wilhelmina, Mount Carstenz, and Mount Idenberg rise to over 15,000 feet. Parallel with this chain runs the northern coast range, known as the Finisterre Mountains (11,500 feet), which terminates eastwards in an imposing headland projecting in the direction of New Britain, and enclosing Huon Gulf on the north side. Between these two chains run the Bismarck and Krätke ranges (10,000 feet), the latter discovered in 1887 by Dr H. Zöller. About the same time Count Pfeil, administrator of German New Guinea, penetrated from the north coast still farther inland in search of expansive tablelands suitable for settlement; but he found the

whole surface broken into a confused mass of steep mountains composed mostly of old sedimentary rocks—altogether 'a rugged, hopeless region' intersected by deep gorges, but few open river-valleys.

All these mountain-ranges converge in the south-east peninsula in a lofty chain which traverses the whole of Papua (formerly British New Guinea). The whole of the more central part of this system in Papua is generally known as the Owen Stanley Range, with Mount Victoria, its highest mountain, over 13,000 feet. Mount Albert Edward, the highest mountain in Papua, lies to the north of the 'Main' or Owen Stanley Range. The prevailing formations appear to be very old plutonic and sedimentary rocks. Gneiss and granites crop out in the Arfak highlands; elsewhere stratified clay-slates and old limestones abound; quartz and greenstones occur on the south-east coast resembling those of the auriferous region in New South Wales, and gold has been worked in several districts. Osmiridium has also been found, and petroleum has been located in both old and new British territories. Copper, now exported, occurs

in large quantities in the neighbourhood of Port Moresby, and a coalfield has been found on the Upper Kiko River. Earthquakes are frequent in some districts, such as the Bismarck Archipelago, and there are numbers of active volcanoes. Extinct craters are common throughout New Guinea.

A number of considerable rivers have been found in New Guinea. The three largest appear to be the Amberno (Mamberamo, or 'Great River') in Dutch, the Kaiserin Augusta, or Sepik, in new and the Fly in old British territory. The Amberno (the Rochussen of Dutch geographers) descends probably from the Nassau Mountains to the east side of Geelvink Bay, where it develops an extensive delta. The Sepik flows mostly from the central water-parting north-eastwards to the coast at Cape della Torre in 4° S. and 144° 30' E., entering the sea in a broad, deep channel without any delta. It is navigable for several hundred miles by vessels of small tonnage, and it has been explored as far as the Papuan border. But the largest of all New Guinea rivers is probably the Fly, which rises on the southern slope of the central water-parting and flows mainly south-east to a delta of vast extent on the west side of the Gulf of Papua. This great estuary, discovered in 1845 by Blackwood, was explored for over 600 miles by Sir William Macgregor. The tides ascend the Fly for 150 miles, and 90 miles higher up it is joined on its left bank by the Strickland. Feeding the lower reaches of the Strickland is a lake of some size, which has been named Lake Murray after the lieutenant-governor of Papua at the time of its discovery. North-eastwards, round the head of the gulf, are the deltas of three other great rivers—the Bamu, Turama, and Kiko, the last two flowing a long distance east-south-east, parallel to the Sir Arthur Gordon Range, before turning to the sea. Farther east comes the Purari, which runs by Mount Murray (8000 feet), and is navigable by steam-launch for 120 miles from its mouth. Among other navigable rivers on the south side of the main watershed are the Lakekamu, entering the gulf at Port Chalmers, the St Joseph, the Vanapa, and the Kemp Welch. On the north-east coast may be mentioned the Mambar, flowing at first north-west, the upper reaches being known as the Yodda; the Markham, which flows into the Huon Gulf; and the Ramu, which, after a course of over 400 miles, reaches the sea near the Sepik.

In 1908-9 Mackay and Little ascended the Purari River 100 miles farther than Macgregor had done. Captain Rawling's expedition (1909-11), in the Dutch territory, surveyed a large tract of country, and explored the Kapare and other rivers; while a Dutch expedition reached the snow-line of the central (Nassau) range. Staniforth Smith's expedition (1910-11), in the British territory, found that its western division—except along the coast and the navigable rivers—was a lofty plateau, and roughly defined the watersheds of the great rivers flowing into the Gulf of Papua. Subsequent patrols in Papua have opened up many new areas, and have penetrated to the former German boundary at several points.

The whole of New Guinea lies within the track of the south-east trade-winds, which prevail from March to October, and which are charged with much moisture from the Pacific. These are followed for the rest of the year by the north-west monsoons, whose rain-bearing clouds are condensed on the cold alpine slopes of the island. The consequence is that the rain or snow fall is considerable in every part of the country, and this, combined with an average high temperature of from 80° to 90° F., results in a hot, moist climate on all the low-lying coast-lands and fluvial valleys. Hence malaria is generally endemic in the low-

lands, and is sometimes conveyed to a considerable height above sea-level. But it has become rare at the chief settlements (Port Moresby, Samarai, &c.), where due precautions are taken against mosquitoes. In any case New Guinea, as a whole, seems unsuitable for permanent settlement by European races; but much of the soil is excellent for the cultivation of tropical produce by coloured labour (native or imported) under white direction. For instance, in Papua there are plantations of coconuts, sisal hemp, rubber, &c.; and 60,000 acres of land were under commercial cultivation in 1921 as compared with 1500 in 1907. Some of the uplands are suitable, if not for permanent colonisation, at least for the establishment of health-resorts for officials, traders, and missionaries.

Thanks to its abundant rainfall, varying altitudes, high temperature, and position intermediate between the Asiatic and Australian botanical areas, New Guinea is almost everywhere clothed with a rich and highly diversified flora. The vegetable zones appear to be even superimposed as in Mexico, and as Sir W. Macgregor states, after passing successively through the domains of tropical plants, such as the coconut, sago, banana, mango, taro, and sugar-cane, and of such temperate or sub-tropical growths as the cedar, oak, fig, acacia, pine, and tree-fern, he was gladdened on the higher slopes by the sight of the wild strawberry, forget-me-not, daisy, buttercup, and other familiar British plants. Towards the summits these were succeeded by a true alpine flora, in which Himalayan, Bornean (Kinabalu), New Zealand, and sub-antarctic forms were all numerous represented. In general, arboreal vegetation ceases at about 11,000 feet, and shrubs at 12,000, the latter being overlapped by the alpine zone. In New Guinea the Asiatic and Malayan floras are far more richly represented than the Australian, as shown by the rarity of the eucalyptus, a great number of varieties of which occur in the southern continent. Indigenous forms are numerous, and include many species of palm.

On the other hand, the New Guinea fauna is much more closely related to that of the Austral than to that of the northern hemisphere. This is seen in the almost total absence of placental mammals and the presence of over thirty species of marsupials, such as the cuscus and kangaroo, as well as the bower-bird, of which two new species were discovered on the Owen Stanley Range. Here also were found the European lark and blackbird in curious association with the bird of Paradise, of which typical New Guinea bird many species occur. Scarcely any birds of prey are found, a circumstance which may explain the presence of so many forms—parrots, cockatoos, pigeons, &c.—remarkable for their gorgeous plumage. Reptiles are numerous, and include a remarkable python (*Chondropython pulcher*), intermediate between the Asiatic python and American boa. A still more remarkable very primitive form is the spiny ant-eater, of which there are three species; it is allied to the Australian echidna, and like it oviparous. The placental mammals are represented only by some bats and mice, besides the pig and dingo, both probably introduced in early times.

Apparently man has invaded the island more than once, producing a population which differs markedly from that of Australia or Indonesia. Between the Australians and Papuans, who form the bulk of the New Guinea population, there is little in common except the dark colour. But the New Guinea natives are far from a homogeneous people. Three ethnical elements may be distinguished with some clearness: Papuans proper, diffused over the whole region; Negritoes, who

have been found in the more interior districts of Dutch and British territory; and Melanesians, who, mixed in various degrees with indigenous stocks, form over half of the population of former German territory, and, under the name of Papuo-Melanesians, occupy the south-east coastal regions of Papua. Malayan influence is also of importance in the north-west. The mingling of these elements in different proportions has brought about much diversity in the physical appearance, speech, usages, and general culture of the natives. The true Papuans of the Fly River are almost black, usually tall, with frizzled hair; but eastwards, among the Papuo-Melanesians, the stature decreases, colour becomes lighter, and the hair, though generally frizzly, is occasionally wavy. Native dwellings are frequently built on piles, not only in the shallow bays but also inland. Amongst Papuans communal houses are much used. The bow-and-arrow is the principal weapon, but this is replaced by the spear in the east. Cannibalism and head-hunting was prevalent in most districts until recently. The social organisation shows great variation throughout the territory. In some districts strict marital fidelity is customary, in others considerable laxity; government is by hereditary chiefs, or by secret societies, or, in some few cases, is almost anarchic. Though a few tribes are nomadic, most are agriculturists, and the domestic pig plays an important part in native economics. Many groups are industrious and keen traders, displaying remarkable skill, especially in the arts of pottery and wood-carving. In the island-groups lying off the south-east peninsula remarkable forms of trade and native money are characteristic.

New Guinea appears to have been first sighted by A. D'Abreu in 1511, and first visited by De Meneses about 1526, and Alvaro de Saavedra in 1528. It received its present name in 1546 from Ortiz de Retez (Roda), who was struck by the resemblance of its inhabitants to those of the Guinea coast in West Africa. During the flourishing period of the empire of Tidor the Malay sultans of that state extended their sway over the so-called *Raja Ampat* or 'Four Kingdoms' of Waiju, Salwatty, Mysol, and Waigamma, including large tracts on the adjacent mainland. In 1793 the East India Company occupied the island of Manassari in Geelvink Bay; but the British troops were soon withdrawn, and in 1814 the English government admitted the claims of Holland to the *Raja Ampat* as suzerain of the sultan of Tidor. In 1848 the Dutch proclaimed their sovereignty over the western half of the island, and in 1884 the remainder was divided between Great Britain and Germany. In 1920 the Dutch had in view the centralisation of the government in Manokwari, the territory having been previously administered from the residencies on the islands of Ternate and Amboina. In 1914 Rabaul, the capital of German New Guinea, was occupied by an Australian force. In 1921 the Australian military administration was replaced by a civil administration responsible to the Commonwealth of Australia, which holds a mandate under the League of Nations. Subjoined is a roughly estimated table of the areas and populations of the British and Dutch territories:

	Area in sq. miles.	Population.
Dutch New Guinea.....	150,000	200,000
Papua (British New Guinea)....	90,000	300,000
Territory of New Guinea (former German New Guinea)....	90,000	250,000
Total.....	330,000	750,000

In the Dutch section until recently the only settlement of resident officials was at Merauke,

in which district there has been some cultivation. Otherwise little has yet been done to develop the resources of the country. The southern half of the British territory, officially known as Papua, is administered from Port Moresby by a lieutenant-governor, appointed by the Commonwealth of Australia, with executive and legislative councils. An excellent native police force, in the charge of magistrates in fifteen stations, disposed throughout the territory, maintain order amongst the native population. A fair amount has been done to develop the resources of the country since its annexation. Copra, pearl-shell, gold, osmiridium, and copper are among the chief exports. The northern half of British territory, known as the 'Territory of New Guinea,' is administered from Rabaul, on the island of New Britain, by means of machinery modelled largely on that of Papua. Although the exploitation of the territory has been carried much farther than in the case of Papua, exploration has been neglected, nor is the region of government influence over the native population as extensive as in the case of Papua.

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New Hampshire, the 'Granite State' and a New England state, is the most northerly of the thirteen original United States of North America, lying between 42° 40' and 45° 18' N. lat., and bounded N. by Quebec, E. by Maine and (for 18 miles) the Atlantic Ocean, S. by Massachusetts; on the W. the Connecticut River separates it from Vermont. Area, 9305 sq. m.—a fourth larger than Wales. The average elevation is about 1200 feet, the general slope being towards the south. The highest point is Mount Washington (6293 feet), in the White Mountains, which include more than a hundred peaks of note, mainly in the northernmost county; among the peaks over 5000 feet high are those bearing the names of the successive presidents, Adams, Jefferson, Madison, and Monroe. Geologically they consist of early metamorphic rocks; immense masses of granite and gneiss constitute the bare peaks that make the name of the range as appropriate in summer as in winter. The largest lake is Winnepiseogee (72 sq. m.); the principal rivers are the Connecticut, Merrimac, and Piscataqua. From Dover Point to its mouth the Piscataqua is about half a mile wide; and the volume and swiftness of its current at ebb-tide prevent the freezing of the water in Portsmouth harbour during the coldest winters. The Merrimac is said to turn more spindles and propel more shuttles than any other river in the world. The state is noted for its salubrious climate and grandly picturesque natural scenery. The mean annual temperature at Concord is 46° F.

The principal agricultural products are hay, potatoes, maize, and oats. There is much forest in the state. Agricultural interests steadily declined for a number of years, but New Hampshire has become very popular as a summer-resort, and the farmers, who owing to the rough and sterile soil could not compete in the great markets with

those of the West, now find a new and important market brought to their very doors. But manufacturing is the leading industry in New Hampshire, the chief centres being Manchester (the largest city), Nashua, and Dover. The chief mineral product is granite.

New Hampshire embraces ten counties, and returns two senators and two representatives to congress. The governor is elected biennially, and appoints the judiciary, who hold office to the age of seventy. The public schools are efficient. The principal college is Dartmouth, founded at Hanover in 1769. The capital is Concord.

History.—The earliest settlements were made in 1623 near Dover and Portsmouth. In 1641–79, 1689–92, and 1699–1741 New Hampshire was under the governor of Massachusetts, but during the intervening dates and until 1775 it was under royal governors of its own. The people took an active part in the revolution. A provisional government was formed in 1776, a state constitution adopted in 1784; and New Hampshire was the ninth state (21st June 1788) to ratify the national constitution. Pop. (1790) 141,885; (1840) 284,574; (1880) 346,991; (1900) 411,588; (1910) 430,572; (1920) 443,083.

New Hanover, an island of the Bismarck Archipelago; area, 570 sq. m. Its physical characteristics resemble those of New Britain (q.v.).

New Harmony, a village of Indiana, 28 miles by rail N.W. of Evansville, was first settled in 1815 by a German community of religious socialists, called Harmonists, under the leadership of George Rapp (q.v.). In 1824 the village and domain was purchased by Robert Owen for an experimental community on his system, but this failed after a test of nearly three years.

Newhaven, a seaport of Sussex, at the mouth of the Ouse, $8\frac{1}{2}$ miles E. of Brighton and 56 S. of London. It has risen into importance through its steamboat traffic, particularly to Dieppe (2 $\frac{1}{2}$ hours), and has a large fort (1864–69) and a little Norman 12th-century church, with an east tower and small semicircular apse, curiously like that of Yainville-sur-Seine. Pop. (1921) 6436.

Newhaven, a fishing-village, now within the burgh of Edinburgh. Dating from about 1490, it has a tidal harbour, and is famous for its fish dinners and fishwives.

New Haven, the chief city and seaport of Connecticut, and capital of New Haven county, at the head of New Haven Bay, 4 miles from Long Island Sound, and 73 miles by rail E.N.E. of New York. Its broad streets are shaded with elms, and the public squares, parks, and gardens, with its handsome public and private edifices, make it one of the most beautiful of American cities. It is the seat of Yale College (q.v.), the Sheffield Scientific School, the Peabody Museum, &c.; and also of the Hopkins grammar-school (1660). Its other public buildings include the former state-house, the city hall, and United States government building. The port has a large trade. But New Haven is of more consequence as a manufacturing town, employing many thousands of hands in its large works, and producing hardware, wire, clocks, cutlery, fire-arms, corsets, india-rubber goods, carriages, paper, musical instruments, &c. New Haven was settled in 1636 by a company from London, and the colony was not united to that of Connecticut until 1662; and till 1873 it was recognised as, jointly with Hartford, the capital of the state. It was incorporated as a town about 1665, and chartered as a city in 1784; and it retains a town as well as a city administration, choosing select-men, &c., besides a mayor, aldermen, and council. Pop. (1850) 22,529; (1900) 108,027; (1920) 162,537.

New Hebrides, a chain of islands in the Western Pacific, extending NNW. to SSE., and lying W. of Fiji and N.E. of New Caledonia. There are in all some thirty islands (area, 5500 sq. m.), of which twenty are inhabited, the people, mostly of the Melanesian race, numbering about 60,000. Some of the islands—e.g. Ambrym, Tanna, and Povei—have active volcanoes. The larger islands are Espiritu Santo (70 miles long by 40 wide), Mallicolo (56 miles by 20), Ambrym (22 miles by 17), Efate or Sandwich (30 miles by 15), Erromango (30 miles by 22), Tanna, Aneityum, Epi, Maiwo (Aurora), and Aragh (Pentecost). All are wooded, and some lofty, reaching 3000 feet. The climate is moist, but clear and healthy. This chain was discovered by the Portuguese navigator Quiros in 1606, and was thoroughly explored by Captain Cook in 1773. The chief exports are copra, maize, cocoa, cotton, and coffee, which go principally to Sydney and Nouméa (New Caledonia). The islands are under joint French and British administration.

New Holland. See AUSTRALIA.

New Holland, a port on the Humber opposite Hull, with which it is connected by steam ferry.

New Ireland, or NEU-MECKLENBURG, the largest island of the Bismarck Archipelago; area, 4900 sq. m.; length, 300 miles; width, 15 miles. The hills rise to 6500 feet, and they and the whole of the interior are richly wooded. The climate, products, and inhabitants resemble those of New Britain (q.v.).

New Jersey, a Middle Atlantic state and one of the thirteen original states of the Union, is bounded on the N. by New York; E. by Hudson River, Staten Island Sound, Raritan Bay, and the Atlantic; SW. by Delaware Bay; and W. by the Delaware River, which separates it from Pennsylvania. Its greatest length is 167 miles; its width varies from 32 to 59 miles. It has an area of 8224 sq. m.; it is the smallest of all the states save three, but it ranks just about midway amongst them in population.

In the north-west part of the state there are two portions of the Appalachian system. The Blue or Kittatinny Mountains extend along the Delaware from the Water Gap up, attaining a height of 1400 to 1800 feet. The highlands south and east of these consist of many ridges, their greatest height 1488 feet. In this part of the state are many small lakes. The Palisades, the Orange Mountains, and other hills are in the red sandstone region, which extends from the north-east to the central part of New Jersey. The Navesink highlands (282 feet), south of Sandy Hook, are the only considerable elevation on the Atlantic coast south of New England. The central portion of the state is generally level and fertile; the southern part is in large measure sandy, covered with pine-woods, and marshy near the coast. The state is abundantly watered; its chief rivers, the Passaic, Raritan, Little and Great Egg Harbor, flow south-east into bays. The coast from Sandy Hook to Cape May is generally protected by peninsula or island beaches; the only considerable exception to this rule being the strip of mainland, about 18 miles long, between Monmouth and Squan beaches.

In agriculture the state occupies a prominent position in proportion to its area. About 60 per cent. of the total land area is included in farms. While the average acreage of the farms decreased from 115·2 in 1850 to 76·8 in 1920, the number of farms largely increased. The chief products are maize, oats, wheat, rye, hay, potatoes and sweet potatoes, cattle, butter, milk, and market-garden produce. The leading mineral products are iron ore, limestone, zinc, potash, and slate. After oil-

refining, glass, pottery, machinery, leather, clay, cement, silk, and woollen and cotton goods are among the chief manufactures.

New Jersey returns two senators and twelve representatives to congress. The state legislature meets at the capital, Trenton, in January; a senator is chosen from each of the twenty-one counties (one-third each year) for three years; the assembly has about sixty members, who serve one year. There are (besides several county asylums) two large lunatic asylums near Trenton and Morristown, the latter accounted a model. Princeton (q.v.) University, founded in 1746, is the most famous institution in the state. There are many colleges and other institutions at or near Trenton (q.v.), at New Brunswick (q.v.), and at Hoboken (q.v.).

New Jersey has two canals, the Morris and the Raritan, and nearly 4000 miles of railroads. The position of the state, between the two great eastern cities and bordering upon both, has powerfully stimulated travel, industry, and population. Its south-west portion has Philadelphia for a market; its north-east section, including its two largest towns, is a suburb of New York. Its coast from Navesink to Squan is covered with villas, cottages, and hotels. Cape May, Long Branch, and Atlantic City are noted seaside resorts. Asbury Park, Ocean Grove, Seabright, &c., are growing places, crowded in summer. Newark and Jersey City are by far the largest cities; next come Paterson, Trenton, Camden, Elizabeth, Bayonne, Hoboken. Pop. (1800) 211,149; (1840) 373,306; (1880) 1,131,116; (1900) 1,883,669; (1910) 2,537,167; (1920) 3,155,900.

History.—In 1617 the Dutch settled at Bergen, near New York. In 1623 Cornelius May ascended the Delaware and built a fort 4 miles below the site of Camden. Some English colonists in that region were driven away in 1638 by the Swedes, who were conquered in 1655 by Peter Stuyvesant. In 1664 the territory was granted by Charles II. to the Duke of York, and by him to Lord John Berkeley and Sir George Carteret, with full power of government to them and their assignees. There was no trouble with the Indians, whose titles were peacefully purchased. The proprietors soon divided the territory into East and West Jersey. In 1674 Berkeley sold West Jersey to two Quakers, who settled Salem and Burlington; and in 1682 a society under Penn bought the Carteret rights in East Jersey. In 1702 the proprietors surrendered their power of government to the crown, and the two provinces were reunited; and from 1738 New Jersey had its own royal governors, always at issue with the assembly and the people. New Jersey bore its part in the colonial wars, contributed 10,726 men to the Continental army, besides militia, and spent over \$5,000,000 in the cause of liberty. It suffered heavily during the revolution, and was the scene of several important campaigns and battles. The state sent nearly 7000 men to the war of 1812, and for the civil war thirty-seven regiments of infantry, three of cavalry, and five batteries.

New Jersey Tea, a common name of Red Root (q.v.).

New Jerusalem Church. See SWEDEN-BORG.

New Lanark. See LANARK.

New London, a port of entry of Connecticut, is on the right bank of the river Thames, 3 miles from Long Island Sound, 51 by rail E. of New Haven, and 126 NNE. of New York, with which it has a daily steamboat communication. It has a court-house, a brown-stone city hall, and a granite custom-house. The manufactures include woollens,

sewing-silk, machinery, and hardware. The harbour is one of the best in the United States, and many vessels engaged in the coasting trade, and in sealing or fishing, are owned there. On the left bank of the river is a United States navy yard; and there are two forts, though no longer effective. New London was settled in 1645, and in 1781 was burned by Benedict Arnold. Pop. (1850) 8991; (1920) 25,688.

Newman, FRANCIS WILLIAM, brother of the Cardinal, was born in London in 1805, and educated at a private school at Ealing and at Worcester College, Oxford, where he obtained first-class honours in classics and mathematics in 1826, and, in the same year, a fellowship in Balliol College. This fellowship, however, he resigned; and he withdrew from the university in 1830, at the approach of the time for taking the degree of M.A., declining the subscription to the Thirty-nine Articles, which was required from candidates for the degree. After a three years' stay in the East, he was appointed classical tutor in Bristol College, 1834. In 1840 he accepted a similar professorship in Manchester New College, and in 1846 his reputation led to his being appointed to the chair of Latin in University College, London, which he held till 1869; meanwhile he was an active contributor to numerous literary and scientific periodicals, and to various branches of ancient and modern literature. In controversies on religion he took a part directly opposite to that chosen by his elder brother, being no less eager for a religion in his view more world-wide, and including whatever is best in the historical religions. *Phases of Faith* is by far the most widely diffused of his works, simply because it was mainly negative; but it was preceded by a book called *The Soul* (1849), which aimed to show a solid ground for divine aspirations in the human heart. He died at Weston-super-Mare on the 4th of October 1897. His works include four volumes of *Miscellanies* (1869–90); a *History of the Hebrew Monarchy* (1847); a *Dictionary of Modern Arabic*, in Romanised type (2 vols. 1871); a *Handbook of Modern Arabic* (1866), giving the dialect now used by literary men in all Arab-speaking regions; and a *Libyan Vocabulary* (1882), in which, cutting out the Arabic, he tried to reproduce the old Numidian, Mauretanian, and Gætulan. He also published mathematical volumes, including one on *Elliptic Integrals* (1889); and a small book on the earlier life of his brother, Cardinal Newman (1891). See I. G. Sieveking, *Memoir and Letters of F. W. Newman* (1909).

Newman, JOHN HENRY, CARDINAL (1801–90), the leader of the Oxford Tractarian movement of 1833 in the Church of England, who joined the Roman Catholic Church in 1845, and was made a cardinal by Leo XIII. in 1879. He was born in London on the 21st February 1801. His father was John Newman, a member of the banking firm of Ramsbottom, Newman, & Co. His mother was the child of an old Huguenot family which had settled in London as paper-manufacturers. She was a moderate Calvinist, and taught her children to love the school of Scott, Romaine, Newton, and Milner. Her children learned early to take great delight in the Bible, and Newman has always ascribed the utmost influence over his early religious views to his mother's teaching. From Scott, the commentator on the Bible, he learned two principles which may be traced in all his subsequent career. The first was to prize 'holiness before peace'; the second was that 'growth' is 'the only evidence of life.' From his reading of Law's *Serious Call* he dates his firm inward assent to the doctrine of eternal punishment, which he always held as taught by our

Lord himself; a doctrine, however, of which he often endeavoured to attenuate the mystery—notably in *Callista* (chap. xix.). Milner's *Church History* first attracted Newman to the writings of the early Fathers. Yet at the same time he derived from Newton's book on the prophecies a belief which more or less biased his mind long after he had ceased to accept it as a truth—that Rome is Antichrist. In the autumn of 1816 a belief took possession of him, as he tells us in his *Apologia*, that he was to lead a life of celibacy; and this belief held its ground, with certain brief intervals of 'a month now and a month then,' up to the age of twenty-eight, after which it remained absolutely fixed. Newman went to a private school at Ealing. The stoppage of his father's bank compelled him to take his degree at Oxford as early as possible without taking full time to read for honours, and he actually took it (from Trinity College) in 1820, when he was only nineteen, but overwork resulted in a partial failure. In 1821 he wrote jointly with a friend two cantos of a poem on St Bartholomew's Eve, but the fragment has never been republished. It should be added that Newman was always passionately fond of music, and showed delicacy and skill as a violinist.

In 1822 Newman was elected to a fellowship in Oriel College, then the most distinguished in the university; and it was here that, after a period of some loneliness, he formed his close intimacy with Dr Pusey, and subsequently with Hurrell Froude, whose dash and genius exerted a great influence over Newman, and who had a great share in starting the Tractarian movement of 1833. In 1823, too, Newman first read Butler's *Analogy*, from which he tells us that he learned to interpret the less certain aspects of natural religion in the sense of revealed religion, and especially to interpret natural phenomena in the sense of the sacramental system—i.e. as conveying mystical spiritual influences of which there is no external sign. Keble's *Christian Year* (1827) fell in exactly with this impression of the mystery at the heart of apparently purely physical influences. From Bishop Butler Newman also derived the principle that 'probability is the guide of life,' which, however, he more or less modified when he became a Roman Catholic, holding thenceforward that in all matters of first-rate religious importance certitude can be attained and not merely probability. At Oriel Newman formed cordial relations with Dr Hawkins, afterwards the provost of the college, and Whately, afterwards Archbishop of Dublin. Both of them exercised great influence over him by teaching him to define his thoughts clearly; and he afterwards expressed surprise that the casuistry of the Roman Church should have been credited with those habits of subtle discrimination which he had really gained from his Oxford colleagues.

Newman's first book, completed in 1832, but not published till 1833, was that on *The Arians of the Fourth Century*. It was a very careful and scholarly production, intended to show that the Arian heresy was not, as had been supposed, of Alexandrian origin, but was one of the Judaizing heresies which sprang up in Antioch. The book is a powerful vindication of the Athanasian doctrine of the divine nature of Jesus Christ from the imputation of being arbitrary, or in any way an unauthorised ecclesiastical addition to the essence of the Pauline and Johannine theology. Newman insists on the dogmatic definition of the Son as being 'of one substance' with the Father, and not merely 'of like substance,' as the only escape from either creature-worship on the one hand or the impossible assertion of the voluntary self-sacrifice of an eternal creator on man's account on the other.

In the late autumn of 1832 Newman accompanied Hurrell Froude and his father in a Mediterranean tour undertaken in the hope of restoring the health of the former. It was on this tour that the seed gradually germinated which was to bear fruit in the Anglican movement of 1833. Most of Newman's smaller poems were written on this voyage, and were soon afterwards published with the signature δ in the *Lyra Apostolica*, a volume of verse the object of which was to reassert for the Church of England her spiritual authority and mission with something of the ease and buoyancy of poetic license. It was on this tour that Newman first saw Monsignore (afterwards Cardinal) Wiseman in Rome, and told him gravely in reply to the expression of a courteous wish that Hurrell Froude and he might revisit Rome, 'We have a work to do in England.' At Rome Newman left his friends to go alone to Sicily, where he fell ill of malarial fever. His mind was deeply possessed during this illness by the idea of the work he had to do in England, and the delay in finding passage to England was very trying to him. He spent much of his time in the Roman Catholic churches, which he had up to this period refrained from visiting, and speaks with great feeling in one of his poems of the good offices of that church, though a 'foe,' in ministering to his sickness, like the good Samaritan to the wounded Jew. At last he got passage on an orange boat to Marseilles. Becalmed in the Straits of Bonifacio, he wrote the best known of all his poems, 'Lead, kindly Light.' From Marseilles he travelled straight to England, reaching home in time to be present at Keble's Oxford assize sermon on National Apostasy, which he always regarded as the date at which the Tractarian movement began. It was preached on July 14, 1833.

Into the series of *Tracts for the Times* which now commenced Newman threw himself with great energy; indeed he himself composed a considerable number of them. In the very first page of the first tract, which was his own, he told the bishops that 'black event though it would be for the country, yet we could not wish them a more blessed termination of their career than the spoiling of their goods and martyrdom.' The tracts which now began to pour forth were all intended to assert the authority of the Anglican Church, to claim apostolical descent for the Anglican episcopate, to advocate the restoration of a stricter discipline and the maintenance of a stricter orthodoxy, to insist on the primary importance of the sacraments, and the duty of loyalty to the church—Newman persuaded a friend to stay away from the marriage of a sister who had seceded from the Anglican Church—and in general to preserve the dogmatic purity of the church as well as to guard her divine ritual. But while he was full of confidence in these principles, which he held in common with Rome, what puzzled him was to justify adequately the strong anti-Romanist language of the greater Anglican divines; and a great part of his time was given during the Tractarian movement to laying down clearly the doctrine of the *via media* or midway course between popular Protestantism and Roman Catholicism, which he claimed that the Anglican divines of the 17th century had taken up. Up to nearly the end of his Anglican period he disapproved strongly the cultus of the Virgin Mary and the saints as interfering with the true worship of God. In 1837 he made an attempt to distinguish the Anglican *via media* from the doctrine of the Church of Rome in a course of lectures on 'The Prophetical Office of the Church viewed relatively to Romanism and Popular Protestantism.' In these lectures

he contrasted the attitude of the Anglican and Roman churches in reference to the use and abuse of private judgment, their attitude towards the principle of infallibility, their very different use of Scripture, and their view of the fortunes of the church. But while defending and defining as far as possible the *via media* of Anglicanism, Newman frankly admitted that it had never been practically enforced, and that it was a theoretic line on which no actual ecclesiastical policy had been founded. This it was which it remained for the Tractarians to do.

In 1838 Newman followed up his discussion of the *via media* so far as it affects authority with a volume on the *via media* in its relation to the doctrine of justification by faith. Again he taught that the Anglican Church takes a middle course between the Roman Catholic Church and popular Protestantism in maintaining that justification by faith—or the *imputation* without the *reality* of righteousness—must precede sanctification, which gives the reality, though sanctification must necessarily follow; while the Roman Catholic theology regarded sanctification as the whole substance of justification.

In Tract 85, which was also published in 1838, Newman made an effort to apply the theology of the *via media* to the interpretation of Scripture. He held that the Roman Catholic Church takes a view too independent of Scripture, while the Anglican Church is right in asserting that all revealed doctrine is to be found in Scripture, though it could not be found on the mere *surface* of Scripture, since it needs the guidance of the church's traditions to help us to find it there. He admitted most fully that the stress which one might expect to be laid is not laid in Scripture on baptism, on confession, on absolution, nor even on public worship itself, and that we can only find these doctrines in Scripture by attaching the importance which tradition teaches us to attach to the hints and *obiter dicta* of Scripture. Scripture, he held, *verifies* the teaching of the church rather than systematically inculcates it. Tract 85 was one of the most careful and characteristic of all Newman's essays as a Tractarian.

Tract 90, which appeared early in 1841, and which gave rise to so much agitation in Oxford, was the most famous, but certainly one of the least interesting of the tracts. The right wing of the Tractarian party, headed by William George Ward (q.v.), was at this time urging Newman to reconcile his High Church doctrines with the Thirty-nine Articles. This Newman thought a comparatively easy matter. The Articles recognise the teaching of the Books of Homilies as 'godly and wholesome;' and Newman contended that there was therefore ample evidence that the intention of the Articles was Catholic in spirit, and that they were aimed at the supremacy of the pope and the popular abuses of the Catholic Church in practice, and not at Catholic doctrine. The Homilies regard the first seven hundred years of the Catholic Church as quite pure, recognise six councils as received by all Christians, and speak of many of the Fathers as inspired by the Holy Ghost. Clearly therefore, in Newman's opinion, they were meant to gain over the moderate Romanists; and clearly they were not directed against the Council of Trent, for when the Articles were promulgated the council was not over. But in spite of this really substantial defence for the Anglican view of the Articles, Tract 90 provoked an explosion which was the end of the Tractarian movement, and brought on the conversion to Rome of those of the Tractarians who were most logical as well as most in earnest. The tract was repudiated by those in authority; the bishops almost all declared against

the movement; Newman struggled for two years longer to think his position tenable, but in 1843 resigned the vicarage of St Mary's, which he had held since 1828, and retired to Littlemore (q.v.). The magnificent university sermon on 'Development in Christian Doctrine,' which was the preliminary stage of his *Essay on Development*, was the last which he preached in the university pulpit—viz. on the 2d February 1843. During his life at Littlemore he was a man suspected of all sorts of disloyalty to his church—for example, of being a Roman Catholic already, who only concealed his change of faith in order to exert more influence over other Anglicans—a course of which he was quite incapable. On the 8th October 1845 he invited the Passionist Father Dominic to his house at Littlemore in order that he might be received into the Roman Catholic Church, and on the following day he was received; and within a few months he had left Oxford, which he never saw again for thirty years.

Of Newman's life as a Roman Catholic it is necessary to speak only briefly. It was, however, in a literary point of view much more free and natural than his somewhat repressed and severely reined-in life as an Anglican. He first went to Oscott to be confirmed; then he went to Rome for a year and a half; and on his return in 1848 he published *Loss and Gain*, the story of an Oxford conversion very different from his own, but full of happy and delicate sketches of Oxford life and manners. Shortly afterwards he began, but did not at that time conclude, *Callista*, the story of a martyr in Africa of the 3d century. The little book is full of literary genius as well as of religious devotion, and it contains a most vivid picture of the devastation worked by the locusts in that country, as well as a still more impressive picture of Newman's conception of the phenomenon of demoniacal possession. In 1848 Newman established a branch of the brotherhood of St Philip Neri (q.v.) in England (see ORATORY). Newman established himself at Edgbaston, a suburb of Birmingham; and here he did a great deal of hard work, devoting himself to the sufferers from cholera in 1849 with the utmost zeal. The lectures on *Anglican Difficulties*, intended to show that Tractarian principles could only issue in submission to Rome on the part of any Tractarian who had a logical perception of what the movement meant, was the first book which drew public attention to Newman's great power of irony and the singular delicacy of his literary style. These lectures were delivered and published in 1850, and were followed in 1851 by the Lectures on 'Catholicism in England,' in which the Protestant prejudices and prepossessions about Roman Catholics were painted with a great power of ridicule and even caricature. This was the book which gave occasion to Dr Achilli's action for libel against Newman, tried by Lord Campbell, in which the verdict went against Dr Newman so far as this, that the jury thought that he had not succeeded in justifying the libel, and awarded damages of £100 against him, while the costs of the case are said to have amounted to £10,000. Lord Campbell's charge was deemed very one-sided even by Protestants.

Newman will probably be longer remembered as a great preacher than in any other capacity. His long series of Oxford sermons contain some of the finest ever preached from an Anglican pulpit, and his Roman Catholic volumes—*Sermons addressed to Mixed Congregations* (1849) and *Sermons on Various Occasions* (1857)—though less remarkable for their pathos, are even fuller of fine rhetoric, and show the rarest finish. In 1864 a casual remark by Canon Kingsley in *Macmillan's Magazine* on the indifference of the Roman Church to the virtue of truth-

fulness, an indifference which he asserted that Dr Newman approved, led to a correspondence which resulted in the publication of the remarkable *Apologetica pro Vita Sua*, afterwards slightly recast as *A History of My Religious Opinions*. In this book Dr Newman gave us much the most fresh and effective religious autobiography of the 19th century, and completely vindicated the simplicity and candour of his own theological career. It is perhaps the most fascinating of his many works, as it is of course the most personal. In 1865 Newman wrote a poem of singular beauty, giving his view of a good Roman Catholic's experience in death, called *The Dream of Gerontius*. It is a poem of marvellous subtlety and pathos, as unique in treatment as it is in subject, and is now republished in the volume of *Verses on Various Occasions* (1874), which contains also all the pieces originally published in the *Lyra Apostolica*. In 1870 he published his *Grammar of Assent*, a book on the philosophy of faith, based on the view that a believing and even credulous attitude of mind clears itself much more easily of false beliefs than a sceptical attitude of mind clears itself of false denials. In the controversies which led to the Vatican Council Newman sided with the Inopportunist. He believed that the decree of the pope's personal infallibility in putting forth *ex cathedra* definitions on theology or morals intended to teach the church would alienate many Anglicans from the Roman Church, and he thought the doctrine, though true, not ripe for definition, nor pressed upon the attention of the church by any heresy. He was at this time in vehement opposition to the Ultramontanes under Archbishop Manning and William George Ward, and the bitterness between the two parties ran very high. Under Leo XIII. the policy of the church altered, and the new pope was anxious to show his sympathy with the English Catholic moderates; and in 1879 Newman was summoned to Rome to receive the cardinal's hat. In acknowledging congratulations he renewed his protest against liberalism in religion, the depreciation of revealed dogma, and the popular view that one creed, honestly held and practised, is as good as another. In the last eleven years of his life his most notable publication was an essay in attenuation of the difficulty of treating Scripture as plenary inspired, suggesting that inspiration does not necessarily include mere matters of detail in history, unless these are of the nature of what are called 'dogmatic facts'—facts which lie at the basis of revealed truths, such as the supernatural birth of Christ. He died of pneumonia on the 11th August 1890, after a very short illness.

Newman has of late become a recognised spiritual power in France, where many devout and distinguished Catholics have pronounced him the greatest theologian of his time. The modernists claim him as a spiritual father, mainly in virtue of his theory of development; and wide as are their differences in dogmatic detail, Loisy professes discipleship, with obvious grounds of justification. See works by Loisy, Thureau-Dangin, Dimnet, Lucie Félix Faure, Grappe, Raoul Gout, and the Abbé Brémond (1905-12); and on Newman's life generally, the standard Life by Wilfrid Ward (1912); his own letters, edited by Miss Mozley (1891); and works on him by R. H. Hutton (writer of the above article), Waller and Burrow (1901), Whyte (1903), Barry (1904), Sarolea (1908), Bertram Newman (1925).

Newmarket, the 'racing capital of England,' lies in Suffolk on the border of Cambridgeshire, 14 miles ENE. of Cambridge and 69 NNE. of London. Twice almost destroyed by fire, in 1683 and 1700, it chiefly consists of one long street, and contains an unusual number of hotels and fine private houses, belonging to the great patrons of the turf. Principal edifices are the Jockey Club (1773); the adjoining Subscription Rooms (1844);

the King Edward Memorial Hall (1913); the Rous Memorial Hospital (1883), with almshouses for eight jockeys and trainers or their widows; St Mary's Church, Perpendicular in style; and All Saints (1877). The town owes its prosperity to its horseraces, as old at least as 1605; and nearly half the male population are jockeys, trainers, or stablemen (Holcroft the dramatist was once one of their number). The race-ground, on Newmarket Heath, to the west, which is traversed by the Devil's Dyke (see CAMBRIDGESHIRE), is owned by the Jockey Club, and, with its soft elastic turf, is one of the very finest in the world. Of its ten courses, the longest is $4\frac{1}{2}$ miles in circuit. The training-ground bears a like character for excellence, and 400 horses are constantly in training. There are eight annual meetings, the principal events being the Two Thousand at Easter and the Cambridgeshire and Cesarewitch in October. Pop. (1851) 3356; (1921) 9752. See HORSERACING.

New Mexico, a south-western state of the United States, admitted in 1911, an earlier scheme for incorporating it with Arizona as a new state having been defeated (1905) by the opposition of Arizona. Bounded N. by Colorado, E. by Oklahoma and Texas, W. by Arizona, and S. by Texas and Mexico, it has an area of 122,580 square miles, and exceeds in size all the states of the union except Texas, California, and Montana. The population in 1880 was 119,565, and in 1920 360,350. The surface of the region belongs to the great plateau upon which rests the Rocky Mountain system. From an altitude of 6000 to 6500 feet in the north it descends gradually to about 4000 feet along the Mexican border, and sinks to 3000 or 3500 in the Llano Estacado of the south-east. Except in the east the whole region is traversed by broken ranges of mountains having in general a north and south trend. In the northern central part the Santa Fé, Las Vegas, and Taos ranges form part of the main axis of the Rocky Mountains, with a number of peaks over 12,000 feet high. Farther south, and east of the Rio Grande, are numerous broken ranges; and west of the Rio Grande the Sierra Madre rise above the level of the *mesa* (plateau) in various ranges. These mountains and the intervening *mesas* are cut by deep cañons. In the north-west a number of chains cross the Arizona boundary, and the San Juan Mountains enter the territory from Colorado. Among the mountains, especially in the north-east, are many 'parks' noted for their beauty and fertile soils. The surface rocks belong mainly to the Cretaceous period, with belts of Triassic formation. The mountain-chains and great part of the Sierra Madre plateau are much older. There are many tracts of metamorphic rock and lava overflows, some of which appear to be of comparatively recent date.

The precious metals are found in almost all parts of the state. Some of the most important mines are in the south-west near Silver City, Deming, and Lordsburg, others in the central region in the vicinity of Socorro, and farther north near Santa Fé. There are also valuable mines in San Juan county. Some of these mines were rudely worked by the early Spaniards, who compelled the Pueblos to labour like slaves. In several places old shafts have been discovered which were filled in by the Indians when they successfully revolted from this tyranny. Iron, lead, and copper occur in valuable deposits, and near Santa Fé are famous turquoise mines. There are also fields of both bituminous and anthracite coal. Mineral and hot springs are numerous.

The great mountain-divide causes the drainage of the region to flow south to the Gulf of Mexico, and west to the Pacific Ocean. The Rio Grande

traverses the central part of the state and receives many tributaries. The Rio Pecos which joins it in Texas drains the south-eastern part. In the north-east are streams which unite to form the Canadian River, and in the west are the headwaters of the San Juan, Little Colorado, and Gila, all affluents of the Colorado. In the river-valleys the soil is fertile and produces excellent crops; and many acres elsewhere may be (and are) successfully cultivated by irrigation. Specially notable is the vast Elephant Butte reservoir on the Rio Grande, 45 miles long, completed in 1916. The climate is healthful, and on the whole remarkably uniform, and the atmosphere is very pure and dry. The death-rate from pulmonary diseases is the lowest in the country. The rainy season occurs between the middle of July and the middle of September, lasting about a month. There are extensive forests on the mountains, and in the hilly regions of the western part of the state, and on the pastoral plains nutritious grasses which support great numbers of cattle and sheep. The yucca and cactus are characteristic forms of vegetation, especially in the Llano Estacado. Stock-raising is one of the leading industries. The flocks and herds need no housing in the winter, but of late years more attention has been given to improvement of the breeds, and the stock, instead of roaming at will, is often confined within enclosed ranges.

Though one of the most recently settled portions of the Union, New Mexico was among the earliest regions occupied by the white man, and Santa Fé, originally an Indian pueblo, claims the title of the oldest town in the country. When the Spaniards first visited this region they found a people living in communities with substantial dwellings, and marking the decay of a civilisation which had flourished in previous centuries. Excavation is yielding good results. In 1822 the people of New Mexico, in common with the other inhabitants of Mexico, of which it then formed a part, threw off the Spanish yoke. By the treaty of Guadalupe Hidalgo in 1848, after the war between Mexico and the United States, part of the territory was acquired by the latter nation. Additions were made by a later purchase from Mexico and by a cession from Texas. The population still includes about 20,000 'Mexicans,' and 20,000 Indians (see APACHES, NAVAJO, PUEBLOS). Santa Fé (q.v.) is the capital of the state; the state university is at Albuquerque.

Newnes, SIR GEORGE (1857-1910), son of a Matlock Congregational minister, founded *Tit-Bits* (1881), *The Strand Magazine* (1891), and other periodicals, sat as a Liberal for Newmarket (1885-95) and Swansea (1900-10), and was made a baronet in 1895. See PERIODICALS.

Newnham College, Cambridge, dates from 1871, when the Newnham Hall Company opened a house for five resident women students; Professor Sidgwick (q.v.) being from the first one of the most helpful friends of the enterprise. The numbers steadily increased, and in 1875 Newnham Hall was built, providing rooms for the principal, a lecturer, and twenty-six students. Scholarships were given by the London Companies and private friends, the library grew, a chemical laboratory and gymnasium were added, and the whole machinery of the college became more and more complete till, in 1879, the Newnham Hall Company was amalgamated with the Association for the Promotion of the Higher Education of Women. Additional land was acquired, and halls added. Old Hall, Sidgwick Hall, Clough Hall, and Peile Hall (1910), with the Pfeiffer Building (1893), Kennedy Buildings (1906), and a library, now form Newnham College. In 1881 the university

of Cambridge opened to students of Newnham and Girton some of its examinations, but not till 1921 its degrees. Trinity College, Dublin, however, admitted them meanwhile to *ad eundem* degrees. Miss Anne Clough (1820-92), sister of the poet, the first principal of the college, was succeeded by Mrs Sidgwick (see SIDGWICK, HENRY), Miss Stephen, Miss B. A. Clough, and Mrs J. P. Strachey (from 1924).

New Orleans, chief city of Louisiana and one of the greatest commercial cities in the Union, is situated on both sides of the Mississippi River—mostly on the east bank—107 miles from its mouth. The corporate area is 265 sq. m., but a large portion of this is market-gardens, forest, and swamp. The Mississippi makes two bends here, giving the old city a crescent-shaped front, whence its former title, 'The Crescent City,' but it has now the shape of the letter S. The river is from 600 to 1000 yards wide, and 60 to 240 feet deep. The bar at its mouth was removed in 1874-79 by the Eads jetties in South Pass, and vessels of 30 feet now easily reach New Orleans. On the north the city fronts Lake Pontchartrain, which connects directly with the Gulf by two channels, by one of which it is proposed to open communication for ships of 40 or 45 feet between city and sea. In 1923 the Industrial Canal was completed, which runs through the city from the lake to the Mississippi (over 5 miles). The commerce of the city is large, especially in cotton, for it is one of the world's greatest cotton markets, and has a great trade in fish, oysters, and other commodities. Since 1875 it has made great progress in manufactures, particularly in cotton goods, cotton-seed oil, shoes, machinery, lumber, furniture, fertilisers, sugar, rice-milling, cigars, &c.

The land upon which New Orleans is built is perfectly flat, and lies from 3 to 6 feet below the level of the Mississippi at high-water, and is protected from overflow by levees or dykes of earth. Similar levees in the rear keep out the waters of Lake Pontchartrain. The soil is saturated with water, and cellars are impossible. The climate is warm and damp, the mean temperature for the year being 69° F. The summer is tempered by winds from the Gulf, and is not oppressively warm. On account of its situation, the city is badly drained. Its health, however, has greatly improved.

While it possesses few imposing buildings, New Orleans is a picturesque city. There are several parks little improved, but with handsome monuments or statues of Jackson, Lee, Franklin, and others. The custom-house of granite is the largest and most imposing building in the city. The cathedral of St Louis, a Gothic church erected in 1794, is a good sample of the Creole-Spanish architecture. The archiepiscopal palace (1737) is the oldest building in the city. Other noteworthy structures are the cotton exchange, United States branch mint, and Christ and St Patrick's churches. Tulane University (known as the University of Louisiana from 1834 to 1883) is the principal educational institution. The Sophie Newcomb Memorial College (1887) is for the higher education of girls. Loyola University is Roman Catholic. There are colleges for negroes. The Howard Memorial (1888), Tulane, and Louisiana State libraries are all free. The Charity Hospital (1784) is the largest of many.

The site of New Orleans was first visited in 1699 by Bienville, who in 1718 laid the foundations of the city, and in 1726 made it the capital. In 1763 it was ceded to Spain by France, with the rest of Louisiana; but when in 1765 the Spanish governor, Ulloa, attempted to take possession, he was driven out, and the people established a government of their own. In 1769 New Orleans was occupied by the Spanish, and the leaders in the

late movement were shot. It was ceded to France in 1802, and transferred to the United States a few days later. Incorporated as a city in 1804, it was divided in 1836 into three separate municipalities, in consequence of the jealousies between the Creoles and the Americans; but the three were again consolidated into one in 1852. Since then New Orleans has annexed the neighbouring towns of Lafayette, Jefferson, Carrollton, and Algiers. Other outstanding events in the history of the city have been the battle of New Orleans (see JACKSON) in 1815; its capture in 1862 by the Federal fleet under Admiral Farragut (q.v.); serious political troubles in 1874 and 1877, resulting in 1874 in a battle on the levee between the citizens and the police and militia, in which 46 persons were killed and 216 wounded; and the lynching in 1891 of 11 Italian *maffiosi*. In 1880 the capital of Louisiana was removed from New Orleans to Baton Rouge.

Pop. (1769, when it was transferred to Spain) 3190; (1802, when it became American) 10,508; (1840) 102,193; (1880) 216,190; (1900) 287,104; (1910) 339,075; (1920) 387,219. The city is very cosmopolitan in race and language. Italians and Germans prevail among the foreign-born. There are over 100,000 negroes.

New Plymouth, the chief town of the provincial district of Taranaki, New Zealand, 220 miles NW. of Wellington by rail. Two miles from the town is an extensive roadstead. Pop. 13,000.

Newport, since 1891 a county borough of Monmouthshire, and a parliamentary borough (till 1918 combining with Monmouth and Usk), is seated on the river Usk, about 4 miles from its junction with the Severn, 24 miles SSW. of Monmouth and 145 W. of London, and it is one of the principal outlets for the produce of the extensive collieries and iron and steel works in the vicinity. Its shipping trade has greatly increased, and with it its dock accommodation, which now covers more than 100 acres (the Alexandra South Dock being the biggest in England). Newport is the largest iron-exporting port in the kingdom, and ranks third amongst the coal-exporting ports. Iron pyrites and manganese are imported. The town has many fine public buildings, prominent amongst them being the town-hall (1885) and St Woollos' Church, occupying an elevated site, and in style partly Norman and partly Perpendicular. On the creation of the Welsh diocese of Monmouth St Woollos' became its pro-cathedral. A transporter bridge (1903) crosses the river about 1½ mile below the road bridge which carries the traffic between London and South Wales. Besides its shipping trade, Newport has manufactures of india-rubber, gutta-percha, and railway and telegraph plant and wagons, whilst several important brass and iron foundries are in operation, as well as breweries and pottery-works. On 4th November 1839 the town was the centre of a Chartist outbreak, which resulted in the death of twenty persons, and the wounding of many more. Pop. (1801) 1087; (1891) 54,707; (1921) 93,700.

Newport, an urban district of Shropshire, on the Shrewsbury Canal, 11 miles WSW. of Stafford. Chartered by Henry I., and burned in 1665, it has a 15th-century church, a grammar-school (1656), and manufactures of machinery. Pop. 3000.

Newport, the capital of the Isle of Wight, on the navigable Medina, near the centre of the island, 4½ miles S. of Cowes and 10 SW. of Ryde. The church, rebuilt in 1854-56 on the site of one nearly 700 years old, is a fine Decorated edifice, and contains Marochetti's beautiful monument, erected by Queen Victoria in memory of the Princess Elizabeth, who died at Carisbrooke Castle (q.v.) on 8th September 1650. Newport besides has a

town-hall (1810); a free grammar-school (1612), the scene in 1648 of the protracted but fruitless negotiations between the parliamentary commissioners and Charles I., to whose secret 'engagement' a year before with the Presbyterian Scots the town also gave name; a diocesan school (1860); and a literary institute and museum. To the north-west are a reformatory (1838) and barracks (1798). A municipal borough, Newport returned two members till 1867, and then one till 1885. Pop. 11,000.

Newport, a town of Fife, on the Firth of Tay, 1½ mile by water SSE. of Dundee, has a small harbour designed by Telford (1822), and municipal buildings (1890). Pop. 3300.

Newport, (1) a city of Kentucky, is on the Ohio, opposite Cincinnati, and at the mouth of the Licking River, which separates it from Covington; both rivers are bridged. The city contains large rolling-mills and steel-works. Pop. (1880) 15,693; (1920) 29,317.—(2) A port and till 1900 one of the capitals of Rhode Island, on the west shore of the island of Rhode Island, in Narragansett Bay, 5 miles from the ocean, and 69 miles by rail S. by W. of Boston. It has a deep, excellent harbour, defended by Fort Adams. It is noted for fine scenery and sea-bathing, and is one of the most fashionable watering-places in America. In Touro Park stands the 'Round Tower,' or 'Old Stone Mill,' which suggested Longfellow's poem 'The Skeleton in Armour.' It was settled in 1638 by eighteen adherents of Roger Williams, and was an important commercial town prior to the Revolution, which effected its ruin and transferred its trade to New York. Newport was for a time the residence of Bishop Berkeley. Pop. (1880) 15,693; (1900) 22,034; (1920) 30,255.

Newport News, a city and port of Virginia, on the north shore of the estuary of the James River, has extensive shipbuilding yards, iron-works, &c.; pop. 35,600.

Newport-Pagnell, an urban district of Bucks, at the influx of the Ousel to the Ouse, 56 miles NNW. of London. Named from the Paganels, who owned the manor in the days of Rufus, it was taken by Essex in 1643, and held two years later by Sir Samuel Luke, the prototype of Butler's 'Hudibras.' The fine parish church, restored by Street in 1858, is the principal edifice; lace-making has declined. Pop. 4000.

New Red Sandstone. See PERMIAN SYSTEM, TRIASSIC SYSTEM.

New River, an artificial cut, running 38 miles southward from Chadwell Springs in Hertfordshire into reservoirs at Hornsey and Stoke Newington. It was designed for the water-supply of London, and completed (1609-20) at a cost of £500,000 by Sir Hugh Myddelton, goldsmith, who died poor on 10th December 1631. In 1904 the company was taken over by the newly formed Metropolitan Water Board.

New Rochelle, a city of New York, in Westchester county, on Long Island Sound, is a residential suburb of New York; pop. 36,000.

New Ross, a river-port of Wexford, on the Barrow (till 1898 partly in Kilkenny County), 15 miles NE. of Waterford. Old Ross lies 5 miles to the east. Before the Union New Ross returned two members to parliament, and down to 1885 one. It was founded by Strongbow's daughter, and was formerly fortified. Pop. 5500.

Newry, a seaport, till 1918 a parliamentary borough, in County Down, on the Newry River, 38 miles SSW. of Belfast by rail. A canal connects it with Carlingford Lough and with Lough Neagh. The town is handsomely and compactly built, and the port does a large trade with Glasgow

and Liverpool in cattle and other agricultural produce. Flax spinning and weaving, with rope and sail making, tanning, and granite-polishing, are the industries. The place dates from 1131; its castle was taken by Edward Bruce in 1318. Pop. 12,000.

New Shoreham. See SHOREHAM.

New Siberia, a group of uninhabited islands in the Arctic Ocean, lying off the coast of Siberia, between the mouth of the Lena and the mouth of the Indigirka. The principal are Kotelnoi (the largest), Liakhov, Fadeyeff, and New Siberia. The soil contains immense quantities of mammoth and other fossil ivory.

New South Wales, one of the States of the Australian Commonwealth, is the oldest and most populous colony in Australia. The name was given by Captain Cook (at first in the form 'New Wales') to the coast-line which he discovered in 1770, apparently because he saw some resemblance between it and that of Wales; it was therefore applied to the first British colony founded in Australia, which extended nominally from that coast to long. 135° E. As other settlements were made, this area was gradually limited to that of the present state.

The boundaries of New South Wales are: on the north the 29th parallel of south latitude, with two northward bulges near the coast, reaching the Pacific at Point Danger, and separating the state from that of Queensland; on the east, the Pacific Ocean—here known as the Tasman Sea; on the south, a line from Cape Howe to the source of the Murray, and the left bank of that river, separating New South Wales from Victoria; on the west, the 141st parallel of east longitude, separating it from South Australia. The enclosed area is 310,372 sq. m., a tenth part of Australia, but nearly three times as large as Great Britain and Ireland. For the history of the colony, see AUSTRALIA.

Geography.—New South Wales is made up of two series of plains, the coastal and the western, separated by a tableland, which towards the centre of the State has been worn away to a mere watershed. Along this tableland run north and south a series of low ridges with a few peaks, to which different names are given at different points; but the words 'range' and 'mount' must be understood to refer to these plateaux and humps, not to the features which they connote in European usage. Thus Mount Kosciusko, the highest hill in Australia (7328 feet) and the summit of the Australian Alps, is merely one of many hummocks on a plateau well over 6000 feet high. As it extends northwards, the tableland drops to about 3000 to 4000 feet, and ends a little to the north-west of Sydney, where the softer rocks of the great coal-basin have been worn away by the Goulburn River and its tributaries on one side, and the Namoi and its tributaries on the other, of the volcanically formed Liverpool Range. On the northern side of the Namoi valley begins another tableland, the New England Range, whose higher levels reach 4000 feet, while the highest point, Ben Lomond, is another hummock only 500 feet above the railway-line which traverses the tableland. The rivers of both tablelands flow usually northwards at first, then turning east or west to the sea or the plains; in New England they fall suddenly over great cliffs into deep cañons as they turn—farther south they cut huge gorges for themselves before turning seawards; in both cases the westerly-flowing streams descend to the plains by easier grades. The Clarence (190 miles long, draining about 8000 sq. m.) and Macleay (160 miles) are examples of the first kind; the Hawkesbury (335 miles, draining about 8000 sq. m.) and Shoalhaven (220

miles) of the second. The Hunter (340 miles), with its tributary the Goulburn, drains the low land between the tablelands. The western rivers, of which the chief are the Murrumbidgee (1050 miles), Lachlan (850), Macquarie (590), Castlereagh (340), Namoi (430), Gwydir (350), and Macintyre (180), on emerging from the foothills of the tablelands drift slowly to the Murray or its great affluent the Darling; but the bulk of the water they receive from the hills either evaporates in the summer heat of the plain country or sinks through porous soil, mostly replenishing the reservoirs from which artesian wells derive their supply. The Murray itself has 1200 miles of its course in the State, out of a total of 1600; the Darling has 1760 to its junction with the Murray. The lengths given above for the other western rivers are measured to their junctions with the Murray or Darling. There are few real lakes: those on the coast (e.g. Lakes Macquarie and Illawarra) are lagoons connected with the sea; those of the inland plain (e.g. Menindie, Cawndilla, and Victoria) are depressions occasionally filled with flood-water from the Darling; Lake George is a portion of the Murrumbidgee basin isolated by earthquake action, and is often dry for years together; the real lakes of the Kosciusko plateau are of small area. The coast-line is unusually uniform in trend, running from NNE. to SSW. in almost strict parallelism with the great tablelands; the deep and ramifying inlets of the coast just north and south of Sydney are replicas of the deep gorges forty miles inland. Port Jackson, indeed, is a typical Blue Mountain valley. Farther north and south there are few harbours that do not require constant dredging; most of them are river-mouths blocked by bars of their own silt, which a steady north and south ocean current will not allow to be thrust farther seawards—hence the few deltas do not extend beyond the protection of neighbouring headlands. Port Stephens, to the north of the Hunter estuary, and Jervis Bay, south of the Shoalhaven, are the only natural harbours beyond the central (Sydney) area. The principal towns are Sydney (q.v.); Parramatta, just inland from it; Newcastle, Maitland, and Cessnock, in the Hunter valley; Goulburn, on the southern tableland; Lithgow (the future federal arsenal), in the hills between Bathurst and Sydney; and Broken Hill, in the extreme west. Towns with less than 10,000 population, but still worth noting, are Albury, on the Murray; Wagga and Hay, on the Murrumbidgee; Bathurst, on the Upper Macquarie; Armidale on, and Tamworth at the foot of, the New England tableland; and Grafton and Lismore, in the northern coastal valleys.

Geology.—'Physiographically,' says Professor David, 'New South Wales consists of immense tablelands and plains of ancient hard rocks, often highly crystalline, ranging from Archæan to Carboniferous in geological age, and containing lodes and reefs of gold, silver, copper, lead, zinc, tin, antimony, bismuth, molybdenite, tungsten, &c.' A deep hollow in this substructure holds the great central coal-basin, whose centre lies 3000 feet below Sydney, and whose edges, roughly speaking, are lines drawn from Gunnedah, on the Namoi, to Port Stephens and Jervis Bay. A second coalfield of Trias-Jura age occurs in the north-east of the State, and Trias-Jura sandstones underlie the whole of the artesian basin which spreads across the northern plains, bounded on the south by the Macquarie and the Darling as far as Louth. The tablelands are Palæozoic, diversified with volcanic upbreaks, especially in the New England district. Of the western plains two great areas, one stretching from Cobar towards the Darling and Lachlan, the other round Mount Brown and the Barrier

Ranges in the far west, are also Palaeozoic; a third along the Murray and lower Darling is a depression filled with the sediments of an Eocene sea; a fourth is the artesian (Trias-Jura capped with Cretaceous sediments) basin just spoken of. All these are covered for the most part by red and black soils (the latter the mark of ancient river-beds) formed from the disintegration of Desert Sandstone (Upper Cretaceous) deposits. The oldest sedimentary rocks occur in the Barrier Ranges, wherein no fossils have yet been found. A remarkable feature of the State's geology is the occurrence at many points in the southern tableland of oval limestone areas, containing fossil corals and marine shells similar to those now found in the Barrier Reef of Queensland (q.v.). Seventeen of these areas are known, and in most there are caves of the Cheddar type, though much larger. In a series near Wellington the bones of extinct marsupials of great size—e.g. the *Diprotodon*, a wombat 16 feet long—are found under a thin layer of stalagmite.

Industries.—Almost the first, and always the chief, industry of the State has been wool-growing. Its stations in normal years contain over 40 per cent. of the sheep of the Commonwealth, and yield about 47 per cent. of the wool; its horses number nearly a third, and its cattle about a quarter, of the Australian totals. (The best New South Wales cattle, by-the-by, are in its dairy herds; it is the dry inlands of the far north that rear the Commonwealth's finest beef-producing cattle.) The mining industry is next in importance. Coal, which was first discovered at Newcastle and Coal-cliff (near Bulli) almost simultaneously in 1797, is obtained mainly in three districts—Maitland-Cessnock, in the lower Hunter valley; Lithgow, west of the Blue Mountains; and Wollongong-Bulli, in northern Illawarra. A shaft has also been sunk on the shores of Port Jackson, but the mine is worked only intermittently. The famous Newcastle coalfield is now practically worked out. All these fields belong to the great coal-basin; the Trias-Jura coal of the Clarence district is suitable only for local use. Silver production, mainly from the mines at Broken Hill (with lead and zinc) in 1919–20 diminished almost to extinction on account of constant strikes. Gold was discovered in 1851, but the Victorian fields soon outdid the New South Wales yield. Nowadays alluvial gold is chiefly won by dredging, in the Araluen, Adelong, and Gundagai valleys of the southern tableland; the chief quartz-mining areas are near Canbelego on the western plains, and Hillgrove on the northern tableland, but both are almost abandoned. Copper was first mined for in 1844, but the Cobar district, which became the State's main source of copper, was not touched till 1869. The drop in prices of 1919 affected it so seriously that by 1921 it had practically vanished. Tin shows a somewhat steadier yield, chiefly from the Inverell and Emmaville districts on the western slopes of the northern tableland; a new field at Ardlethan in the western plains has been found profitable. The extensive deposits of iron ore, whose existence has long been known, have been of late years systematically developed. The yield of other minerals is commercially of little importance; attempts to develop profitably known deposits of oil-shale have not succeeded, but there are valuable deposits of various clays and pigments, magnesite and tripolite, and at Bulladelah (north of Newcastle) there is the most remarkable deposit of alunite known in the world.

In manufactures New South Wales, largely because of its free trade policy, was, for many years before federation, of much less importance than protectionist Victoria; but when the common federal tariff more or less equalised conditions,

the larger State gradually caught up. Except the great steel works at Newcastle and Lithgow, and the smelting works at Newcastle and Port Kembla, New South Wales has no special lines of manufacture; its clothing and food manufacturing industries are conducted much on the same scale as those of other States, the actual factories being on the whole fewer and larger. The metal works, however, are particularly subject to strikes and the consequent disintegration of industry.

Agriculture, though practised in various forms from the earliest days of the colony, was of little importance for more than a hundred years. Up to 1892 the area farmed had never exceeded an acre per inhabitant; ten years later the proportion had doubled, and in the early years of the Great War more than trebled, but has since declined to pre-war level—about 2 acres per inhabitant, mostly in wheat. The sugar yield, which in the last century was an important part of New South Wales agriculture, fell off greatly in the first years of this century. This was due to the discovery that the north coast valleys and deltas, in which sugar had been grown previously, were admirably fitted for dairying; when, therefore, the introduction of cold storage on the mail-boats enabled dairymen to send their produce direct to the European markets, not only were the cane-fields regrassed for cattle pastures, but a huge area of forest was brought under settlement. In the period 1901–11 the production of butter alone grew from 39,000,000 to 83,500,000 lb., most of it coming from the north-coast districts; while the south-coast farmers supplied Sydney with milk, and made cheese. During and since the war, however, the yield of butter steadied at a lower level. The wheat district lies mainly along the western slopes of the main range; it is at present bounded (roughly speaking) by a line drawn from Moree in the north through Condobolin to Swan Hill on the Murray, which corresponds in most districts to the western limit of 10-inch rainfall between April and October; but south of the Lachlan towards Lake Cargelligo and Hillston, and along the Murray towards Balranald, good crops are obtained on a smaller rainfall. Near Goulburn the wheat-growing area extends across the main range eastward to the upper Shoalhaven. The production has of late years varied between 20,000,000 and 50,000,000 bushels, averaging 11 bushels to the acre; 'bumper' crops in 1915 and 1920 reached 67,000,000 and 56,000,000 bushels respectively. Oats and barley (grown for hay) are hill crops; potatoes also, mainly round Bathurst; maize, grown usually as feed for the dairy herds, is a staple of the coast, averaging from 18 to 30 bushels per acre. (This illustrates a weakness of New South Wales agriculture, the tendency to evade rotation and use the same area for the same crop year after year; in the ten years preceding the war the average maize crop ranged from 40 to 44 bushels.) *Paspalum* grass occupies much of the north-coast pastures, while at the western edge of the tablelands, especially where irrigation is possible, lucerne is a favourite fodder crop. Wine grapes are cultivated and good wine is made near Albury on the Murray, and in the valley of the Upper Hunter; table grapes and citrus fruits round Sydney; English fruits on the tablelands; the northern rivers produce semi-tropical fruits, and near Wagga the fruit-drying industry has been started with success. Timber-felling is, on the whole, carelessly conducted; the State until lately was slow to make, and negligent in enforcing, the regulations necessary for the proper use of existing forests and the reforestation of depleted areas. Fishery has been even more neglected, although the coastal waters are full of edible fish,

and the lagoons afford excellent breeding-grounds; but of late years some attention has been paid to this industry—in 1906 a State hatchery was established on Port Hacking, south of Sydney, and in 1915 three steam trawlers, under government control, began to supply the public (through State retail depots) with excellent fish trawled at less than three hours' steaming distance outside Port Jackson. This enterprise, however, was wastefully managed, lost a great deal of public money, and was closed down in 1923. Refrigerating stations have also been built at Newcastle, Port Stephens, and the Clarence River to store fish caught by local fishermen.

Trade.—The overseas trade of New South Wales has for many years exceeded that of any other State, and is still growing proportionally. More than nine-tenths of it is of internal origin or destination, the rest being in transit to or from other States. As might be expected from the account of industries already given, the chief export is wool, which accounts for nearly 40 per cent. of the total Australian export; for butter and wheat the proportion is about a quarter, for silver four-fifths, for coal practically the whole. The imports from other States, chiefly either foodstuffs or ores for smelting, are balanced by exports to them of coal, &c. (see AUSTRALIA, SYDNEY). Trade within the State is facilitated by about 5500 miles of railway, forming a comparatively aimless network of lines constructed to suit local needs and temporary conditions of finance; when the lines now under construction are completed, the State will have two main lines into Queensland (one along the coast, the other on the New England tableland), one to Melbourne, and one across the inland plains to Broken Hill and South Australia—this is intended to connect up with the federal trans-continental line, and give a direct route from Sydney to Perth. A very important branch line (Binnaway to Werri Creek) opened in 1923 gives for the first time through communication between northern and southern Australia by an inland route, safe from coastal attacks: until its opening the only through line passed over the Hawkesbury Bridge, which is close to and easily accessible by water from the open ocean.

Government.—The State, while for certain purposes administered by the federal government (for which see AUSTRALIA), has still sovereign rights over its lands, railways, education, internal trade, &c. The State governor is appointed by the imperial government for a period of five years. His personal powers, apart from those exercised as the head of the executive council, include that of withholding the royal assent from certain classes of bills and that of granting or refusing a dissolution. The Legislative Council consists of nominees for life—there must be at least 21 members, but the usual number is about two-thirds of the Assembly, i.e. 60. Of late years this proportion has been considerably exceeded, in order to 'swamp' the House with members favourable to its abolition. The Legislative Assembly of 90 members is elected under a system of proportional representation, nine electorates returning 5 members each and fifteen returning 3 each. Until lately members were paid £500 a-year; but in 1921 the amount was increased to £875, and in 1922, after an election at which this increase was one of the issues, reduced to £600.

The population has grown from 1,377,648 in 1901 to 2,189,379 in 1923. (These figures are taken from the federal statistician's publications; the State statistician, for some reason, lessens the first and increases the second computation slightly.) There is a small preponderance of males. The excess of births over deaths is about 16½ per

thousand. About 1 per cent. are of non-European blood; and 1500 full-blooded aboriginals are not included in the total. Over 85 per cent. are Australian-born, and another 12 of British birth. A disquieting feature of the growth is its distribution between town and country. In 1901 less than 36 per cent. of the population was settled in the metropolis; by 1921 the proportion had risen to 43. The percentage of the purely rural population has at the same time sunk from 37 to 32, and that of the population within extra-metropolitan municipalities from 27½ to 25. To put it in another way, in twenty years the population of an already over-grown metropolis increased by nearly 420,000, while all the rest of the State only acquired 330,000 new inhabitants.

See AUSTRALIA and works there cited; also the State's *Official Year Books and Statistical Register*. The *Historical Records of New South Wales* (8 vols. ending with 1811) contain many documents not to be found in the *Historical Records of Australia*, which, as far as New South Wales is concerned, are so far almost entirely confined to governors' despatches. Sir Henry Parkes's *Fifty Years in the Making of Australian History* is valuable, despite its obvious bias, for the political history of the period 1842-93; Dr Lang's *Historical and Statistical Account of New South Wales* gives with greater bias another point of view. An excellent summary of facts of all kinds about the colony covering the period up to 1914 is given in the *Handbook to New South Wales* published in Sydney in connection with the visit of the British Association for the Advancement of Science; this was compiled by experts in all the subjects treated of, and a reprint, if brought up to date, would be of great value.

Newspapers.—Ancient Rome and China had the honour of introducing the newspaper. As early as the 1st century the Roman government issued daily bulletins of official news called the *acta diurna*. These were posted in public places, and circulated to the generals in command of the different armies. These *acta diurna* ceased when the Western Empire fell, about 476 A.D. The *Peking Gazette*—to use its foreign name—has been published regularly since 618 A.D. It was not, however, until the introduction of printing from movable type (about 1450) that anything resembling the modern news-sheet was issued. In this respect the Germans were the pioneers. German news-sheets were started in the early part of the 16th century. The newspaper industry began in England in 1622, when Nathaniel Butter issued the *Weekly News*. The *Oxford Gazette*, predecessor of the *London Gazette*—still the government official organ—first appeared in 1665.

It is estimated that the aggregate number of newspapers in all countries amounts roughly to 34,000, of which 2000 are published in Great Britain and Ireland, 184 being dailies and evenings, 18 Sunday, and 1798 weeklies, but it is difficult to procure precise information regarding newspapers in other countries. The estimate must be taken subject to this proviso.

Cheap paper, the rotary printing-press, and the electric telegraph revolutionised the production of newspapers. These changes date back to 1870, but their full effect was not felt until some twenty-five years later. The result has been an amazing increase in the number of publications and in the size of circulations. Cheap paper was due to the introduction of wood pulp as a paper-making material (see PAPER). Vast forests are now cut down each year in Canada, Newfoundland, Norway, Sweden, and Finland to supply the millions of tons of paper required to produce the newspapers and periodicals of the world. Prior to 1814 all newspapers were printed on hand-driven machines. In that year Mr John Walter, of the *Times*, installed a machine driven by steam, but the practice did

not become general until the introduction of the rotary printing-press, which prints from rolls of paper, the sheet being passed through rapidly revolving cylinders on which are fixed circular metal plates containing stereotyped reproductions of the page as set up in type. The modern rotary presses print at almost incredible speed. Sixteen-page papers can be produced complete at 36,000 per hour (see PRINTING). The first practical rotary, invented by Augustus Applegath, was installed at the *Times* in 1848 by Walter the second, but the machine did not come into general use until much later. Simultaneously with the provision of cheaper paper and improved machinery, increased cable, telegraphic and telephonic facilities entirely revolutionised the collection and distribution of news. Vast news-gathering organisations have been established in most civilised countries. The chief are: in Britain, Reuters, which has world-wide connections, the Press Association, a co-operative society comprising the newspapers of the United Kingdom and Ireland, and allied with Reuters, the Central News, and Exchange Telegraph Company; in America, the Associated Press, the United Press and International News Agency; in France, the Havas Agency; in Germany, the Wolff Agency; in Italy, the Stefani Agency; in Belgium, the Agence Télégraphique Belge; in Spain, the Fabra Agency; in Holland, the Nederlandsch Telegraaf Agentschap; and in Japan, the Kokusai Agency.

Most of these are ordinary commercial undertakings. Many work in co-operation, so that the news collected in one country is available for newspapers elsewhere. By these means the most important parts of the world are bound together for news-gathering purposes. What is collected in Britain, for instance, is available for France, Germany, America, &c. The news agencies in each country are represented by correspondents in the various districts. Most of them are attached to local newspapers, each of which collects the news in its own district. In Britain and America the bulk of the news is supplied to the newspapers by news agencies, but leading papers in all countries have their own correspondents in most of the principal centres both at home and abroad. Large sums are spent in telegraphing or cabling news and comment. Information is often communicated and published with extraordinary rapidity. For instance, when peace was signed at Versailles, the London evening newspapers announced the fact within three minutes after the signatures had been affixed. In Britain, reports of parliamentary proceedings, law reports, and public speeches are usually supplied by the news agencies. In Britain the art of shorthand reporting has been highly developed. In America it is little used.

The modern press has been revolutionised by many important innovations, of which the chief are:—

1. *Illustration by what are known as Half-tone Blocks* (see ILLUSTRATION OF BOOKS).—These blocks, produced by photography, and mostly from photographs, superseded the line engraving in the weekly illustrated papers, such as the *Illustrated London News*, *Graphic*, and *Sphere*, about the year 1890. In the same year the *Daily Graphic*, the first daily illustrated, was published. But it was not until 1904, when the *Daily Mirror* was converted into a picture paper, that daily illustrated journalism achieved its present-day popularity. The success of the *Daily Mirror* led to the publication of half-tone illustrations in the daily, evening, and Sunday papers throughout the country. This may be regarded as a most important journalistic epoch. These activities gave rise to a new pro-

fession, that of the press photographer, one of the most adventurous and daring types in history. These photographers are prepared to take any risks to secure a good picture, even in some cases the risk of unpopularity with their victims.

2. *The Woman's Page—Catering for the Requirements of Feminine Readers.*—Prior to 1895 newspapers did very little for women, except by providing their readers with plenty of scandal. Before 1860 or thereabouts in this respect the press displayed a degree of licence never since equalled. Newspapers of the highest degree published personal paragraphs, the like of which are never seen nowadays. The provision for women readers has not been confined to the woman's page. Many leading English papers now publish serial fiction. This idea was borrowed from France. Generally speaking, this sort of fiction is written by experts who understand the true significance of the phrase, 'To be continued in our next.'

3. *News Treatment.*—The hurry and complexity of modern life, and the creation by the Education Act of 1870 of a new class of reader, inevitably led to the *Tit-Bits* style, first exemplified by that perceptive genius, Sir George Newnes, in 1881. The success of *Tit-Bits* showed journalists, and notably Lord Northcliffe, undoubtedly the outstanding figure of modern journalism, that the public wanted shorter and snappier paragraphs in the newspapers, and more information about the simple things of life. The period when the press enlivened its columns by more or less authentic paragraphs concerning the private lives of more or less distinguished people was followed for the most part by a period of stately dullness, only lit up by occasional verbatim reports of *causes célèbres*. The *Daily Telegraph*, built up by the journalistic skill of the Burnham family, was a notable exception. But the *Daily Telegraph* had a style all its own, of which brevity was not a distinguishing characteristic. The *Daily Mail*, established in 1896, marked a new epoch in daily journalism. Its founder prided himself on picking out the eyes of the news. But this feature was usually supplemented by what unfriendly critics would describe as a 'stunt'—in other words, by lengthy treatment of some startling subject, such as German armaments, standard bread, sweet peas, &c. Another new feature was the adoption, from the *Globe*, now defunct, of brightly-written column articles on subjects of general interest. The leaders also were written in a new style—to use a journalistic phrase, 'with more punch'—and not too long. In the new journalism features and paragraphs were embellished with striking headlines, in marked contrast to the old-fashioned conventional style. It must be admitted, however, that much of this journalistic atmosphere was imported from America, where its protagonist was Mr Pulitzer, the emperor of yellow journalism. The *Daily Mail* was published at one halfpenny, but was not the first London halfpenny morning daily, having been preceded by *The Morning*, issued on 21st May 1892, and the *Morning Leader*, issued on the 23d May 1892. *The Morning* had a short life, but introduced to the British public most of the features of modern journalism. The *Morning Leader* has long since been incorporated with the *Daily News*. The journalistic revolution led to intensified treatment of all departments of information—sport, finance, shipping, markets, literature, &c. To-day most papers devote a large amount of space to racing, football, boxing, and golf. The evening papers issue early editions giving racing news, and every daily, evening, and weekly newspaper has its sporting correspondent, who not only comments upon current events, but provides its readers with prognostica-

tions or 'tips.' Football is one of the best sellers, and most evening papers throughout Britain issue on Saturdays football editions which have enormous circulations.

4. *The Extension of Advertising.*—The vast and varied activities of the modern press involve huge expenditure. To provide this, newspaper proprietors have found it necessary to pay ever-increasing attention to their advertising columns. In former days the advertiser was kept within strict limits. Many newspapers refused to publish display or full-page advertisements. To-day newspapers do their best to cater for the advertiser, and to provide him with full value for his money. Advertising has become a fine art, and advertisement-writing and the placing of advertisements a profession employing large numbers of skilled persons known as advertising agents.

5. *Improved Size, Type, and Make-up.*—The extended scope of newspapers in influence, features, and advertisements has necessitated a great increase in size, rendered possible, as has been said already, by cheap paper, the rotary press, and increased advertisement revenue. Types have also increased in size as compared with former days. The make-up of newspapers and the display of news has also become a fine art.

6. *The Contents Bill.*—The old-fashioned contents bill, containing a number of items in small type, has given place to a bill with not more than three lines in large heavy lettering. Many newspapers use their contents bills as a sort of slogan, intended not only to sell the paper but to emphasise a point of view.

7. *Vast Increase in Circulations.*—In all parts of the world the circulations of newspapers have largely increased, but those of London and Paris still predominate because they have national sales. French newspapers achieve this result by publishing numerous editions circulating throughout France, while the size of Britain, and the excellence of its railway service, enable London newspapers to reach most parts of the country in time for the breakfast-table. In America conditions are different and the sales much smaller. The circulations of the *Daily Mail* and *Daily Mirror* are in the neighbourhood of two million each, while the *Daily Chronicle*, *Daily News*, and *Daily Express* also have huge sales. Those of the *Times*, *Daily Telegraph*, and *Morning Post*, sold at 2d., and catering specially for a different class of reader, are considerably smaller.

8. *The Growth of the Sunday Press.*—Sunday newspapers appealing to the mass of the people have always enjoyed large circulations. Early in its career the *News of the World*, started in 1843 at 3d., had a sale of 250,000 per week—a huge figure in those days. It was followed by *Lloyd's News*, which also attracted a large number of readers. To-day the *News of the World* has a circulation of 3½ millions. The *Sunday Pictorial*, the *Sunday News*, formerly *Lloyd's News*, the *Weekly Dispatch*, *Sunday Express*, *Reynolds's*, the *People*, the *Empire News*, and *Sunday Chronicle*, all have large sales. The aggregate sale of Sunday papers is said to be about 12 millions.

9. *The Growth of the Provincial Press.*—Since 1880 the provincial press has made remarkable progress in importance and circulation. Great papers like the *Scotsman* (as a daily, 1855), *Glasgow Herald* (as a daily, 1858), *Liverpool Post* (as a daily, 1853), *Manchester Guardian* (1855), *Yorkshire Post* (1866), *Sheffield Telegraph* (1855), *Western Mail* (1869), *Birmingham Post* (1857), *South Wales Daily News* (1872), *Western Morning News* (1860), *East Anglia Times* (1874), and others provide their readers not only with local news, but with first-class services of general information.

The circulations of provincial morning papers are limited, but what they lack in numbers they make up in quality, being read by the more influential classes in their respective districts. Probably the sale of no provincial morning exceeds 100,000 per day. But the most marked feature of provincial journalism is the growth in number and importance of evening newspapers. In the chief centres their circulations run into big figures, such as 200,000, 300,000, 400,000, and 500,000. There is hardly a town of any importance that does not possess its evening paper. The aggregate sale of evening papers throughout Great Britain is estimated at six and a half millions.

10. *Improved Methods of Distribution.*—Newspapers are now distributed by means of a vast and complex organisation, employing every type of transport, from aeroplanes and special trains to push bicycles.

11. *Ownership by Companies.*—Formerly most newspapers were owned by individuals, but at the present time practically all the chief newspapers in Britain are owned by companies, many of which have large capitals, and some of which are public companies with thousands of shareholders. Many of these concerns control groups of publications, and are linked up with other concerns controlling other groups.

12. *Organisation of the Trade.*—In Britain the newspaper trade is perhaps the most highly organised of all trades. Employers are united in the Newspaper Proprietors' Association, representing the London daily, evening, and Sunday newspapers, and the Newspaper Society, representing the provincial press. The journalists are represented by the National Union of Journalists and the Institute of Journalists, and the various sections of mechanical workers by their respective trade unions. There is also a Society of Women Journalists. The wholesale and retail newsagents also have their respective associations.

13. *The Trade and Technical Press.*—In Britain, America, France, and Germany there are now large numbers of weekly newspapers dealing with scientific and technical subjects. Every profession and trade has a publication, or publications, devoted exclusively to matters affecting its interests. Some of these publications are very valuable properties, and are conducted with much knowledge and skill. Many of them largely consist of advertisement pages, alike informative for the reader and profitable for the proprietor. In Britain there are at least 450 trade and technical publications.

The Advance of Weekly Illustrated Newspapers.—The *Illustrated London News*, started in 1842, was the first illustrated newspaper of the modern type. It has been followed by many others in most civilised countries. In Britain, the *Graphic* and *Sphere* are two of its most notable successors. Many of these illustrated papers are works of art. They are usually sold at one shilling. Some are devoted more or less to sectional interests. *Country Life*, for instance, as its name implies, is chiefly concerned with country houses and country pursuits. Illustrateds like the *Tatler*, *Sketch*, and *Bystander* are mostly devoted to illustrating the glories of society.

Production of Newspapers.—A newspaper office comprises five departments—editorial, mechanical, commercial, publishing, and advertisement. The two chief executive officers are the manager and editor. Other head officials are the works manager, publisher, and advertisement manager. The editorial staff usually consists of the assistant editor, the news editor, the financial editor, the sports editor, the literary editor, the leader writers, and last, but not least, the sub-editors, reporters, and contributors. The news editor is responsible

for collecting the news, and ensuring that all forthcoming events are covered. The sub-editors are responsible for the treatment of the 'copy' as it is called. They cut down, write up or re-write what goes into the paper, and are also responsible for the headlines. The copy is then passed to the composing room, where it is set up, usually on linotype machines. The proofs are then checked by the 'readers' and submitted to the sub-editors. After the pages have been made-up in the composing room, they are passed to the stereotyping room, where the cylindrical plates are cast. These are then passed to the machine room, where they are fixed upon the presses. The copies are delivered by the machines ready counted for distribution. All these operations are performed in an incredibly short space of time, so that in some instances within a quarter of an hour after the copy has been received by the sub-editor it is published in the paper.

Power and Influence of the Press.—Burke described the press as the 'Fourth Estate,' implying, of course, that the other three were King, Lords, and Commons. Although this phrase is frequently used, it is neither happy nor accurate, as, unlike King, Lords, and Commons, the press has no executive power. It is purely a reportorial and critical institution. During recent years its influence has increased enormously. As the servant of the public it has secured all sorts of privileges for collecting and distributing information. The severity of the libel laws has been mitigated in regard to the publication of the reports of meetings and other matters of public interest. It is difficult to analyse or accurately to appraise the influence of the press. According to Lord Northcliffe, the chief power of the press is 'the suppress'—i.e. silence. But it may be noted that two at least of the epoch-making movements of modern times received little notice from the press until they had arrived, viz. Woman's Suffrage and the formation of the Labour Party, with their respective implications.

The truth seems to be that while vital movements are bound to make way, whether noticed in the press or not, press publicity can do much to further them. It also seems clear that no movement advocated by the press can hope to secure permanent support unless it has the sympathy and is based on the necessities of a large section of the public.

According to post-office regulations, a newspaper can only be registered as such under the following conditions:—(a) The publication must consist wholly or in great part of political or other news, or of articles relating thereto, or to other current topics, with or without advertisements. (b) It must be printed and published in the British Islands, or in some British possession or protectorate (including the Malay States). The Postmaster-General may refuse to register as a newspaper a publication printed and published in a British possession or protectorate unless arrangements have been made to his satisfaction for maintaining a responsible representative of the publication in Great Britain. (c) It must be published in numbers at intervals of not more than seven days. (d) The full title and date of publication must be printed at the top of the first page, and the whole or part of the title and the date at the top of every subsequent page. This regulation applies also to 'Tables of Contents' and 'Indexes.' (e) Any supplement issued with a newspaper must consist wholly or in great part of matter like that of a newspaper, or of advertisements, or engravings, prints, or lithographs illustrative of articles in the newspaper; it must in every case be published with the newspaper, and

have the title of the newspaper printed at the top of every page. Supplements may not exceed the newspaper itself in size or weight.

OVERSEAS NEWSPAPERS.—There are many powerful daily and weekly newspapers published in the Dominions. Some of the chief are the *Sydney Morning Herald* (the oldest Australian paper), the *Melbourne Age* (1854), the *Melbourne Argus* (1846), the *Brisbane Courier* (1846), the *Cape Argus* (1857), the *Cape Times* (1876), the *Natal Mercury* (1852), the *Rand Daily Mail*, the *Toronto Globe* (1844), the *Montreal Star* (1869), the *Montreal Herald* (1811), the *Calcutta Englishman* (1833), and *The Statesman* (1873).

Canada has 1202 newspapers, of which 116 are dailies and evenings, 3 Sunday, and 1083 weeklies.

Australia has 844, of which 84 are dailies and evenings, 10 Sunday, and 750 weeklies.

New Zealand has 222, of which 62 are dailies and evenings, and 160 weeklies.

South Africa has 175, of which 24 are dailies and evenings, 2 Sunday, and 149 weeklies.

The *Newspaper World* is the organ of the British press. Price 2d.

America is said to boast 17,327 newspapers, of which 2421 are dailies and evenings, 50 Sunday, and 14,856 weeklies. More than 1000 are published in foreign languages. Mostly American dailies are published seven days a week. The Sunday newspaper is one of the chief features of American journalism. It is usually made up in several sections profusely illustrated, each section being devoted to some special subject, such as sport, real estate, women and children, finance, comics, &c.

Germany has 3167 newspapers, of which 2055 are dailies and evenings, and 1112 weeklies.

France has 1288, of which 225 are dailies and evenings, and 1043 weeklies.

Italy has 488, of which 148 are dailies and evenings, and 340 weeklies.

The Press of Britain.—In London: *The Times* (2d.), started 1785 by John Walter, carried on by the Walter family until 1908, when the paper was acquired by a company formed by Lord Northcliffe. On his death in 1922 his shares were purchased by Major Astor, M.P. Now vested in a trust with object of ensuring that the paper shall be conducted as a national organ. *The Daily Telegraph* (2d.; Conservative), started 1855 by Colonel Sleigh. Acquired shortly afterwards by Mr Joseph Moses Levy, grandfather of Viscount Burnham, present managing proprietor, now assisted by his nephew Colonel Lawson. Viscount Burnham is chairman of the Newspaper Proprietors' Association, Empire Press Union, and Newspaper Press Fund. *Morning Post* (2d.; Conservative), started 1772. Now owned by company formed of leading Conservatives. *Morning Advertiser* (2d.), started 1794. Owned by Association of Licensed Victuallers. Represents the trade. *Daily News* (1d.; Liberal), started 1846. Edited by Charles Dickens from January to March in that year. Now owned by company in which shares are chiefly held by the Cadbury family. Absorbed *Morning Leader*, one of the first halfpenny papers, in 1812. Company also own *Star* (1d.) evening newspaper, started 1888. *Daily Mail* (1d.; Independent), started 1896 by Lords Northcliffe and Rothermere and late Mr Kennedy Jones at price of 3d. Increased to 1d. in 1917; owned by Associated Press Ltd.; also proprietors of *Evening News* (1d.), started 1881, and *Weekly Dispatch* (2d.), started 1810; control continental *Daily Mail*. Shares in company widely held by public, but principal shareholder Viscount Rothermere. Chairman, Mr Thomas Marlowe; deputy chairman, Sir Andrew Caird. *Daily Chronicle* (1d.; Liberal), established 1855 as *Clerkenwell News*. In 1904 price reduced to 3d. Raised to 1d. in 1917. Now owned by United Newspapers (1918), Ltd. Bulk of shares held by Lloyd George interest. Editor, Mr Ernest Alfred Ferris. Company also owns *Sunday News* (2d.), started 1842 as *Lloyd's News*. *Daily Express* (1d.; Independent), started 1900 by late Sir Arthur Pearson. Now controlled by Lord Beaverbrook and Mr Ralph D. Blumenfeld, editor since 1904. *Daily Herald*

(1d.; Labour), started 1912. Owned and controlled by trade unions. *Westminster Gazette* (1d.; Liberal), started 1893 as evening paper. In 1921 converted into morning paper, owned by company in which Lord Cowdray is understood to be chief shareholder. *Daily Mirror*, picture paper (1d.; Independent). Started 1903 by Viscount Northcliffe. Owned by company controlled by Viscount Rothermere. Associated with *Sunday Pictorial* (2d.), started 1915, published from same offices and owned by similar company. *Daily Graphic* (1d.; Independent), started 1890. First daily picture paper. Owned by company controlled by Messrs Berry. *Daily Sketch* (1d.; Independent), started 1910 by Sir Edward Hulton. Associated with *Illustrated Sunday Herald* (2d.), started 1915, published in same offices. Now owned by company controlled by Viscount Rothermere. Managing director, Mr James Heddle. *Evening Standard* (1d.; Independent), started 1827. Now owned by company controlled by Lord Beaverbrook. *Financial News* (2d.), started 1884. Owned by company. *Financial Times* (2d.), started 1888. Owned by company controlled by Messrs Berry. *Sporting Life* (2d.), started 1859. Owned by company controlled by Messrs Odhams.

Sunday Newspapers.—*News of the World* (2d.; Independent), started 1843. Owned by company of which Lord Riddell is chairman. Editor, Sir Emsley Carr. *Observer* (2d.; Conservative), started 1791. Owned by Lord Astor. Editor, Mr J. L. Garvin. *Sunday Times* (2d.; Independent), started 1822. Owned by company controlled by Messrs Berry. Editor, Mr Leonard Rees. *Reynolds's* (2d.; Liberal), started 1842. Owned by company controlled by Lord Dalziel. *People* (2d.; Conservative), started 1881. Owned by company controlled by Messrs Odhams. *Referee* (2d.), started 1877. Devoted to theatrical and sporting matters. Owned by company controlled by Sir Oswald Stoll.

The chief Irish papers are *The Irish Times* (1859), *The Belfast News Letter* (1737), *The Belfast Evening Telegraph* (1870), *The Dublin Daily Independent* (1891).

The chief weekly reviews are *The Spectator*, started 1828; *The Nation*, started 1890; *The New Statesman*, started 1913—all sold at 6d.; and *Truth*, started 1877 (9d.).

The chief weekly financial papers are *The Economist*, started 1843 (1s.); *The Statist*, started 1878 (6d.); *The Investors' Review*, started 1892 (6d.); *The Investors' Guardian*, started 1863 (6d.).

The chief comics are *Punch*, started 1841 (6d.); *London Opinion*, started 1904 (2d.); *The Humorist*, started 1922 (2d.).

The religious press is represented by *The Guardian* (2d.), Church of England (1846); *Church Times* (2d.), Ch. Eng. (1863); *Church of England Newspaper* (2d.), Ch. Eng. (1894); *Christian World* (2d.), Nonconformist (1857); *British Weekly* (2d.), Nonconformist (1886); *The Tablet* (6d.), Roman Catholic (1840); *The Universe* (2d.), R.C. (1860); *Catholic Times* (2d.), R.C. (1860); *Catholic Herald* (2d.), R.C. (1888).

Lloyd's Shipping List (1s.), published by Lloyd's Insurance Corporation, gives a daily account of arrivals, departures, wrecks, &c. Daily shipping publications are also issued at Liverpool, Glasgow, and Cardiff.

REFERENCES.—Mitchell's *Press Directory*; Williams's *History of English Journalism*; Kennedy Jones's *Fleet Street and Downing Street*; Simonis's *Street of Ink*.

Newstead Abbey, 10 miles NNW. of Nottingham, on the border of Sherwood Forest, was founded for Augustinian Canons by Henry II. in atonement for Becket's murder (1170), and in 1540, after the dissolution, was given to 'Sir John Byron the Little, with the great beard.' Among his descendants were the first Lord Byron (cre. 1643), the 'wicked Lord Byron' (1722–98), and the poet Lord Byron (q.v.), who made the half-ruins old place his home in 1808, but sold it in 1818. See Washington Irving's *Abbotsford and Newstead* (1835).

New Style. See CALENDAR, CHRONOLOGY.

New Sweden. See PENNSYLVANIA.

Newt, or EFT (*Triton* or *Molge*), a genus of tailed Amphibians (Urodela), in the same family as the Salamanders (q.v.). The gills are absorbed

in youth (Caducibranchiate); the eyes have movable lids (except in the blind Typhlotriton of the Rock House Cave in Missouri); there are teeth on both jaws and on the palate; there are always four fingers and five toes; the tail is laterally compressed, and often bears a permanent fin. The majority of the newts are European, but the genus has representatives in western Asia, north-eastern China, Japan, Algeria, and North America (*T. torosus* and *T. viridescens*). In regard to all the species the following statements may be made: they like cool, damp places, they betake themselves to water during the prolonged breeding season; they are normally oviparous, the youthful stages are strictly aquatic; the winter is passed in a lethargic state in the ground, or occasionally in ponds; the food consists of insects, worms, slugs, snails, and the like, and is chiefly sought for at night; they do not drink, but water is absorbed through the skin; the outermost layer of the epidermis is shed periodically, and especially during the period of rapid growth it is turned inside out from the head backwards, and typically comes off as a whole; it is eventually swallowed. As to the development and life-history: propagation usually takes place in spring; the excited male, more brightly coloured than the female, plays about his mate, and in some species embraces her; he emits at intervals spermatophores (packets of spermatozoa) which sink to the bottom; the females take these up into the cloaca, so that fertilisation is internal; the eggs are glued singly or in small numbers to stones or water-plants, and are hatched in about a fortnight; the larvæ have three pairs of branched external gills, and in most (if not all) cases two pairs of thread-like protuberances on the sides of the upper jaw, by which they moor themselves to water-plants for some time after hatching; the metamorphosis is normally accomplished by the end of summer, but some retarded individuals may pass the winter as larvæ. Total 'neoteny,' where the animal retains some larval features, such as gills, and yet becomes sexually mature, is known in *Triton cristatus*, *T. vulgaris*, *T. alpestris*, and some other newts.

The skin of newts is warty, moist, rich in glands, and with numerous sensory cells, especially along the lateral lines of the body and tail; the males of some species develop a high skin-crest along the back, which is non-muscular but rich in sensory cells; the tail-fin helps in the undulatory movements of swimming, in which the weak limbs are of very little account; the internal organs, such as the three-chambered heart, are, in general, like those of frogs; there is a notable capacity of regenerating fingers and toes to replace those that have been bitten off.

There are three British newts. The Crested Newt (*Triton cristatus*), 5 to 6 inches in length, is



Fig. 1.—The Crested Newt (*Triton cristatus*)

dark brown above, with an olive tinge interspersed with spots, which are dark above and white on the sides; the under parts are yellow with dark spots; the breeding male has brighter coloration, and a high notched or serrate dorsal crest. The Common or Spotted Newt (*T. vulgaris*), 3 inches in length, is olive-green or brown above, spotted with black, and inclining to white on the flanks, yellow and

orange on the under surface with black spots; the breeding male has a high crest, wavy instead of serrate, and his tail shows a blue stripe; the larvæ are marked by yellow dots. The Palmate Newt (*T. palmatus*) is a little smaller than the Common Newt. The general colour is olive-brown above

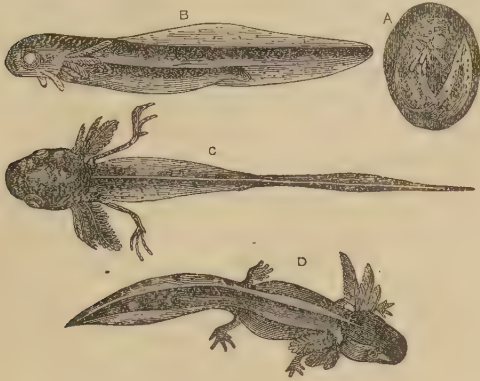


Fig. 2.—Larvæ of *Triton cristatus*.

A, condition before leaving the egg; B, larva shortly after it is hatched; C, at about the twenty-second day; D, at about the forty-second day.

with dark spots, yellow and orange below with dots; the tail of the male ends in a thread, just indicated in the female; the breeding male has a low median crest, a fold of skin along each side of the back, and markedly webbed feet.

The Alpine Newt (*T. alpestris*) ascends the Alps to 7000 feet, but is also found in the Netherlands. The Pyrenean newt (*T. asper*) occurs at high levels up to about 7000 feet. The Iberian newt (*T. waltii*) sometimes shows a curious perforation of the skin by the long ribs, a peculiarity also seen in *Tylostrotion andersoni* from the Ryukyu Islands. The newt of western North America is *Triton torosus*, reaching a length of 6 inches; in the northern and eastern parts of the United States its place is taken by *T. viridescens*, with a greenish tinge.

Newts are interesting inmates of aquaria, easily reared and kept. The words *newt* and *eft* are really identical, a *newt*=an *eft*. O.E. *efeta*, just as an *adder*, resulted from a *nadder* by mistake. For newts in general, see Gadow, 'Amphibia and Reptiles,' vol. viii. of *Cambridge Natural History*, 1901.

Newton, (1) capital of Harvey county, Kansas, 134 miles by rail SW. of Topeka, is the centre of a rich coalfield. Pop. 10,000.—(2) A city of Massachusetts, 7 miles WSW. of Boston by rail, and almost surrounded by the Charles River. It contains many suburban residences belonging to citizens of Boston, and has manufactures of cotton, paper, silk, machinery, &c. Pop. (1860) 8382; (1890) 24,379; (1900) 33,587; (1920) 46,054.

Newton, SIR ISAAC, the greatest of natural philosophers, was born on 25th December (o.s.) 1642—a year remarkable in English history for the breaking out of the Civil War, and doubly remarkable in the history of science by the birth of Newton and the death of Galileo. The farmhouse he was born in, still preserved religiously, is at the hamlet of Woolsthorpe in Colsterworth parish, Lincolnshire, 8 miles S. of Grantham (q.v.), at whose grammar-school the boy received his early education. On the 5th of June 1661 he left home for Cambridge, where he was admitted as subsizar at Trinity College. On the 8th of July following he matriculated as sizar of the same college. He immediately applied himself to the mathematical

studies of the place, and within a very few years must have not only made himself master of most of the works of any value on such subjects then existing, but had also begun to make some progress in the methods for extending the science. In 1665, in which year he took his B.A., he committed to writing his first discovery on fluxions; and in 1666, according to Voltaire's *Lettres sur les Anglais* (1733), the fall of an apple, as he walked in the garden at Woolsthorpe, suggested the most magnificent of his subsequent discoveries—the law of universal gravitation. On his first attempt, however, by means of the law so suggested to his mind, to explain the lunar and planetary motions, he employed an estimate then in use of the radius of the earth which was so erroneous as to produce a discrepancy between the real force of gravity and that required by theory to explain the motions, corresponding to the respective figures 16.1 and 13.9. He accordingly abandoned the hypothesis for other studies. These other pursuits to which he thus betook himself consisted chiefly of investigations into the nature of light, and the construction of telescopes. By a variety of ingenious and interesting experiments upon sunlight refracted through a prism in a darkened apartment, he was led to the conclusion that rays of light which differ in colour differ also in refrangibility. This discovery enabled him to explain an imperfection of the telescope, which had not till then been accounted for. The indistinctness of the image formed by the object-glass was not necessarily due to any imperfection of its form, but to the fact of the different coloured rays of light being brought to a focus at different distances. He concluded rightly that it was impossible for an object-glass consisting of a single lens to produce a distinct image. He went further, and too hastily concluding, from a single experiment, that the dispersive power of different substances was proportional to their refractive power, he pronounced it impossible to produce a perfect image by a combination of lenses. This conclusion—since proved erroneous by the invention of the achromatic telescope (see ACHROMATISM)—turned Newton's attention to the construction of reflecting telescopes; and the form devised by him is the one which, at later periods, reached such perfection in the hands of Sir William Herschel and Lord Rosse.

Newton became a Fellow of Trinity in 1667; and Lucasian professor of Mathematics in 1669; and it was on 11th January 1671 that he was elected a member of the Royal Society, having become known to that body from his reflecting telescopes. At what period he resumed his calculations about gravitation, employing the more correct measure of the earth obtained by Picard in 1670, does not clearly appear; but it was in the year 1684 that it became known to Halley that he was in possession of the whole theory and its demonstration. It was on the urgent solicitation of Halley that he was induced to commit to a systematic treatise these principles and their demonstrations. The principal results of his discoveries were set down in a treatise called *De Motu Corporum*, and were afterwards more completely unfolded in the great work entitled *Philosophiæ Naturalis Principia Mathematica*, which was finally published about midsummer 1687.

Shortly before the *Principia* was given to the public Newton had been called to take an active part in defending the rights of the university against the illegal encroachments of James II. The conspicuous part which he had taken on that occasion procured him a seat in the Convention Parliament, in which he sat from January 1689 to its dissolution in 1690. In 1696 he was appointed Warden of the Mint, and was afterwards promoted to the office of Master of the Mint in 1699, an office

which he held till the end of his life. He again took a seat in parliament in the year 1701 as the representative of his university. Thus engaged in the public service, he had little time left for mere scientific studies—pursuits which he always held of secondary importance to the public duties in which he was engaged. In the interval of public duty, however, Newton showed that he still retained the scientific power by which his great discoveries had been made. This was shown in his solution of two celebrated problems proposed in June 1696 by John Bernoulli, as a challenge to the mathematicians of Europe. A similar mathematical feat is recorded of him so late as 1716, in solving a problem proposed by Leibniz for the purpose, as he expressed it, of feeling the pulse of the English analysts. When in parliament Newton recommended the public encouragement of the invention of a method for determining the longitude—the first reward in consequence being gained by John Harrison for his chronometer. He was president of the Royal Society from 1703 till his death, a period of twenty-five years, being each year re-elected. In this position he could do much for the advancement of science; and one of his most important works during this time was the superintendence of the publication of Flamsteed's *Greenwich Observations*—a task, however, not accomplished without much controversy and some bitterness between himself and that astronomer. The controversy between Newton and Leibniz as to priority of discovery of the differential calculus, or the method of fluxions, was raised rather through the partisanship of jealous friends than through the anxiety of the philosophers themselves, who were, however, induced to enter into and carry on the dispute with some degree of bitterness and mutual recrimination. The verdict of the impartial historian of science must be that the methods were invented quite independently, and that, although Newton was the first inventor, a greater debt is owing by later analysts to Leibniz, on account of the superior facility and completeness of his method. In 1699 Newton was elected a foreign associate of the Academy of Sciences, and in 1705 he received the honour of knighthood from Queen Anne. He died at Kensington on 20th March 1727, and his remains received a resting-place in Westminster Abbey, where a monument was erected to his memory in 1731. Roubilliac's magnificent full-length statue was erected in 1755 in the ante-chapel of Trinity College, Cambridge.

Besides the first edition of the *Principia*, other editions appeared in 1713, 1726, 1729, 1780; and at Geneva the Jesuits' edition (1739-42; republished at Glasgow, 1822). An admirable reprint is that by Lord Kelvin and Professor Blackburn (Glasgow, 1871). Clarke's Latin translation of the *Optics* appeared in 1706; the *Optical Lectures* in 1728; the *Fluxions* in 1736; and Horsley edited his collected works (5 vols. 4to 1779-85). Newton was a student of Alchemy (q.v.); and he left a remarkable monument of his interest in theology, especially prophecy, a MS. work on the prophecies of Daniel and on the Apocalypse, a history of the Creation, and a number of tracts. See the articles on ASTRONOMY, FLUXIONS, GRAVITATION, LIGHT, OPTICS, SPECTRUM; Sir David Brewster's *Life of Newton* (1855); and Augustus de Morgan's *Newton, his Friend, and his Niece* (1885), that friend being John Conduitt (1688-1737), Newton's successor as master of the mint, who in 1717 married Newton's niece, the 'gay and witty' Catherine Barton. See also Bloch, *La Philosophie de Newton* (1908), and G. G. Gray, *Bibliography* (1907).

NEWTON'S RINGS.—In his investigations of the colours produced by thin plates of any material, solid, liquid, or gaseous, Sir Isaac Newton hit upon the following mode of exhibiting the colours produced by reflection from a film of air. He took two lenses, one convexo-plane, its convex side

having a radius of 14 feet, the other equi-convex, with the radii of its surfaces 50 feet, and laid the first with its plane surface downwards on the top of the second, thus producing a thin film of air between the lenses; the film being thinnest near the centre, and becoming gradually thicker outwards. On slowly pressing the upper lens against the under one, a number of concentric coloured rings, having the point of contact of the lenses for their centre, appeared, and increased in size when the pressure was increased. These rings, or more properly systems of rings, are in this form of the experiment seven in number, and each of them is composed of a number (ranging from eight in the first or smallest ring to two in the outermost) of rings of different colours, the colours, though different in each of the systems of rings, preserving the same arrangement as the colours of the spectrum; thus, in the second ring the inside colour is violet, and the outside scarlet red. The colours are very distinct in the first three systems of rings, but become gradually confused and dull towards the outside, till they almost fade away in the seventh system. The centre is deep black. The thickness of the air-film at the centre is about half a millionth of an inch, and increases gradually to nearly $\frac{1}{100000}$ of an inch, when the colours disappear. See INTERFERENCE.

Newton, JOHN, the friend of Cowper, was born in London, 24th July (o.s.) 1725. He had little schooling, and, as his father was master of a trading ship, the boy joined him at eleven and sailed under him for six years. Next impressed on board a man-of-war, he was made midshipman, but was degraded and cruelly treated for an attempt to escape. He was allowed at Madeira to exchange into an African trader, joining a slaver at Sierra Leone, and sailed with her for two years, returning to England in 1747. He next sailed to Guinea and the West Indies as mate on a Liverpool slaver, married in 1750, and made several voyages of the same nature as master, giving his leisure to study. In 1755 he became tide-surveyor at Liverpool. In 1764 he was offered the curacy of Olney, and he was at once ordained deacon, and next year priest. Hither the poet Cowper came about four years later, and an extraordinary friendship quickly sprang up between the two men. Newton was a burning Calvinist, and his influence was to a great extent disadvantageous to the sensitive nature of the poet. Newton left Olney in 1779 to become rector of St Mary Woolnoth, London, and there he died 21st December 1807. Newton's prose-works, *Omicron* (1762), *Cardiphonia* (1781), &c., are now but little read, save his vigorous and interesting *Authentic Narrative of some Interesting and Remarkable Particulars in his own Life*. But his name can never be forgotten from his association with Cowper, and from some of his *Olney Hymns*, which have been taken to the heart by the English-speaking religious world.

Newton-Abbot, a Devonshire urban district, at the influx of the Lemon to the Teign estuary, 15 miles (by rail 20) S. of Exeter. Ford House, a good Tudor building, has lodged both Charles I. and William of Orange, who here in 1688 was first proclaimed king. The foundation-stone of the agricultural college was laid in 1912. Pop. 14,000.

Newton Heath, since 1890 one of the wards of the city of Manchester.

Newton-in-Makerfield (otherwise NEWTON-LE-WILLOWS and EARLSTOWN), a thriving town of Lancashire, 16 miles E. of Liverpool and 16 W. of Manchester. An important railway junction, it has rapidly increased in size, and large printing-works, bleach-works, iron-foundries, and a sugar-refinery are in operation, whilst numbers of hands

are employed in the making of railway wagons. Near to the town is a fine racecourse. At Park-side, $\frac{1}{2}$ mile distant, the Right Hon. W. Huskisson met with the accident which caused his death, on the occasion (15th September 1830) of the opening of the railway. Newton returned two members to parliament from 1558 to 1832, when it was disfranchised. Pop. (1801) 1455; (1881) 10,580; (1921) 18,796.

Newton-Stewart, one of the most beautifully situated among the smaller towns of Scotland, on the Wigtownshire side of the Cree, near its mouth. It owes its name to a son of the Earl of Galloway, who obtained a charter making it a burgh of barony in 1677. Pop. 1800.

Newtown (Welsh *Drefnewydd*; anc. *Llanfair Cedewain*), a manufacturing town of Montgomeryshire, North Wales, on the Severn and the Montgomery Canal, 13 miles SSW. of Welshpool. It is the centre of the Welsh flannel manufacture, and also produces tweeds, &c. Robert Owen was a native. Pop. (with Llanllwchaearn) 5700.

Newtownards, a town of County Down, 14 miles E. of Belfast by rail. Flax-spinning, muslin weaving, tapestry, and embroidering, cotton-printing, hemstitching, hosiery making, and nursery gardening are the industries, and there are important markets. Pop. 9600.

New Westminster, formerly the capital of British Columbia, on the north bank of the Fraser River, 10 miles from its mouth, is the centre and port of a fruit-growing, salmon-fishing, and lumbering district; pop. 15,000.

New-year's Day was celebrated by some religious observance, generally accompanied by festive rejoicing, among most of the ancient nations. The Egyptians, the Chinese, the Jews, the Romans, and the Mohammedans, although differing as to the time from which they reckoned the commencement of the year (see CALENDAR, CHRONOLOGY, YEAR), all regarded it as a day of special interest. On the establishment of Christianity the usage of a solemn inauguration of the New Year was retained; but considerable variety prevailed, both as to the time and as to the manner of its celebration. Christmas Day, the Annunciation (25th March), Easter Day, and 1st March have all, at different times or places, shared with the 1st of January the honour of opening the New Year; nor was it till 1751 that the 1st of January was accepted in England. It had long before been adopted by Scotland and other countries. The early Fathers—Chrysostom, Ambrose, Augustine, Peter Chrysologus, and others—in reprobation of the immoral and superstitious observances of the pagan festival, prohibited in Christian use all festive celebration; and, on the contrary, directed that the Christian year should be opened with a day of prayer, fasting, and humiliation. The festal character of the day, however, generally was preserved, though the day was also observed as a day of prayer.

From the earliest recorded celebration, we find notice of feasting and the interchange of presents as usages of New-year's Day. Suetonius alludes to the bringing of presents to the capital; and Tacitus makes a similar reference to the practice of giving and receiving New-year's gifts. This custom was continued by the Christian kingdoms into which the western empire was divided. In England we find many examples of it, even as a part of the public expenditure of the court, so far down as the reign of Charles II.; and, as all our antiquarian writers mention, the custom of interchanging presents was common in all classes of society. In England, as in Germany, this custom has been largely eclipsed by the still more popular practice of Christmas gifts (see CHRISTMAS); in Scotland, as in France and Italy, New-year's Day

is still the day most observed, and the festival according to Old Style, twelve days later, still lingers in corners of the country. In many countries the night of New-year's Eve, 'St Sylvester's Eve,' was celebrated with great festivity, which was prolonged till after twelve o'clock, when the New Year was ushered in with congratulations, complimentary visits, and mutual wishes for a happy New Year; this is an ancient Scottish custom (see HOGMANAY). In many places the practice of tolling bells till midnight, and then 'ringing in the New Year' is still observed. Many religious communions are wont to celebrate it with a special service or 'watch night.' In the Roman Catholic Church New-year's Day is a holiday of strict obligation. See Chambers's *Book of Days*.

New York, the 'empire state' of the American Union, is the twenty-ninth in area and the first in population. Lying between 45° and 40° 29' 40" N. lat., and 71° 51' and 79° 47' 25" W. long., and bordering on Ontario, Quebec, Vermont, Massachusetts, Connecticut, New Jersey, and Pennsylvania, it is somewhat triangular in shape. Its boundary line measures 1420 miles, of which 879 miles, or nearly two-thirds of the entire length, lie along the shores of Lake Erie, the Niagara River, Lake Ontario, the St Lawrence River, and Lake Champlain. The remaining portions of the boundary are formed by arbitrary straight lines. Area, 49,204 sq. m., or almost that of England. Long Island is the largest, and Manhattan, containing the most populous part of New York City, the most important of the many islands.

The surface structure of New York is remarkably diversified, and presents many contrasts of elevation. The state is traversed by numerous chains of mountains and hills, among which lie beautiful valleys. There is also much rolling land, and there are several extensive plains. The greatest elevations are in the eastern and north-eastern parts of the state, but nearly the whole of the south-eastern part is hilly or mountainous. From this highland region the land slopes gradually, and declines in a series of terraces, north and west toward Lake Ontario. The most level portions are those bordering that lake and the St Lawrence River. The mountainous region in the east is cut by the gap of the Mohawk River. The narrow valley of this stream, once traversed by a mighty river which drained the great Ontario basin, joins at right angles the deep depression in which are Lake Champlain, Lake George, and the Hudson River. Both of these valleys pass directly through the Appalachian system of mountains, and divide the state into three distinct sections. The mountains are also disposed in three groups. The Adirondacks (highest point, Mount Marcy, 5400 feet), in the north-eastern part of the state, are completely isolated by the valleys of Lake Champlain and the Mohawk River from all other parts of the Appalachian system. South of the Mohawk valley are the Catskills with various associated groups, such as the Helderberg and the Shawangunk Mountains, covering an area of about 500 sq. m. The Shawangunk Mountains are continuous with the Blue or Kittatinny Mountains of Pennsylvania. The Taconic range of New England enters the state still farther south, and passes south-westerly into New Jersey. This range is cut by the Hudson River, and forms the celebrated Highlands.

The geology of New York is peculiarly interesting and comprehensive. With the exception of the Jurassic formations and a few others closely related in time with the Jura-Trias, its rocks exhibit deposits of nearly every period, from the primitive Archæan rocks to the Tertiary and recent alluvium. Briefly and superficially classified, the outcropping rocks are disposed as follows: In the north-eastern

part of the state, with the Adirondacks as a centre, is a somewhat circular area of Archæan formation. Along the eastern side of the Hudson River and near its mouth, the Archæan rocks again appear, and are continuous with the primitive formations of New England. Nearly surrounding the Adirondack region is a belt of Silurian rocks, which extends southward along the western shore of the Hudson, and westward, bordering upon Lake Ontario and Lake Erie. North of the Adirondacks is a belt of Cambrian rocks, and south and west of the Silurian belt the greater part of the formation belongs to the Devonian age, with traces of Carboniferous deposits, but no true coal-measures. There are in the state some extensive iron-mines, deposits of lead, copper, zinc, and other valuable minerals, and an abundance of building-stones. The salt-springs, especially those of the Onondaga salt group, are of great value. There are also valuable petroleum springs, and mineral and medicinal springs—the most noted are those at Saratoga, Ballston, Sharon, Richfield, Avon, and New Lebanon.

The most important river belonging entirely to the state is the Hudson (q.v.). The Oswego, draining a chain of lakes in the central part of the state, the Black, and the Genesee are affluents of Lake Ontario; the St Lawrence forms part of the northern boundary; the Niagara connects Lakes Erie and Ontario, and the Delaware, the Susquehanna, and the Allegany rise within and drain the southern portions of the state.

New York lies mainly in the lake region of North America. The eastern part of Lake Erie, one-half of Lake Ontario, and one-half of Lake Champlain are controlled by the state. Among the numerous lakes of north-eastern New York, Lake George and the Adirondack lakes are the most noted. There are three groups of picturesque lakes in central New York. The mountains, rivers, and lakes of New York make it famous for its scenery. Of this, one of the most notable features is the number of waterfalls, among which the mighty Niagara is of course pre-eminent. Other beautiful falls are the Falls of the Genesee (q.v.), Trenton Falls, the Kaaterskill Falls in the Catskills, and those of Cohoes, Ticonderoga, and at Watkin's Glen.

The average temperature of New York is about 47° F., with a range of over 100°. The climate is thus subject to extremes, but is very healthful. Although the surface is so diversified, most of the soil is arable, and much of it is fertile. More than one-half the area of the state is under cultivation. The usual farm products are raised in abundance. In the lake valleys there are many vineyards. Hops and tobacco are also important crops. In the vicinity of New York and the other large cities market-gardening is a profitable occupation, and, indeed, New York leads the Union in the production of vegetables, though dairying is the most important type of farming, and the highland regions yield excellent milk, butter, and cheese. But manufacturing is the leading industry, and in the value of its manufactured products New York is the foremost state of the Union. Moreover, its geographical position and its natural avenues of communication with other parts of the country, together with the system of canals and railroads, make it the leading commercial state. There are several canals, of which the Erie (see CANAL) is the most important. New York is the centre towards which nearly all the great railroads of the country tend, and within the state there are about 14,000 miles of railway.

Previous to the coming of the whites the territory now known as New York was occupied by the Iroquois (q.v.) Indians. Almost simultaneously, in 1609, Samuel Champlain discovered the lake

which bears his name, and Henry Hudson explored the Hudson River as far as the present site of Albany. A few years later settlements were made by the Dutch, but they were looked upon as intruders by the English, who in 1664 forced them to surrender their city of New Amsterdam, which had grown up on Manhattan Island. The name was then changed to New York, and, with the exception of a short period in 1673, the city remained in the possession of the English till the war of the revolution. As in the other colonies, the early settlers endured many vicissitudes, and were at different times engaged in conflicts with the Indians. In the struggle for independence, in the war of 1812, and in the civil war New York played a prominent part. The physical structure of the state has made it a most important factor in the development of the nation, and in population, wealth, and political influence it has always held the pre-eminence.

With her great material prosperity New York has not neglected the education of her people. The whole range of public education (school and university) is under the Board of Regents of a body called the University of the State of New York. There is no more complete school-system in the country. It includes about 12,000 public schools, 1000 public high schools and academies, besides many private schools and academies; and there are nearly fifty colleges, universities, and schools of higher learning, not including theological seminaries and professional schools.

Politically the state is divided into sixty-two counties; it returns the largest number (43) of representatives to congress. No other state has so many large cities and thriving, enterprising towns. New York City is the centre of a thickly populated district, which is second only to London in the number of its people and the importance of its commercial interests. The other most important cities are Buffalo, Rochester, Syracuse, Albany (the capital), Yonkers, Utica, Schenectady, Troy, Binghamton, Niagara Falls, Elmira, Jamestown, Mount Vernon, Amsterdam, Poughkeepsie, Auburn, New Rochelle, Newburgh, Watertown, Kingston, Oswego, Cohoes, Rome, Gloversville, White Plains, Lockport, Olean. Pop. (1800) 589,051; (1850) 3,097,394; (1890) 5,997,853; (1900) 7,268,894; (1920) 10,385,227.

NEW YORK, CITY OF, officially so called since 4th May 1897, is the most important city on the American continent, and, next to London, the most populous in the world. It is situated on New York Bay at the junction of the Hudson, or North River, and the East River. It is divided into five boroughs: Manhattan, between the North, East, and Harlem rivers; the Bronx, on the mainland to the north, across the Harlem River; Richmond (Staten Island), to the south-west, across New York Bay; and on Long Island (to the south-east, separated from Manhattan by the East River), Queens, in the east, and Brooklyn, to the south-east. Comprised in the various boroughs there are several islands, such as Ward's, Randall's, and Blackwell's (renamed Welfare Island in 1921, the seat of the city and other hospitals) in the East River and in Hell Gate; and Governor's Island, Ellis (with an immigration station), and Bedloe's (with the Statue of Liberty) in New York harbour. The harbour, one of the finest in the world, consists of the outer harbour or Lower Bay (area, 88 sq. m.), separated from the Atlantic Ocean by Sandy Hook bar; and the inner harbour or Upper Bay (14 sq. m.), connected with the former by the Narrows, a strait 1 mile wide, between Long Island and Staten Island. There is a narrow channel, Kill van Kull, between Staten Island and the mainland, and a passage by Long Island Sound into Hell Gate and the Harlem and East rivers. The har-

bour's approach has fortifications at Sandy Hook and the Narrows, and the upper entrance to the East River is also guarded. Manhattan Island is $13\frac{1}{2}$ miles long, with an average breadth of $1\frac{1}{2}$ miles; and it is on this island that the larger proportion of New York's millions live, while here also is the main business district of the metropolis. In the south of Manhattan is Old New York, surrounding the Battery and Castle Green, and composed of many winding streets which are relics of the old settlements. North of Washington Square and 9th Street, Manhattan is laid out in an orderly arrangement of streets and avenues; the former run across the island from south-east to north-west, and are numbered up to 162d street; the latter run north-east and south-west, and are numbered from 1st to 12th Avenue, with four additional avenues numbered A, B, C, and D. Across Manhattan running roughly from south to north lies Broadway, to which, by reason of its being out of the regular alignment of streets and avenues, a special interest attaches. In its southern or downtown district, where it develops from the Battery, are to be found the City Hall, the building of the Sub-Treasury, Wall Street (the financial centre of the city, and in fact of the United States), and the various commercial houses. A little farther up-town, on the east side, is to be found the tenement district, one of the most crowded in the world. Then it develops into the shopping district, and thence into the residential flat district. The finest thoroughfare in New York City is 5th Avenue, stretching from Washington Square to Mount Morris Square, and in its course bordering Central Park on its east side. At its junction with Broadway and 25th Street stands one of the most original, as it was one of the first, of New York's skyscrapers, the 'Flatiron Building,' while on that portion facing Central Park are to be found the Metropolitan Museum of Art and many palaces of New York's millionaires. The most striking feature of the architecture of New York is the 'skyscraper,' made necessary by the very high cost of land, Manhattan, the heart of the city, having only a comparatively small area. The earliest of these giant buildings was the Singer, held at first to be impossible of construction, but proving on completion that the steel frame was the solution of New York's building problem. The Metropolitan Life Insurance Company building on the eastern flank of Madison Square, or 23d Street, has an imposing tower containing 50 stories above the sidewalk level, and reaches an altitude of 700 feet. This height is, however, exceeded by the gigantic Woolworth building, the tallest building in the world excepting the Eiffel Tower; it has 51 stories, and rises to an altitude of 792 feet. In the interests of public health and safety the vertical height of these buildings is now subject to regulation, a New York Building Resolution of 1924 determining that the height of all buildings subsequently to be erected should bear a certain relation to street width, withdrawal of a whole or a part of any building from the street-line making permissible, however, a proportionate increase in height; the resolution regulated also the area of yards, courts, and other open spaces, and controlled, too, the location of trades and industries. Among many other prominent buildings in New York are the Public Library, the Astor Library, Columbia University and Library, the Museum of Natural History, the Treasury building, Bankers' Trust, Equitable, Whitehall, and General U. S. Grant's tomb on Riverside Drive. Riverside Drive faces the Hudson River, and, built on reclaimed land, is one of the finest residential streets in the world. Morningside Heights in the north of Manhattan is the highest point of the island, and here is the very

fine Protestant Episcopal Cathedral Church of St John the Divine, begun in 1892 and expected to be finished about 1934. Of New York's many other churches the most prominent are the Catholic Cathedral of St Patrick; Trinity, St Paul's, St Thomas's (all Protestant Episcopal); Fifth Avenue Presbyterian; St Mark's-in-the-Bowwerie (Dutch Reformed); Church of St Paul the Apostle (Paulist Fathers). There are also notable Baptist and Methodist churches, and Jewish synagogues and temples. New York's hotels are legion, and include the Pennsylvania (the largest in the world), the Commodore, Waldorf-Astoria, Plaza, Biltmore, Ambassador, St Regis, Ritz-Carlton, while the Old Holland House has been converted into office buildings. New York suffers under the disadvantage of having within the city only two of the termini of the railways which serve her, the others being on the New Jersey side of the Hudson. Grand Central Station at Park Avenue and 43d Street was entirely reorganised in 1922, and is now a wonderful structure, with underground shopping centres, and hotels and offices built overhead. Pennsylvania Station is also a wonderful erection. New York is saved much of the smoke nuisance by the fact that within a radius of 30 miles only electric locomotives may be used. Along the shores of the Hudson River, both on the Manhattan and New Jersey shores, lie the great docks, capable of taking the largest vessels in the world. Thousands of river boats keep up communication between New York and New Jersey with its railway termini, while there is an ever-increasing number of tunnels under the Hudson (one for vehicular traffic was commenced in 1920), as also under the East River. The East River is spanned by many fine bridges, the Brooklyn Suspension, Manhattan, Williamsburg, Queensboro, New East River, Hell Gate, and 3d Avenue bridges being the most important (see BRIDGE). On Manhattan Island itself, and in the other boroughs of New York, transport is by means of tramways, overhead railways, and subways of the most elaborate description. Traffic tends continuously and rapidly to increase, and despite a great extension of transport facilities the provision of an adequate system of passenger conveyance remains a problem constantly demanding solution.

The Battery Green encloses 21 acres, planted with trees, shrubbery, and grass, and occupies the most southern point of Manhattan Island; it marks the original site of Nieu Amsterdam. After the American Revolution it was used for military and civic displays, and from that time until near the middle of the 19th century was the fashionable promenade. On its west side is Castle Garden (q.v.). The laying-out of Central Park was begun in 1857. The park comprises 843 acres, extends from 59th to 110th Street, and is bounded by 5th and 8th Avenues. Its dimensions are thus $2\frac{1}{2}$ miles by $\frac{3}{4}$ mile. It is well laid out, and contains lakes (The Lake, The Mere, &c.), woods, walks, drive-ways, bridle-paths, recreative and garden structures, and some fine monuments—e.g. the Egyptian obelisk brought from Alexandria in 1880. Here also are situated the Croton Reservoir and two receiving reservoirs. Other parks in New York are Riverside, Morningside, Mount Morris, Madison, Union, and Washington, all situated on Manhattan Island; Van Cortlandt and Pelham Bay in the Bronx; Dyker Beach and Highland in Brooklyn; and Forest and Silver Lake in Queens and Richmond respectively. The New York Botanical Garden occupies a reservation of nearly 400 acres in Bronx Park north of Pelham Parkway, and the Zoological Park (Bronx Zoo), opened in 1899, has served as a model for other parts of the world. Coney Island in Brooklyn is a favourite and famous

amusement place. The theatres of New York City are many and well built. The most outstanding are the Metropolitan Opera House, Manhattan Opera House, Hippodrome, Capitol, Casino, Booth, Century, Knickerbocker, Republican. Notable clubs are the Union, Union League, Century Association, Knickerbocker, Players', University, Manhattan, Metropolitan. Restaurants and dance halls and cinema houses are without number but too ephemeral for individual note.

New York City now ranks as the first shipping port of the world. As the commercial metropolis of the United States, its foreign commerce comprises more than half the total export and import trade of the Union. Its domestic commerce is also of great dimensions, many places all over the Union drawing their supplies from it. Its manufactures are hardly of less importance. The principal industries include printing and publishing, lard and sugar refining, meat-packing, and the making of furniture, clothing, machinery, textiles, musical instruments, and iron and steel goods.

New York is governed by a mayor, elected for four years, five borough presidents, also elected for four years, and a board of aldermen consisting of a president, elected for four years, and sixty-five members elected for two years. Finance is under a separate controller elected for four years by the city, but the mayor chooses all the other officials. When Tammany (see TAMMANY SOCIETY) ruled there was much graft and many scandals.

New York is perhaps the most cosmopolitan city in the world, the emigrants of all countries entering and forming separate colonies, such as Greek Colony, Little Italy, Chinatown, and Hebrew, Russian, and Negro quarters. This last is increasing enormously, and has driven the white inhabitants out of whole blocks in the middle-class districts of the city.

The water-supply of New York was formerly provided almost wholly by Croton River and its lakes, situated some 40 miles from the city. But with the growth of population the system which had been in use from 1842 proved altogether inadequate, and in 1917 a new scheme was put into operation. By it a supply of water estimated at 300 million gallons a day was brought from the Ashokan reservoir in the Catskill Mountains. The total distance from the Ashokan to Richmond borough is 120 miles, and the undertaking was second only to the Panamá Canal in magnitude. Even this added supply did not prove sufficient, and as part of the Catskill system it was soon found necessary to tap the Schoharie watershed. New York's various sources of water-supply are estimated to be capable of providing over 1000 million gallons daily. The Catskill water enters New York through a siphon under the Hudson River. The chief reservoirs on the system apart from Ashokan, are Kensico, Hill View, and Silver Lake.

New York contains numerous institutions for higher education. Among the chief are Columbia University, New York University, the College of the City of New York, Fordham University, Union Theological Seminary, the College of Physicians and Surgeons. The principal libraries in New York are New York Public Library (formed in 1895 by consolidation of the Astor and Lenox libraries and the Tilden Trust; see LIBRARY), the library of Columbia University, the Morgan Library (q.v.), and the Metropolitan Museum of Art Library. The Metropolitan Museum, housed in magnificent quarters to the east of Central Park facing 5th Avenue, is a treasure-house of the fine and decorative arts. The exhibits, some of which are unique and are of great value, range in date from 3000 B.C. to the present day. The American Museum of Natural History is also notable.

John Verrazani, a Florentine navigator, was the

first European who entered New York bay, in 1525. His exploration was interrupted by a storm that compelled him to put to sea without making a settlement. In 1609 Henry Hudson entered Hudson River, and, trading with the aborigines, ascended the stream for about a hundred miles. In 1614 the Dutch built a fort on Manhattan Island, and in 1623 a permanent settlement was made, named Nieu Amsterdam. Brooklyn, first settled in 1636, was organised by the Dutch governor of New Amsterdam in 1646, and named Breukelen, after a place 8 miles NW. of Utrecht. In 1664 the English drove out the Dutch from New Amsterdam; in 1673 the Dutch the English. In 1674 Manhattan Island came permanently by treaty into the possession of Great Britain, the name New York being given in honour of James, Duke of York. New York privateering was a great business during the climax of the slave importation, about 1730-35. At the time of the American Revolution the city's population was less than that of Philadelphia and Boston. It was evacuated by the forces of Great Britain in 1783, and from 1785 to 1789 was the seat of government of the United States. In 1774 the city census, taken by government, showed a population of 22,861; (1800) 60,489; (1825) 166,136; (1850) 550,394; (1860) 813,669; (1870) 942,292; (1880) 1,206,599; (1890) 1,515,301, a recounting by the city police giving 1,710,715. In 1898 Brooklyn, Richmond County, Flushing, Port Hempstead, Jamaica, Long Island City, Newton, Jamaica Bay, East and West Chester, and Pelham were incorporated with the municipality; and 'Greater New York,' with an area of 309 square miles, had a population of 3,437,202 in 1900, of 4,766,883 in 1910, and of 5,620,048 in 1920.

See R. R. Wilson, *New York: Old and New* (2 vols. 1902; new ed. 1909); Theodore Roosevelt, *New York* (1891; new ed. 1903); Valentine's *Manuals of the Corporation of the City of New York* (old series, 1841-70, ed. D. T. Valentine; new series, 1916 *et seq.*, ed. H. C. Brown); M. J. Lamb, *History of the City of New York* (1877; new ed. 1910); Leslin, *History of the Greater New York* (1898); F. B. Kelley, *Historical Guide to the City of New York* (1913); histories by Lossing (2 vols. 1884) and Stone (1872); popular works by Goodwin, *et al.* (2 vols. 1899) and by Hemstreet (1899 to 1903); and as a guide book, *Rider's New York City* (1924 edition, ed. F. T. Cooper).

New Zealand.—The British Dominion of New Zealand consists of two large islands, called simply North and South, and of a number of small islands and islets. Of the latter, some lie in tropical Polynesia where the Cook group and Niue, Penrhyn, and Suvarrow islands have been annexed to the Dominion. The last two are held on account of their fine lagoon harbours. New Zealand also governs most of the Samoan Archipelago under a mandate from the League of Nations. Under another mandate she shares with Great Britain and Australia the administration of the phosphate-bearing island of Nauru. Finally, the uninhabitable antarctic territory of Ross Land has been placed under her Governor-general. Of the islands other than North and South, only Stewart and the Chathams are of much value. They support together about a thousand inhabitants, and might easily be made to carry more. Cook Strait, narrowing to 13 miles, separates North from South Island, and is known as 'the wind-pipe of the Pacific,' owing to the north-westerly gales that sweep through it. Foveaux Strait, 15 miles across, divides South from Stewart Island. Broadly speaking, North and South Islands comprise all that is important of New Zealand as well as all but a few hundred square miles of its area, which, apart from the tropic islets, is stated to be 103,656 sq. m., lying between latitudes 34° 22' and 47° 18' S. lat., and between 166° 27' and 178° 34' E. long.

The Dominion is, therefore, one of the most isolated of civilised countries of any size. Twelve hundred miles of the unbroken Tasman Sea separate it from Australia to the west and north-west, and a slightly larger breadth of South Pacific Ocean divides it from the nearest Polynesian group. South America is more than 4000 miles to the east, and southward there are but a few islets between it and the ice-fields of the Antarctic. Very few islands indeed break the immense expanse of the ocean surrounding New Zealand.

The archipelago itself, however, atones for its loneliness. It is lofty, picturesque, fertile, healthy, and with natural features full of variety and interest. Of these the most striking are long, lofty ranges and high volcanic cones. Everywhere ridges or summits stand out, usually near at hand. More than a hundred and fifty peaks or cones exceed seven thousand feet, and in the South Island sixteen rise to a height of more than ten thousand. In the south-west of that island much of the spine of the Southern Alps passes above the level of eternal snow, reaching its acme in Ao-rangi (Mount Cook), 12,349 feet. Next come Tasman 11,467 feet, and Dampier 11,287 feet. Near the north-eastern coast again, in the double range of the Kaikouras, Tapuaenuku attains to 9460 and Kaitearau to 8700 feet. In the North Island the ranges are lower, seldom exceeding 5000 feet. Four volcanic cones, however—Ruapehu 9175, Egmont 8260, Ngauruhoe 7515, and Tongariro 6458—equal the finest of the southern mountains in beauty. Mountains cover the larger part of the South Island, running in close parallel chains from south-west to north-east. They present an unbroken barrier along the whole west coast, and, spreading across to the east coast of the northern provinces of the island, show a formidable wall in the seaward Kaikouras. In consequence, the small mining settlements on the west coast are completely cut off from the more populous middle east, south-east, and south, and the same is true of the agricultural and grazing communities of Nelson and Marlborough at the northern end of the same island. There is virtually no communication by land between the last-named districts and the progressive provinces of Canterbury and Otago. A long coach road through river gorges and narrow valleys unites Nelson with the western coal-bearing districts of Westport and Greymouth and the gold-mines of Westland. A railway lately opened through Arthur's Pass and the beautiful Otira gorge now links Canterbury with the same districts. South of the Otira only an occasional mountain-climber ever passes from east to west. The one practicable pass in that region, the Haast, though less than a thousand feet high, is unused, as the south-west littoral, south of Martin's Bay, is an uninhabited sanctuary reserved for the native flora and fauna, and for imported game such as the moose and the wapiti. There the fiords or sounds, nineteen in number, are visited in summer by steamships conveying throngs of tourists to gaze on scenes where the richness of the vegetation and the height of the precipitous cliffs and mountains rival or surpass the scenery of Norway or the coast of Alaska.

In the North Island the mountain chains, though (as said) lower, show the same chief feature—ranges running from south-west to north-east, from Cook's Strait to East Cape on the Bay of Plenty. These chains—the Rimutaka and Tararua to the south, farther north the Ruahine, Kaimanawa, and Raukumara—likewise impede communication between eastern and western settlements. They have been penetrated by a railway through the gorge of the Manawatu River uniting Wellington with Napier. Farther south another railroad

climbs from Port Nicholson over the Rimutaka, and, passing through the inland plain of the Wairarapa into the province of Hawkes Bay, links up with the line from the Manawatu. In the northern half of the island—the province of Auckland—there is no continuous dividing spine, though there are many considerable elevations. Fairly in the centre of the island rises a cluster of massive volcanic heights, some active, some dormant. One of the latter, Tarawera, broke out in June 1885, in the worst natural convulsion recorded in New Zealand, destroying the famous Pink and White Terraces, and killing more than one hundred persons. Volcanic activity is still to be witnessed at numerous points between Mount Ruapehu and White Island, an active island-cone in the Bay of Plenty, in a region covering nearly 6000 sq. m. The centre of the disturbing forces seem to be near the oval Lake Rotorua. Hot springs, sometimes boiling, warm pools, solfataras, and mud volcanoes are to be seen in numbers, and the medicinal powers of the acid or alkaline waters are utilised in a state sanatorium frequented by patients suffering from rheumatic, neurotic, or skin diseases. Earthquakes are experienced in many parts of both islands.

Lake Taupo (238 sq. m.), in the volcanic district, is the largest body of fresh water in the Dominion. Some 40 miles north-east of it lie several smaller lakes, noted for a beauty that also distinguishes Lake Waikare to the east. In the South Island many alpine lakes, notably Manapouri, Te Anau, Wakatipu, and Rotorua, take high rank for scenic grandeur, and Kanieri and Mapourika in Westland for softer loveliness. Several lakes have great potentialities as providers of electric power, and two, Waikare and Coleridge, are already being used on a considerable scale.

For the same purpose the rivers promise to be of much service. In the South Island they have more or less the character of mountain torrents, too swift and variable in volume to be of any real use for navigation. The largest, the Clutha, 260 miles long, discharges over 2,000,000 cubic feet of water per minute into the sea, but, like most New Zealand rivers, is bar-bound. The lower elevation of the North Island allows certain rivers a slower current and more even depth. The Waikato, 220 miles long, the Wanganui, 140 miles, the Mokau, and Waihou are navigable for considerable stretches by steamers of light draught. The sea-borne coastal traffic of the islands is naturally considerable. The harbours, though numerous, are not all well placed for trade. The admirable shelter afforded by the sounds is quite useless for mercantile purposes, and to the north of them almost every harbour on the west coast is bar-bound. This is notably the case with that fine sheet of water the Kaipara, fed by navigable rivers. In a number of cases harbour works have been required to fit ports for commerce. Fortunately three of the four largest trading ports in the country—Auckland, Wellington, and Lyttelton—have wide, deep entrances.

The mountainous surface of the western half and of the north-eastern corner of the South Island has had, of course, a marked effect on settlement. Of half a million inhabitants, less than 30,000 live west of the Alps, and four-fifths of the whole are found between the Kaikouras and the Waiau to the west of Southland. In this tract are found the large Canterbury plains and many smaller levels, as well as rolling downs and arable valleys. The North Island, though without any very extensive plain, has a greater share of fertile, practicable country, and this, with its milder climate, has attracted for many years a greater influx of settlers. The south-eastern portion of Wellington province, the pumice-covered plateau round Lake Taupo and

over the Kaingaroa Plains, and the scrub or fern-clad clay lands north of Auckland, are the least inviting parts. Otherwise, except on the heights of the central spine, the North Island is almost everywhere attractive to settlers.

Geology.—The classification and distribution of the pre-Cretaceous formations of New Zealand are still matters of dispute. Over wide areas the rocks of these formations have not yet yielded fossils, and problems of correlation are rendered especially difficult by widespread metamorphism. The gneisses, granulites, and plutonic rocks which occur in the south-west of Otago and in Stewart Island are usually regarded as Archæan. From Fiordland to Cook Strait a series of crystalline schists and other metamorphic and igneous rocks form the core of the main divide in the South Island. They are separated from the Archæan gneisses by a wide area of unaltered sediments which pass into the crystalline schists by gradual transitions, and rocks of similar character can be traced as a broad belt along the south-east side of the main divide all the way to Cook Strait, and thence into the North Island, where they form the chief mountain chain (the Ruahine Range). Similar rocks appear again in the core of the north-east promontory of North Island. The above complex of sedimentary, igneous, and metamorphic rocks is known to include strata of Ordovician, Siluro-Devonian, Permo-Carboniferous, and Trias-Jurassic age. Quartz veins in this series carry gold and scheelite.

After the deposition of the Jurassic came a period of great orogenic movements, which resulted in intense folding and fracturing of all the pre-Cretaceous strata, the strike of the folds and the main faults running in a north-east and south-west direction, and determining the trend of the coast-lines and the chief mountain chains. Widespread regional metamorphic effects were produced at the same time, and the movements were accompanied by the intrusion of plutonic rocks ranging in composition from acid granites to ultra basic peridotites, such as the well-known dunite or olivine rock of Mount Dun. The great movement of uplift was followed by a period of denudation and depression, during which were deposited strata of Cretaceous and Tertiary age. This younger series of rocks contains valuable coal-seams at several horizons. There is evidence of volcanic action during the Cretaceous period; but the greatest outburst of volcanicity in New Zealand began in early Tertiary times, and resulted in extensive accumulation of lavas and tuffs, particularly in North Island, where volcanic activity has not yet ceased. Towards the close of the Tertiary period New Zealand underwent a movement of uplift, which reached a maximum in South Island. The elevation was accompanied by noteworthy block faulting, which has influenced considerably the topography of the islands. The uplift resulted, too, in a marked increase of glaciation in the South Island. A movement of depression followed, carrying the land slightly below its present level, and this in turn was followed by slight elevation, evidence of which can be read in the raised beaches which fringe the coast. Study of a geological map of New Zealand shows that no inconsiderable part of the islands is covered by Pleistocene and Recent deposits, and these are noteworthy for the occurrence in them of abundant remains of the Moas and other extinct birds, some of which were contemporary with man.

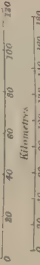
Climate.—The islands are fortunate in a climate temperate, very healthy, and, for the most part, pleasant. It is, however, marked by very great variety, due chiefly to the length of the archipelago from north to south, to the conformation of the mountain ranges, and to fresh and sometimes

stormy oceanic winds. Northward of the Hauraki Gulf and the Lower Waikato conditions are more or less sub-tropical, though the ocean breezes and plentiful rainfall save the summer from being oppressive. At the colder end of the South Island the climate does not differ much from that of southern England and Ireland. As in England, the west coast is wetter than the eastern; indeed, the contrast is considerably greater, and is often very marked between localities not far apart. The western coast of Stewart Island, for example, is made almost uninhabitable by the violent south-west gales. The eastern side is mild, and, though damp, is quiet and agreeable. Over the greater part of the islands rain-bringing winds blow mainly from the south-west and north-west, and where the moisture of the north-west winds is caught by the spinal ranges, the country eastward is comparatively dry. The province of Auckland is an exception, for there the north-east wind often brings with it clouds heavy with rain, whereas farther south that wind is usually dry. Napier, on the east coast of the North Island, with an average rainfall of about 33 inches, has at least 20 inches less rain than Taranaki on the opposite coast, where, over much of the dairy-farming country, grass remains green all the year round. The most remarkable contrast, however, between east and west is exhibited by Christchurch and Hokitika, about half-way down the South Island. The average rainfall at Christchurch is between 25 and 26 inches per annum, while that of Hokitika is about 116 inches. Hokitika nevertheless enjoys 1871 hours of sunshine a year, with a very clear atmosphere when rain is not actually falling.

Wellington, the capital, the climate of which may be called a mean for the inhabited parts of the Dominion, has an average rainfall of nearly 49 inches, with rather more than 2100 hours of sunshine. Its mean temperature is about 5 degrees warmer than that of London. The mean temperature of Auckland city is about 9 degrees warmer than that of London, while those of Dunedin and Invercargill in the South Island are almost the same as that of the English metropolis. New Zealand, then, shows a combination of a plentiful rainfall with an ample share of sunshine, due to the absence of fogs and light drizzle. Certain districts are windy, notably Wellington city, the mountain gorges of the Southern Alps, and the country for some miles outside their mouths. Blizzards and cyclones, however, are virtually unknown. Snow falls heavily on the mountains, but is a curiosity on the coasts of the North Island, and on the west coast everywhere. The islands are entirely free from malaria. The pleasantest climate is perhaps that on the east coast of the North Island, from Napier northward to the Coromandel Peninsula, also round Nelson and Blenheim on the southern side of Cook Strait, and in Banks Peninsula. The greatest summer heat is commonly felt near the mid-east coast of the South Island, between the Kaikouras and the district of Oamaru. Here more than 90° is often registered, and droughts sometimes occur, though not sufficiently protracted to ruin farmers or destroy live-stock. Apart from the alpine heights, the only intolerable climate is to be found on the mountainous south-west of the South Island, where rainfall often approaches 200 inches, and a considerable tract of country is uninhabited. In the interior of central Otago dry heat in summer and severe cold in winter are common. In the Southern Alps snowstorms are known heavy enough to cause costly losses of sheep. The redeeming features of the sub-alpine climate are the clear, bracing air and the sunshine, which is usually plentiful even in winter.

NEW ZEALAND

English Miles



Reference to Counties not named on Map.

- | North Island | | South Island | |
|-----------------|------------------|-----------------|--|
| 1 Whangamuna | 17 Mount Herbert | 18 Levels | |
| 2 Taranaki | 19 Tairāhiti | 20 Invercargill | |
| 3 Waikato | 21 Wairarapa | 22 Dunedin | |
| 4 Bay of Plenty | 22 Hauraki | 23 Otago | |
| 5 Waikato | 23 Waikato | 24 Southland | |
| 6 Waikato | 24 Waikato | 25 Invercargill | |
| 7 Waikato | 25 Waikato | | |
| 8 Waikato | | | |
| 9 Waikato | | | |
| 10 Waikato | | | |
| 11 Waikato | | | |
| 12 Waikato | | | |
| 13 Waikato | | | |
| 14 Waikato | | | |
| 15 Waikato | | | |
| 16 Waikato | | | |
| 17 Waikato | | | |
| 18 Waikato | | | |

NORTH ISLAND

P A C I F I C

North Taranaki Bight
New Plymouth
South Taranaki Bight

SOUTH ISLAND

P A C I F I C

Population.—The estimated white population at the end of 1924 was 1,316,000. To this must be added about 53,000 Maori. At the date of annexation in 1840 the country did not contain more than two or three thousand whites. By 1855 this number had risen to 37,000. The following table shows the progressive decennial increase from 1861 on :

Year.	Population.
1861.....	99,021
1871.....	256,393
1881.....	489,933
1891.....	626,658
1901.....	772,719
1911.....	1,008,468
1921.....	1,239,980

The increase has, of course, been largely due to immigration. In the sixty years 1861–1920 the total gain from this cause was 483,480, and the gain still continues, partly because the government still assists certain classes of emigrants, such as agricultural labourers, both boys and adults, female domestic servants, and persons nominated by friends in the colony. The excess of males over females in the islands, once proportionately very large, is now quite small, and may be expected to disappear. Ninety-eight per cent. of the population are of British birth or extraction. The largest element is the English, the Scottish coming next with about 24 per cent. of the total, and the Catholic Irish third, with about 13 per cent. The chief European foreign elements are Scandinavians and Yugoslavians, the latter almost entirely concentrated on the kauri-gum fields north of Auckland. Chinese number about 2200, and are kept in check by a poll-tax and other restrictions, and by the fact that they have but two or three hundred women with them, and usually return to China after saving a few hundred pounds. The only other Asiatics are about 1200 British Indians, known as 'Syrians.' In the North Island a large majority of the population is settled within 30 miles of the coasts, and the emptiest tracts are in the spinal ranges and the country to the east and west of Lake Taupo.

In March 1923 the North Island contained 772,000, the South 500,000 people. Of the four chief towns, Auckland now contains about 180,000, Wellington and Christchurch each about 115,000, and Dunedin about 78,000. In all cases liberal expanses of suburb are included. The fifth town, Wanganui, has but 25,000 inhabitants. Throughout the islands rural population only very slightly exceeds urban.

The Maori.—When British traders, whalers, and sealers began to establish themselves on the New Zealand coasts in the first four decades of the 19th century the islands were sparsely occupied by a brown race calling themselves Maori, in number probably between 100,000 and 150,000. Very large tracts of forest and mountain—including most of the South Island—were empty of human life. The Maori were Eastern Polynesians, whose point of departure was most likely the Cook Islands, whence in large double-canoes they contrived to run to New Zealand before the prevalent north-east winds. They settled down, dispersed in small village communities, linked to some tribal organisation, and placed chiefly by bays, rivers, lakes, or the edges of forests where fish and birds could be found. They found virtually no four-footed beasts in the country, few food-plants except the edible fern, and brought with them only a black rat, now rare, and a small dog, now extinct; also two vegetables, the taro and the sweet potato. They were tillers of the soil, without flocks or herds, and their tribes and sub-tribes were incessantly at war. Without metals or pottery their tools and weapons were those of the Neolithic stage, and they used neither

the bow nor the boomerang. Yet their *pa*, or stockades, showed engineering skill, and they were no mean adepts at building huts and canoes and in carving, and weaving hemp fibre. The patterns on their cloaks and tattooed faces were artistic, and they spoke a very pure dialect of the liquid, resonant Eastern Polynesian. In height and colour they resemble the swarthier peasants of Greece or Spain. Their features are rather Caucasian than Asiatic or Negroid, but the mouth, though not blubber-lipped, is coarser than the European, and their bodies are longer in proportion and the skull more pyramidal. The quality of their intelligence is good, and not confined to a few exceptional males. This, with their courage, eloquence, courtesy, sense of humour, and fondness for sport, has won for them a respect seldom rendered by British settlers to a barbaric race. Throughout most of the 19th century their numbers rapidly declined owing to the use of the musket in tribal wars and to diseases and unhealthy habits resulting from their first intercourse with whites. After 1890, however, they began to increase slowly but steadily as the spread of education among them led them to obey medical advice and adopt more sanitary methods of living. Tuberculosis is still rather common among them. Including half-castes they now number about 60,000. Most of them have at least a strain of white blood. Since 1872 there have been no rebellions or serious riots, and they may now be reckoned peaceable, loyal, and contented. They possess full citizenship, and send four representatives to the elective House of Parliament, while two of their chiefs sit by custom in the Nominated Upper Chamber, and the Ministry usually contains one Maori member. Though they have sold most of their tribal lands to the government, they still retain about 4,650,000 acres, mostly fertile, and in the aggregate very valuable. Considerable tracts of this are leased to whites, commonly under the supervision of official trustees, who protect the Maori from fraud and imposition. The remainder is farmed by the natives, who are gradually using it to better advantage, and already own about 500,000 sheep, with many cattle, horses, and pigs. The state provides them with free education, in special schools in which English is compulsory. They may and do, however, use ordinary schools also. Nearly all of them now speak and write English. They still talk Polynesian among themselves, but dress in European fashion, and may fairly be termed civilised. Crime is rare among them, and drunkenness not a scourge. They understand the value of money, but seldom engage in trade, and rarely work for wages, except for short periods on farms. For the most part they live on their own land in communal villages, are at least nominally Christians, and on good terms with their white neighbours. Almost the only remaining mark of racial repugnance is the objection of white women to marry Maori males. Regular marriages between male whites and Maori women are fairly common, and it seems likely that the smaller race will thus gradually be absorbed by the larger.

Land Settlement and Tenure.—Of a total area of 66,292,000 acres, 43,653,000 acres in the islands were officially returned as occupied in 1923. This, however, does not include land held by the Maori communes. The one-third of the islands still unoccupied is mostly mountainous or covered by lakes or forest. About 4,000,000 acres are admitted to be unfit for settlement. Of occupied soil 21,000,000 acres are held in freehold, and 18,000,000 leased from the Crown. New Zealand is far from being a land of peasant farmers; nearly 18,000,000 acres of the occupied land is in holdings of more than 1000 acres each, nearly $3\frac{1}{2}$ millions more in

holdings of between 640 and 1000 acres. The larger properties are almost all pastoral, and used for raising wool, mutton, and beef. The smaller are mainly dairy farms in the North Island. In the south, however, there is much mixed farming, including cereal growing, horse-breeding, and the rearing of high-class sheep and cattle. Grazing rather than tillage is predominant. Grazing, however, has involved the laying down of more than 16,000,000 acres in artificial grasses, chiefly those used by English farmers, as their carrying power is several times greater than that of native grasses. Besides land 'improved' in this or other ways, 25,000,000 acres of the occupied land are classed as 'unimproved,' and remain chiefly under native grasses. The area under grain and root crops is about 1½ million acres.

Grazing, then, is the chief source of production, and sheep and cattle of wealth. The number of sheep was estimated at about 24,000,000 in 1895. The sheep are mainly cross-bred, the basis being Merino crossed with Romney Marsh, Lincoln, Leicester, or Southdown. The prime object is to produce carcasses suitable for freezing combined with a heavy fleece. The average weight of the fleeces is now 7·72 lb. Inspection and grading of meat at the freezing factories is carried out with the utmost care. Cattle numbered 3½ millions in 1923, and, thanks to the growth of dairying, had increased through several decades. Much keenness is being shown both officially and by societies to improve the breed and yield of the dairy cows. Milking machines and the use of electric power are cheapening production. The butter and cheese are made in factories, mostly co-operative, of which there are 535, producing 11,182,000 cwt. of butter and 1,268,000 cwt. of cheese. The state encourages those factories by loans and otherwise, but their inspection is minute. Auckland, Taranaki, and Southland are the chief dairying districts. Beef and bacon are exported, but the total weight produced in the islands is comparatively small. Horses number 330,000, and the quality is high. Bee-keeping is coming into favour.

Agriculture.—The climate and soil of the eastern lowlands are well suited to cereals, but for many years the production of these has tended to dwindle. The annual consumption of wheat is no more than 7½ million bushels; yet though the Dominion was a generation ago a substantial exporter, it has lately had to import from Australia for home use. Similarly the export of oats, once over 10,000,000 bushels, is now very small, the crop having fallen by two-thirds. About half a million of bushels of maize are grown, and rather more barley. In 1922-23 no less than 493,000 acres were in turnips for live-stock; mangolds, potatoes, peas, and beans are grown. About 73,000 acres are devoted to growing grass for seed, and large crops of hay and lucerne are raised. The area in orchard is about 31,000 acres, making progress especially in Nelson, Central Otago, and Northern Auckland. In the last-named district, citrus fruits, notably lemons, can be grown profitably. Apples are an article of export to London. Grapes, from Hawkes Bay northwards, can be grown out-of-doors with commercial success.

The Department and Board of Agriculture are extremely active in educative and experimental work by means of visiting instructors and experimental farms. Inspection and supervision are carried to great lengths, but the results have been admittedly beneficial, and the standard of farming, particularly in all matters connected with grazing and dairying, has steadily risen during the last generation. Under recent acts of parliament, boards of control for frozen meat and for dairy produce have been set up to regulate export and

marketing, especially in Great Britain. This, it is claimed, has stabilised prices and reduced exporters' costs; but the experiment is new. A forestry department encourages planting, and about 100,000 acres are now in plantations, largely of exotic pines. The reserves of native forest are admittedly insufficient, and the export of timber may have to be stopped.

Mining.—Many minerals of economic value are found, but only three have been mined on a large scale—gold, coal, and kauri-gum. Important gold discoveries were first made in 1861, and the total export since 1853 is valued at over £91,000,000. The annual product has shrunk to between £500,000 and £600,000, and there is little expectation of increase. Silver is extracted from the gold bullion in the Auckland mines. The value of the total production of coal is estimated at about £34,000,000. Except that supplied to steamers, all is consumed locally. The yearly output is no larger than it was in 1909. There is very little anthracite, but a good supply of excellent bituminous, and very large quantities of brown coal. Two state collieries are profitably worked. Kauri-gum, the fossil resin of ancient pine forests, is found in large subterranean deposits in the northern part of Auckland. When cleaned and scraped it is shipped, chiefly to London, for use in making varnishes and linoleum. The annual value is above £500,000, but the supply is not inexhaustible. Very large deposits of iron ore and iron-sand have been examined, and an attempt is now being made to work the first-named commercially. Cinnabar, sulphur, tungsten ore, and phosphates are mined on a small scale. The islands are well provided with building-stone, including marble and decorative serpentine, and with fireclay.

Trade.—The overseas trade is large, though almost entirely carried within the empire. The one important exception is trade with the United States, which in 1922 exceeded £8,000,000, but with a heavy balance against New Zealand. Trade with Germany is increasing. Nearly two-thirds of the whole commerce is with Great Britain, which in 1923 took £37,000,000 of New Zealand produce, selling the Dominion in return about £24,000,000, mainly manufactured articles. The total trade reached £101,000,000 in the year 1924. The exports in that year were above £52,000,000, and, per head of population, were believed to be the highest of any country. New Zealand being a debtor community should export about £7,000,000 more than she takes in. Her transit trade is small. An overwhelming proportion of her exports—92 per cent.—are of pastoral products. By comparison the exports of minerals and agricultural produce are low: taken together they come to about 5 per cent. of the whole, and the export of wholly manufactured goods is also trifling. The trade figures have, of course, been swollen by inflated prices since 1914. Still, they were large before—£45,275,000 in 1913—having risen to that amount from £15,070,000 in 1893. Between 1883 and 1893 they were almost stationary. In the Empire, outside the United Kingdom, New Zealand does a considerable, though fluctuating, trade with Australia and Canada, and a substantial business with India and the Pacific Islands. The principal imports are spirits and wines, tobacco, cottons and silks, tea, sugar, and other groceries, machinery (including heavy imports of motors and parts thereof), clothing of all kinds, books, and chemicals. The revenue collected in customs-duties is equal to rather more than one-sixth of the declared value of the imports. Excise duties are levied on beer and tobacco. The distillation of spirits is forbidden. Sugar, imported from Fiji, is refined at Auckland.

Manufactures.—Manufacturing for export in

New Zealand consists almost entirely in the partial preparation of goods and raw materials for the wholesale market. They come chiefly under the heads of meat freezing and preserving, butter and cheese making, milk-condensing, wool-scouring, tanning and fellmongering, and flax-milling. The principal manufactures for local consumption are those of timber and furniture, engineering (including motors), woollen milling, boot and shoe making, clothing, printing and bookbinding. The value of the product of all 'principal industries' may be estimated at about £70,000,000, and the number of employees at 70,000, as against 8700 engaged in mining. Only about one-sixth are females. Factory inspection is closely carried out, and the wages and conditions are almost all regulated by awards and registered agreements under the Industrial Arbitration Act. The woollen and leathern articles bear an excellent name.

Banking and Insurance.—The banking business is carried on by six banks of issue, four of which are well-known Australian banks; and the other two, the Bank of New Zealand and National Bank of New Zealand, are established under special local acts. The first of these two is largely a state institution, as the government holds a third of its paid-up capital, and nominates its chairman, auditor, and a majority of its directors. This interesting arrangement appears to work successfully, as the bank does much the largest banking business in the country. Savings-banks held in March 1924 as much as £51,300,000 of deposits. Life insurance is carried on by eleven companies and a government life insurance office. The latter, and the Australian Mutual Provident Society, both do business on a very large scale. The government also does a considerable business in fire insurance, and it is claimed that its competition has reduced rates by 10 per cent. No less than forty-one fire insurance offices carry on business in the Dominion. Friendly societies—chiefly Oddfellows, Foresters, and Druids—have £2,600,000 in funds, and an average capital per member of £32.

History.—Abel Jansen Tasman, the first European to discover New Zealand, coasted along its western shores in December 1642. Captain Cook, the next navigator to behold it, landed in 1769. During the first forty years of the 19th century some hundreds of British subjects—traders, whalers, sealers, and missionaries—gradually settled in the islands, and obtained considerable influence over the natives. The British government, however, was very unwilling to annex the country. It had disavowed Captain Cook's action in taking possession of it in the name of George III., and was only driven to annex the archipelago in 1840 by the disclosure of a French plan to colonise it. An English company, moreover, founded by Edward Gibbon Wakefield, had begun systematic settlement by despatching a band of emigrants to be established at Port Nicholson, now Wellington. Captain Hobson, R.N., was therefore authorised to annex New Zealand. He landed in the Bay of Islands, 29th January 1840, and by the Treaty of Waitangi, concluded with the principal Maori chiefs a few weeks afterwards, obtained their allegiance at the price of guaranteeing them the fee-simple of all their unsold lands. In consequence, the whole country now occupied by whites—save an area of about 2,400,000 acres confiscated during war—has had to be purchased from the tribes. For thirteen years the colony was governed despotically by imperial administrators, one of whom, Sir George Grey, showed marked ability. By proclamation in January 1853 the colonists were granted self-government. Until 1871 progress was checked in the North Island by expensive intermittent struggles with Maori tribes, in which

the natives, though sometimes successful, were finally crushed by the colonial militia. Meanwhile the rapid development of sheep-farming and gold-mining in the South Island had stimulated settlement there. External trade, £900,000 in 1853, had increased to over £12,000,000 in 1873. In the seventies, Sir Julius Vogel initiated a policy of raising loans for railways and telegraphs, land purchase, and immigration. He also abolished the large provincial councils, which had hitherto divided control with the central government, and established such institutions as a public trust office, state life insurance, and a state land transfer system (that of Torrens). New Zealanders thus became habituated to a large measure of governmentalism. Until the end of 1890, however, the colony's affairs were still in the hands of the larger landowners, banks, and professional and commercial classes. In the year named these were ousted by a combination of the smaller farmers and trade unionists, headed by Liberal and Protectionist politicians. The result was a series of experimental laws which attracted critical interest outside the islands. Of these, those enacting progressive taxation, female franchise, compulsory arbitration in labour disputes, old age pensions, loans for farmers and for house-building, repurchase and subdivision of large estates, rating of ground values, and many others of less interest are still in operation. But those enacting local option and the perpetual leasing of state lands have been abandoned, the former in favour of a triennial poll on national prohibition, the latter in favour of sales of crown lands in freehold. This last, it is alleged, has encouraged much disastrous speculation and helped the rise of land values to fictitious heights, land for dairying fetching, in some instances, more than £100 an acre in 1919–20. The Liberal-Labour alliance broke up shortly after the death of the popular leader, Richard Seddon, in 1906. Seddon had supported the Imperialist fiscal policy of Joseph Chamberlain, and had grafted a preference to British imports on to the protectionist customs tariff of the colony. In 1912 the more conservative party, self-styled 'Reform,' gained office, and its leader, Mr W. F. Massey, remained premier till 1925, though during the Great War he headed a coalition government, styled 'National.' Since 1919 New Zealand politics have been made difficult by the divisions of three parties, the largest of which, 'Reform,' barely holds its ground between the other two, Liberal and Labour. Public life is largely a battle between two powerful classes, the agrarians and the trade unionists, both of which are well organised. Recent laws of interest are those which endeavour to control and direct the important exports of meat, butter, and cheese. New Zealand sent ten contingents of mounted riflemen to fight in the Boer War, while her effort in the Great War was on a much larger scale. At a cost of over £82,000,000 she equipped and sent overseas more than 100,000 men, and her soldiers bore themselves more than creditably in Palestine, the Thracian Chersonese, France, and Flanders: 16,700 of them died in service, and while they lost but 354 prisoners, they captured over 19,000, with more than 200 cannon. After the war their government spent about £26,000,000 in settling some thousands of returned soldiers as farmers.

The Crown is represented in New Zealand by a Governor-general appointed by the Imperial Government, but paid by the Dominion, and is governed by two Houses of Parliament. Of these the members of the Upper (Legislative Council) are nominated for seven years by the Governor-general-in-Council, and are paid £350. The Lower (House of Representatives) is elected triennially by uni-

versal adult suffrage without any plural voting. It consists of 80 European and 4 Maori members, paid £450 a year. The Ministry now number 12. Local government is carried on by several hundred municipalities, county councils, road boards, harbour boards, hospital and charitable aid boards. Local indebtedness amounts to about £32,000,000. The Colony, proclaimed a Dominion in 1907, is represented in London by a High Commissioner, and has trade or business agents elsewhere in the Empire and in the United States.

Defence.—A small permanent body of staff officers, instructors, artillery and ordnance officials, form a nucleus round which a territorial division is organised, numbering when mobilised 12,500 officers and men. Three brigades of mounted riflemen are included. The naval force consists of a warship largely officered and manned from England, and a training-ship.

Education.—Public education was so imperfect during the first thirty years after annexation that the proportion of scholars to population was less than 10 per cent. in 1867. It is now about 17 per cent. Primary education is almost entirely controlled by the Department of Education in conjunction with nine provincial boards and numerous school committees. Only one-eleventh of the schools are private. The curriculum of the public schools is modern and fairly liberal. It is secular, but includes moral as well as physical instruction. School teachers, of whom one-third are males, have to take the oath of allegiance. Secondary schools instruct 20,000 students, one-fifth of whom are technical. The university of New Zealand is an examining body with a senate, and four colleges are affiliated to it, one in each of the chief towns. Each manages its own affairs, and though government grants are given to higher education, the university is independent of state control. It has established schools of mining, engineering, medicine, agriculture, commerce, and law, and counts about 4000 students, rather more than one-fourth being women. A good many New Zealanders, however, still resort to British universities and hospitals. Public expenditure on education now exceeds £3,000,000 annually. The number of native children receiving instruction is extremely creditable to the Maori race.

Justice.—The Higher Courts are the Supreme Court, with a Chief-Justice and ten Puisne Judges, and a Court of Appeal. From the latter, leave may be granted to appeal to the Imperial Privy Council. Smaller cases, civil and criminal, are dealt with by Resident Magistrates, with jurisdiction up to £200, and by Justices of the Peace (jurisdiction up to £20). On the whole, legal procedure is cheap and expeditious. Barristers may practise as solicitors and *vice versa*. The number of divorce petitions in 1922 was 644.

Public Health.—Thanks to climate, a high standard of comfort and sanitation and also medical inspection, the population is extremely healthy, with a very low death-rate. The birth-rate is not high. It fell in the twenty years from 1903 to 1923 from 26.6 to 21.95; in 1919, indeed, it was 21.42, that, however, being due to the absence of males during the war. The death-rate in the same years fell from 10.40 to 9.3. In the year of the influenza epidemic, 1918, it rose to 14.84. The percentage of deaths of children under one year to each thousand births is 47, and is, therefore, much the lowest rate in the world. Especial care is taken to preserve infant life. Hospitals and lunatic asylums are state institutions. The Public Health Act gives wide statutory powers. The influenza, which killed 6700 whites and Maori in 1918, is much the most deadly epidemic that has ever swept the islands.

Public Finance.—The average revenue during the five years ending with March 1924 has been about £29,000,000, the average expenditure about £2,000,000 less. The chief sources of revenue are customs, land and income tax, railways, post and telegraphs, stamps, and excise. Taxation has become heavy since the Great War, and is about £12 per head. The net public debt is about £215,000,000, of which somewhat more than one-third is war debt. The remainder is for outlay on railways and other works, and on loans to farmers and work-people, to the latter for housing. War debt apart, the outlay may be called directly or indirectly remunerative. The return on the railways is 3.82 per cent. The state is still a very large landowner.

Pensions.—Pensions paid by the government amount to a sum of more than 2½ million annually. They are classed as Old Age, Widows', Military, War, Miners', and Epidemic. The military, war, and epidemic (influenza) pensions are falling in number, the old age and widows' are increasing. Male old age pensioners must be at least sixty-five, female sixty years of age, unless they have children under fourteen. They must be 'sober and respectable,' and be British subjects and not Asiatics. A widow must have at least one child under fourteen. A National Provident Fund administered by a Government Board provides benefits for voluntary contributors.

See historical works by Gisborne, Rusden, Reeves, Swainson, Thomson; on Maori wars, Sir W. Fox, Gudgeon, Cowan; on New Zealand's part in the Great War, 4 vols. by Stewart, Waite Powles, and Drew; works on the Maori by Maning, Colenso, Percy Smith, Sir G. Grey, Tregear, Cowan, White; on their language, Maunsell, Williams, Tregear; on their art, Hamilton, Robley; earlier descriptive works, Shortland, Savage, Wakefield, Thomson, Samuel Butler; alpine, Green and Malcolm Ross; scientific, Dieffenbach, Hooker, Cockayne, Park, Hudson, Sir W. Buller, Von Haast, and Handbooks by Drummond and Hutton (fauna) and Lang and Blackwell (flora); works on economics and social legislation by Scholfield, André Siegfried, Downie Stewart, Reeves, Demarest Lloyd, Lord Bryce, and Sir J. Gorst; statistical, the *Official Handbook of New Zealand* (annual).

New Zealand Flax. See FLAX (NEW ZEALAND).

Nexø, MARTIN ANDERSEN, Danish novelist, was born in 1869 in a poor quarter of Copenhagen, and spent his boyhood in Bornholm near Nexø (whence his name). From shoemaking and bricklaying he turned to books and teaching, and in 1906 won European fame with *Pelle the Conqueror* (trans. 1915-17; 4 parts), describing poor life from within and the growth of the labour movement.

Next of Kin. See KIN (NEXT OF).

Ney, MICHEL, French marshal, was born at Saarlouis, 10th January 1769. A non-commissioned officer in a hussar regiment when the Revolution began, he quickly secured promotion under the new order of things, becoming successively Kléber's adjutant-general at the blockade of Mainz in 1794, and in 1796 general of brigade. For the capture of Mannheim by a daring *coup de main* he was made a general of division in 1799. He was interim commander of the Army of the Rhine for a time. After the peace of Lunéville Bonaparte brought about his marriage with Aglaé Louise Auguié de Lescans, a young friend of Hortense Beauharnais, and appointed him inspector-general of cavalry. On the establishment of the empire he was made marshal of France. In 1805 he stormed the entrenchments of Elchingen, for which he was created Duke of Elchingen. He distinguished himself anew at Jena and Eylau, and his conduct at Friedland earned him the title from Napoleon of 'le brave des braves,' and the grand-eagle of the

Legion of Honour. He next served in Spain, but quarrelled with his superior Masséna about the plan of the campaign and returned to France, where he remained inactive till in 1812 he received the command of the third corps in the Grand Army. He covered himself with glory at Smolensk and Borodino (q.v.), and was rewarded with the title of Prince of the Moskwa. He led the rear-guard in the disastrous retreat, and his sleepless vigilance alone saved the remnant of the Grand Army. In 1813 he opened the battle of Lützen, and showed his usual capacity and courage at Bautzen, but was defeated by Bülow at Dennewitz. He fought heroically throughout the fatal struggle at Leipzig, and was also in the last defensive campaign of 1814; but after the capture of Paris he urged the emperor to abdicate, and submitted to Louis XVIII., who loaded him with favours. On Napoleon's return from Elba Ney was sent against him at the head of 4000 men; but the old enthusiasm proved too much for him, and with most of his soldiers he went over to his old master's side. In the final campaign he commanded the first and second corps, opposed Brunswick at Quatrebras (June 16), and led the centre with more than bravery at Waterloo; twice—once at the head of the cavalry, last with the Old Guard—he strove to break the English force in vain. During the day he had five horses shot under him. After the capitulation of Paris he yielded to the entreaties of his family to set out for Switzerland; but a costly Egyptian sabre, the gift of Napoleon, led to his being suspected by an official, and arrested near Aurillac. He was condemned to death for high-treason, and was shot in the garden of the Luxembourg on 7th December 1815—a cruel act of revenge that might well have been spared the bravest among the sons of France. Even the cost of the prosecution was extorted from his unhappy widow.

His son published his (uncompleted) *Mémoires* (1833). See *Lives* by Welschinger (Paris, 1893), Bonnal (1910 *et seq.*), and Hilliard Atteridge (1913).

Nez Percés, a tribe of American Indians, settled in Idaho, on the Lapwai River. The Nez Percés 'proper' have always been loyal to the whites, and have made good progress in civilisation. But in 1877 the treaty reductions of their reservation led to a sanguinary outbreak on the part of the 'non-treaty' Nez Percés, who murdered settlers, fought the soldiers, and then fled across Idaho, Montana, and Dakota. They were overtaken and beaten, and the survivors (some 350) transferred to Indian Territory; but in 1885 some were restored to Idaho, and the rest joined the Colville Indians, in Washington. There is no evidence that they ever had a custom which would justify their name, 'pierced nose.'

Ngami, LAKE, a shrunken lake of the Bechuanaland Protectorate, situated at the northern extremity of the Kalahari Desert, in 20° 30' S. lat. and 23° E. long., at an altitude of 2810 feet. When discovered by Livingstone in 1849, it was a lake of about 50 miles long by 10 to 20 miles broad, its chief tributary being the Kubango. It is now little more than a reed-grown swamp in the dry season—the southern end of the Okavango swamps.

Niagara ('Thunder of Waters'), a river of North America, forms part of the boundary between New York state and the province of Ontario. It flows from Lake Erie to Lake Ontario, a course of 36 miles, during which it makes a total descent of 326 feet—about 50 feet in the rapids immediately above the great falls, and nearly 110 feet in the seven miles of rapids below. It encloses several islands, the largest Grand Island, which is nearly 10 miles long. Four miles below this island

are the most famous falls in the world. The centre of the river here is occupied by Goat Island, dividing the cataract into two—the Horseshoe (Canadian) Fall, with a descent of 158 feet, and the American fall, 162 to 169 feet; the outline of the former is about 2640 feet, of the latter 1000 feet. The volume of water which sweeps over this immense chasm (nearly nine-tenths passing over the Canadian fall) is about 15,000,000 cubic feet a minute. The depth of water on the crest of the falls is less than 4 feet, except in a few places, notably at the apex of the Horseshoe Fall, where it is about 20 feet. The limestone edge of both falls is rapidly wearing away in the centre; the Canadian fall now presents the form of a V; in the American fall the same tendency is visible, although the process has begun much more recently. For seven miles below the falls (to the point, that is, where it has been supposed that the falls originally stood) the river is shut in between perpendicular walls of rock, from 200 to 350 feet high. For some distance below the falls there is still water, the body of water which pours over the precipice sinking, and only coming to the surface again two miles below, where the whirlpool rapids begin; a little lower is the whirlpool, where a sharp turn sends the waters hurling against the Canadian side, and then sweeping round in a great eddy before they find a vent at a right angle with their former course. The lands bordering the river on both sides of the falls are state parks. On 4th October 1890, the first sod was cut of a tunnel for utilising the water-power of the falls, regarded as one of the greatest engineering enterprises ever undertaken. By the middle of 1895 the first transmission of electric power for commercial purposes had been made, 4000 horsepower having been transmitted to an aluminium manufactory a mile distant. Power is now transmitted for hundreds of miles, and is also used in the immediate neighbourhood (see NIAGARA FALLS).

Niagara Falls, two cities on the Niagara, 2 miles below the Falls, one (pop. 50,000) is New York State, the other formerly called Clifton (pop. 15,000), in Ontario. They are tourist centres, and have many factories using power from the falls. Three great steel bridges connect the railways and roads of the United States and Canada.

Niam-niam, an African people dwelling along the watershed that parts the feeders of the Bahr el-Ghazal from those of the Welle-Makua and other northern tributaries of the Congo. Of the negroid Nuba stock (with Nilotic admixture), they have round faces, broad heads, bodies long in proportion to the legs, and are inclined to corpulency. They have no cattle. Considerable manual and artistic skill is shown in the forging of iron, making of pottery and baskets, and the carving of wood. They are passionately fond of music, and play a kind of mandolin. To these people legends of 'tailed men' are referable.

Nias, an island to the west of Sumatra, Dutch since 1857, has an area of about 1800 sq. m. The surface is mountainous, the highest peak rising 2000 feet. The Niassers are of the Malay race, but fairer than the Malays usually are. They are gentle, sober, and peaceful, remarkably ingenious in handicraft. They grow rice, coconuts, bananas, tobacco, sugar-cane, and pepper.

Nibelungenlied, also called *DER NIBELUNGE NÔT*, an old German epic poem, that takes rank next after the Homeric poems amongst the great epics of the world. The original substratum of the work is undoubtedly the saga of Sigurd, recounted in the Elder Edda; it is from that source the epic derives its mythological elements, and in all probability the tragic conception of an all-

compelling destiny which dominates the action of the poem. To this original substratum must be added two others—one taken from the legendary history that grew up out of the migrations of the peoples, especially the struggle between the Huns and the Burgundians; the other embodying the spirit, the sentiment, the life and circumstances of the crowning age of chivalry, the middle of the 12th to the middle of the 13th century, during which period the poem, as we now have it, was unquestionably written. Who was its author, or rather the man who cast it in its present form, is altogether unknown; the attribution of it to the minnesinger of Kürnberg in Upper Austria now finds very little acceptance. The oldest elements of the work must have been long current in the form of popular songs or versified sagas; but the incidents of the story as recounted in the epic seem to have been fused into a unity some time previous to the 12th century. The existing version is due to one who was steeped in the ideas of the courtly poetry of the middle ages; the writer took the story that had in process of time grown together into a connected epic narrative, and impressed upon it his own methods of poetic vision, and his own peculiar versification—in short, his own style. German commentators are of opinion that the writer worked from originals composed in Latin. After the Reformation all interest in the poem quite died out, and was only revived in the end of the 18th century. But it was not until twenty years and more of the 19th century had passed that German students began to be aware of the inestimable literary treasure they possessed in the *Nibelungenlied*. A keen discussion arose as to its unity; one school, headed by Lachmann, maintained that it was merely a collection of folk-songs, loosely strung together, or rather intermingled one with another; an opposing school defended the unity of the narrative and of the poem.

The tale is briefly this. Sigfried, the son of the king of the Netherlands, has become the possessor of the storied treasure of the Nibelungs, which carries with it the curse of dire evil to its owner. Sigfried marries Kriemhild, sister of Gunther, king of Worms, and then helps Gunther to win to wife Brunhild of Iceland, by taking Gunther's place without her knowledge and overcoming her in three trials of bodily skill and strength. After some years a bitter dispute breaks out between the heroines as to whether Gunther or Sigfried is the greater. Brunhild's jealousy is so great that she induces Hagen, one of Gunther's vassals, to murder Sigfried. Kriemhild, though she mourns long years for her husband, at length marries Etzel (Attila), king of the Huns. After Sigfried's death she had become the possessor of the Nibelungs' treasure; but Hagen had wrested it from her and sunk it at the bottom of the Rhine. At the end of several years Kriemhild, who still mourns for Sigfried, and still nourishes the desire for revenge upon Hagen and Gunther, invites her brother and his court to visit her. They do so, accompanied by a body of 11,000 knights and men-at-arms. The conclusion of the epic relates the bloody incidents attendant upon the total annihilation of the Burgundians at the court of Etzel, and the slaughter they made amongst their foes. There is a continuation of the poem, called the *Nibelungenklage*, or Lament for the Nibelungs, a production in every way much inferior to the *Nibelungenlied*. In spite of the uncouth versification of this last, it exercises a strong fascination upon the reader, owing to the grandeur of its conception, its strong characterisation, its earnestness and tragic intensity.

There exist numerous old MSS. of the poem; but the most valuable are three, called respectively the Munich,

St Gall, and Lassberg MSS., all of the 13th century. The best modern High German versions are those by Simrock, Bartsch, and L. Freytag. There are English translations by Lettsom (1850), Foster-Barham, Birch, and A. S. Way (1912). See Carlyle's *Miscellanies* (vol. iii.). See also WAGNER.

Nicæa, or NICE, a city of ancient Bithynia, in Asia Minor, situated on the eastern shore of Lake Ascania. It was built by Antigonus, the son of Philip (316 B.C.), and received the name of Antigonæia, which Lysimachus changed to Nicæa, in honour of his wife. It was a handsome town, and of great importance in the time of the Roman and Byzantine emperors. It is famous in ecclesiastical history for two Councils held in it, the First and Seventh Ecumenical Councils. The First Council of Nice was held 325 A.D., and was convened by the Emperor Constantine, for the purpose of defining the questions raised in the Arian controversy (see ARIUS, ATHANASIUS); the Nicene Creed adopted is discussed at CREED. The Council also deliberated on the Meletian Schism; and its decree on the celebration of Easter met with universal acceptance.—The Second Council assembled under the Empress Irene (787), for the purpose of reconsidering the subject of Images (see IMAGE-WORSHIP).

Nicaragua, a state of Central America, stretching right across the isthmus north of Costa Rica. An irregular square, the east (Caribbean) coast measuring 290 miles and the west coast 185, Nicaragua has an area of about 50,000 sq. m. The Central American Cordilleras form the backbone of the country; they run north-west and south-east at a distance of 12 to 30 miles from the Pacific, and attain elevations of 4000 and 5000 feet above sea-level. On the west the surface sinks rapidly to a longitudinal depression (110 feet), the southern two-thirds of which are filled by the large lakes of Nicaragua (115 miles long, 45 broad, and 140 feet deep in most parts) and Managua (35 miles long, 20 broad, 30 feet deep), the latter lying north of the former and 25 feet higher. This depression is studded with a chain of volcanic cones, standing on islands in the lakes (Ometepe and Madera, 4190 feet), and clustering thickly between the northern end of Lake Managua and the Gulf of Fonseca at the north-western extremity of the country, as Coseguina (3835 feet), which was the scene of a tremendous outbreak, lasting over four days, in 1835, Viejo (6267), Telica (4200), Momotombo (6890), Mombacho (4600), and several others. Though most of these are quiescent, some of them burst forth in eruption from time to time. Another low range separates this depression from the Pacific. The districts west of the central backbone are the chief seats of the population. There stand the towns Managua (the capital), León, Granada, Chinandega, Rivas.

East of the Cordilleras the surface falls away gradually; the spurs that break off from the main ridge sink into the low alluvial plains that face the Caribbean Sea. Thick forests clothe extensive areas on this side. A few of the eastward rivers are of good length, such as the Coco or Wanks (350 miles long), the northern boundary; the San Juan (125 miles), which drains Lake Nicaragua and separates Nicaragua from Costa Rica on the south; the Bluefields and the Rio Grande (230 miles). The low coast-belt, formerly called the Mosquito Coast (now the department of Bluefields) is lined with salt lagoons—Pearl lagoon having an area of 200 sq. m., and Bluefields lagoon half as much. The mountain-spurs east of the main chain are rich in minerals; gold is mined a little, as well as silver; coal, copper, tin, iron, lead, zinc, antimony, quicksilver, marble, &c. exist. As a rule the climate varies between 70° and 90° F., and there is a dry season

lasting from about December to May. The natural products of the soil are accordingly tropical. The forest trees include mahogany, rosewood, logwood, fustic, sandalwood, india-rubber, and numerous others that yield fancy woods, medicinal products, gums, and dyes. Large herds of cattle are bred and reared on the extensive plains of the centre and east. The rich soil of the cultivated western region yields maize (the staple food of the people), coffee, cocoa, sugar, cotton, rice, tobacco, indigo, and a great variety of tropical fruits. The east grows bananas, coconuts, and sugar. The exports are chiefly coffee, sugar, bananas, timber, and hides. The animal life is like that of Guatemala (q.v.). The population in 1920 was 638,000. The state religion is Roman Catholic, but all creeds are tolerated. The educational standard is low, in spite of universities at León, Granada, and Managua. The country is governed by a president (elected for four years), a legislative assembly, and a senate; both these bodies are elected by the people, the former for four, the latter for six years. There are 175 miles of railway, connecting the chief towns with Corinto.

Nicaragua, like the states north of it, was a centre of Aztec civilisation; but the Aztecs were preceded by another race, likewise civilised, who have left stone sculptures and monumental remains. The Aztec influence survives in archaeological ruins and relics and in the Indian dialects. Columbus sailed along the Mosquito Coast in 1502. Twenty years later the country was overrun by the Spaniards under Gil Gonzalez D'Avila, and in 1524 the city of Granada was founded. This town soon developed as the head of a stream of commerce that flowed up and down the San Juan River. In 1610 was founded León, the democratic rival of the aristocratic Granada. During the Spanish supremacy (after 1550) Nicaragua was a province of Guatemala. In 1821 it asserted its independence, and two years later joined the federation of the Central American states, a connection that lasted sixteen years. The history of the country after the severance from Spain is a record of war and dissension, war with Costa Rica, with Guatemala, and with Great Britain (1848), which had asserted a protectorate over the Mosquito Coast since 1655. This region was given up to Nicaragua in 1860. Between 1855 and 1860 the aristocratic and the democratic party were fighting tooth and nail, the latter being assisted by the adventurer William Walker (q.v.). Since then the chief events have been wars with her neighbours, resistance to attempts at confederation, and canal negotiations. Nicaragua has made laudable efforts to develop her resources and to advance along the path of civilisation, and she has given one name to literature—Rubén Darío (q.v.).

See Squier, *Nicaragua* (1852); Belt, *Naturalist in Nicaragua* (1873); Bodham-Whetham, *Across Central America* (1877); Lévy, *Notas Geográficas y Económicas sobre Nicaragua* (Paris, 1873); Bancroft, *History of Pacific States: Central America* (1882); and Joyce, *Central American Archaeology* (1916).

Nicaragua Ship-canal. The plan of cutting a canal through Central America by way of the San Juan River and Lake Nicaragua is by no means new. But the project was not taken up in earnest until 1884, when a treaty with this object in view was signed between the United States and Nicaragua. The Nicaragua Canal Company was formed early in 1889, and operations were begun at Greytown, but by 1893 the company ceased working from financial embarrassment. Several United States Commissions reported in favour of the scheme, but the senate insisted on a waiting policy. The rival Panamá scheme was adopted in 1903, consummated in 1914. However, the right

to construct a Nicaragua canal was conferred on the United States in 1916.

Niccola Pisano. See PISANO.

Niccolo da Foligno. See ALUNNO.

Nice (Ital. *Nizza*), chief town of the department of the Alpes Maritimes, France, stands on a beautiful well-sheltered site on the coast, 140 miles E. by N. of Marseilles and 110 SW. of Genoa. It has for many long years been celebrated as a winter-resort for invalids. The mean temperature of winter is 49° F., of summer 72°. Frosts occur but seldom. Pop. (1872) 42,363; (1886) 65,053; (1911) 98,865; (1921) 155,839. The city consists of three parts—the New Town on the west, the Old Town, and the Port on the east. The first of these is the part frequented by foreigners, particularly English (whence its name of 'English town'). Beautiful promenades stretch along the seashore, and are overlooked by villas and hotels. Numerous bridges across the little river Paglione (Paillon) connect the New Town with the Old or Upper Town. This part, with narrow streets, clusters at the foot of a rocky height, the Castle Hill; on the other (east) side of this hill is the harbour. The Castle Hill is an isolated mass of limestone 318 feet high, crowned by a strong castle, now in ruins, and is laid out in public gardens. The chief public buildings are the cathedral, the Gothic church of Notre Dame, the natural history museum, art gallery, library, observatory, casino, &c. The people manufacture olive oil, artistic pottery, and perfumery, grow flowers and southern fruits, the last of which they preserve, and produce inlay work in olive-wood. Most of these things are exported, chiefly by way of Genoa and Marseilles. The ancient Ligurian town of Nicæa, founded by a colony of Phœceans from Massalia (Marseilles), became subject to Rome in the 2d century B.C. It was in the hands of the Saracens during the greater part of the 10th century. Then, after existing as an independent city, it acknowledged the supremacy of the Counts of Provence and the House of Savoy (1388). In 1543 it was taken and pillaged by the Turks under Barbarossa. From 1600 onwards it was repeatedly taken by the French; and they kept possession of it from 1792 to 1814. In 1860 it was ceded to France by Sardinia. Masséna was born near to the city, and Garibaldi in it.

Nice. See NICÆA.

Nicholas, the name of five popes and an anti-pope. **NICHOLAS I.** was born of a noble Roman family, and was elected as successor to Benedict III. in 858. He showed great persistence in his endeavours to assert the supremacy of the Roman curia, especially in his successful disputes with Archbishop Johannes of Ravenna, Archbishop Hincmar of Rheims, and the patriarch Photius of Constantinople. His latest triumph was the restoration to her rights of Thietberga, the unjustly divorced wife of the Emperor Ludwig's younger brother, Lothaire, king of Lorraine. A synod of Metz in 862 had allowed the king to put her away and marry his mistress, but the pope reversed the judgment and deposed the too compliant Archbishops of Cologne and Treves. Nicholas died in 868.—**NICHOLAS V.** was originally called Thomas Parentucelli. Born at Pisa in 1398, he was educated at Florence and Bologna, and was named Bishop of Bologna by Eugenius IV. He showed such astuteness during the troubles of the Councils of Basel and Florence that he was chosen to succeed Eugenius IV. in 1447. He prevailed on the antipope, Felix V., to abdicate, and thus restored the peace of the church in 1449. He was a liberal patron of scholars, and despatched agents both to the East and West, to purchase or to copy important Greek and Latin manuscripts. The number collected is said to have

exceeded 5000. He remodelled, and may almost be said to have founded, the Vatican Library. He invited to Rome the most eminent scholars of the world, and extended his especial patronage to those Greeks whom the troubles of their native country drove to seek a new home in the West. He endeavoured to arouse the Christian princes of Europe to the duty of succouring their brethren of the East; but the age of enthusiasm was past, and he was forced to look on inactive at the fall of Constantinople in 1453. Nicholas died in 1455. He must not be confounded with an antipope of the same name, Peter de Corbario, who was set up, in 1328, by Ludwig of Bavaria, in antagonism to John XXII. (q.v.). See also NICOLAS (St.).

Nicholas I., emperor of Russia, was the third son of Paul I., and was born at St Petersburg, 7th July 1796. On 13th July 1817 he married the eldest daughter of Frederick-William III. of Prussia—a union that long affected European politics. Owing to the resignation of his elder brother Constantine, he succeeded to the throne on the death of Alexander I. (December 1825). A long-prepared military conspiracy broke out immediately after his accession, which he suppressed with great vigour and cruelty. After a brief ebullition of reforming zeal, he reverted to the ancient policy of the tsars—absolute despotism, supported by mere military power. A war with Persia commenced, was concluded by the peace of Turkmanshai (1828), which gave a considerable extent of territory to Russia. In the same year he entered upon a war with Turkey, in which victory, though at enormous cost, constantly attended his arms, and the peace of Adrianople obtained for Russia another increase of territory. The political movements of 1830, in the west of Europe, were followed by a national rising of the Poles, suppressed after a desolating contest of nine months, in which the utmost efforts of the whole military resources of Russia were required. Nicholas punished the rebellion by converting the kingdom of Poland into a mere Russian province, and strove to extinguish the Polish nationality. This policy, however, was viewed with great dissatisfaction throughout Europe, and the vanquished Poles were everywhere regarded with general sympathy. Russia, by Nicholas's mode of government, became more and more separated from the fellowship of the western nations. Intellectual activity was, as far as possible, restrained to things merely practical, education limited to preparation for the public service, the press was placed under the strictest censorship, and every means used to bring the whole mind of the nation under official guidance. His Pan Slavism also prompted him to Russianise all the inhabitants of the empire, and to convert Roman Catholics and Protestants to the Russian Church, of which the tsar was the head. War was waged against the mountaineers of the Caucasus with the greatest energy and perseverance, at the cost of immense sacrifices both of money and lives. The extension of British influence in central Asia was also viewed by him with alarm, and led to an unsuccessful expedition to Khiva. During the political storm of 1848-49 he abstained from interference until an opportunity was found in the request of the emperor of Austria for his assistance to quell the Hungarian insurrection. He succeeded at the same time in drawing closer the bonds of alliance between the Russian and Prussian monarchies. The re-establishment of the French empire still further tended to confirm these alliances, and led Nicholas to think that the time had at length come for carrying into effect the hereditary Russian scheme for the absorption of Turkey; but the unexpected opposition of Britain and France, and his own invincible repugnance to

yield led to the Crimean War (q.v.). He died 2d March 1855. See books by T. Schiemann.

Nicholas II., last emperor of Russia, was born 18th May 1868, and succeeded his father Alexander III. in 1894. Himself narrow-minded, he repeatedly allowed himself to be dominated by his bigoted and reactionary wife Alexandra Feodorovna (Princess Alix of Hesse), who in turn was under the influence of Rasputin and other charlatans and adventurers. Events of his reign include the great Kishinev pogroms conducted by the 'Black Hundred,' the tsar's initiation of the peace conference at the Hague (see PEACE AND INTERNATIONAL ARBITRATION), the disastrous war with Japan, the revolution of 1905, the granting of a constitution, afterwards as near as could be brought to nought, the tightening of the alliance with France, Russia's participation in the Great War, and finally the revolution of 1917. He was forced to abdicate in March, was sent to Tsarskoe Selo (Detskoe Selo), to Tobolsk, and to Ekaterinburg (Sverdlovsk), where on Koltchak's advance the local soviet caused him to be shot along with his wife, son, and four daughters, 16th July 1918.

Nicholas, Russian Grand Duke (born 1856), nephew of Alexander II., was commander-in-chief against Germany and Austria, August 1914 to September 1915, and governor-general in the Caucasus 1915-17.

Nicholas II. Land, a mountainous volcanic land with glaciers, N. of Cape Chelyuskin, discovered in 1913 by Vilkitiski, who explored its NE. coast to 81° N. lat., 96° E. long.

Nichols, a family of printers and antiquaries, associated with the *Gentleman's Magazine* from 1778 to 1856. To it belonged John Nichols (1745-1826); his son, John Bowyer Nichols (1779-1863); and his son, John Gough Nichols (1806-73).

Nichols, ROBERT MALISE BOWYER, poet, born 1893, son of John Bowyer Buchanan Nichols (b. 1859, himself a poet), was educated at Winchester and Trinity College, Oxford. After serving in the Great War, he was appointed to the chair of English Literature in the Imperial University, Tokio. His first book of poems, *Invocation*, was issued in 1915; *Ardours and Endurances* appeared in 1917, *Aurelia* in 1920, *Guilty Souls*, a drama, in 1922, and *Fantastica* in 1923.

Nicholson, JOHN, a distinguished Indian soldier, was born at Lisburn, 11th December 1822. In 1838 he joined the East India Company's service, and in 1840 his regiment was ordered to Ghazni in Afghanistan (q.v.), where, two years later, it was compelled to surrender to the enemy. After a time of miserable captivity he regained his liberty. On the breaking out of the Sikh war in 1845 he served in the campaign on the Sutlej, and was present at the battle of Ferozeshah. He was now appointed assistant to the resident at the conquered capital, Lahore. During the Sikh rebellion of 1848 he greatly distinguished himself, the preservation of the important fortress of Attock being due to his daring and promptitude, whilst soon after, at the Margulla Pass, he succeeded in intercepting and defeating a large body of the insurgents. At the battles of Chillianwalla and Gujrat successively he earned the special approval of Lord Gough, to whom he was immediately attached. The Punjab having finally become a British province, Captain Nicholson was appointed a deputy-commissioner under the Lahore Board. His success in bringing the savage tribes under thorough subjection to law and order was something marvellous.

In the mutiny in 1857 Nicholson perhaps did more than any other single man to hold firm the British grasp of the Punjab. He it was who suggested the formation of the famous movable column, and he

presided over its organisation; while in his dealings with the suspected regiments of sepoys he exhibited throughout a brilliant combination of boldness with subtlety, discretion, and astuteness. At Trimmoo Ghaut on the 12th and 14th July he nearly annihilated a force of rebels, and at Najafgarh on the 24th he dispersed another body of mutineers. As brigadier-general, on September 14 he led the first column of attack at the siege of Delhi, and after the troops had forced their way into the city he still exposed himself in the most fearless manner, and fell, shot through the body. He died on 23d September 1857. Over the whole of India it was felt that, to use Lord Canning's expression, 'a tower of strength' had fallen.

See Kaye's *Lives of Indian Officers* (1867; new ed. 1889); the *Lives of Lord Lawrence* (q.v.); and L. J. Trotter's *Life of John Nicholson* (1897; new ed. 1905).

Nicholson, WILLIAM, artist and engraver, born in 1872 at Newark-on-Trent. After studying in Paris he collaborated with his brother-in-law James Pryde, and under the name of 'Beggartstaff Brothers' they produced many striking poster designs. In 1898 he published *Alphabet*, an *Almanac of Twelve Sports* (with Rudyard Kipling), and *London Types*, illustrated with remarkable woodcuts, where he made use of large masses of sombre shades relieved with splashes of bright colour. As a painter of still life he is notable, his picture 'Zinnias' being one of the greatest flower paintings of modern time. He is equally distinguished as a portrait painter, his paintings of W. E. Henley, Sir W. C. Packenham, and Miss Jekyll being good examples of his work. In the latter, indeed, he joins the realism of the 17th century Dutch painters to the decorative qualities of Japan.

Nicias, a famous Athenian statesman and general during the Peloponnesian war, was the son of Niceratus, a very wealthy citizen, who had acquired his fortune by working the silver-mines at Laurium. He belonged to the aristocratic party, and after the death of Pericles was the chief opponent of the demagogue Cleon, and later of Alcibiades. In 427 B.C. he captured the island of Minoa, next year he ravaged the island of Melos and the coasts of Locris, the next he compelled the Spartan force in Sphacteria to surrender, and defeated the Corinthians. In 424 he ravaged part of Laconia and captured the island of Cythera. After the death of Cleon he brought about a peace between the Spartans and Athenians, 421. Six years later the Athenians at the instigation of Alcibiades resolved on a great naval expedition against Sicily. Nicias was appointed one of the commanders, although he had strongly protested against the undertaking. In the autumn of 415 he laid siege to Syracuse, and was at first successful, but subsequently experienced a series of disasters; his fleet was destroyed, and his troops began a retreat towards the interior of Sicily. They were speedily forced to surrender, and Nicias was put to death in 414. See the *Histories of Greece*, Plutarch's *Life of Nicias*, and A. J. Church, *Nicias and the Sicilian Expedition* (1899).

Nickel (symbol, Ni; atomic weight, 58.7; atomic number, 28; specific gravity, 8.6-8.9), a white metal first isolated by Cronstedt in 1751. Nickel is similar to iron, chemically and physically, and shares with iron and cobalt the distinction of having magnetic properties. The arsenide of nickel being at first mistaken by the mediæval Saxon miners for a copper ore, they called it *Kupfer-nickel* (*Kupfer*, copper; *Nickel*, a refractory or stubborn individual), because it refused to yield copper—whence the origin of the name nickel. In a pure state the metal is malleable and ductile, and possesses a high tensile strength. The tensile

strength of annealed nickel seldom falls below 30 tons per square inch, while that of the cold-rolled metal may reach 45 tons. It can be pressed, spun, cast, forged, welded, and rolled upon other metals. Nickel has many uses in the arts and in industry. Its immunity from attack by most acids and alkalis, and its non-tarnishing quality, make it suitable for culinary vessels, receptacles for storing food, large boiling-pans, laboratory crucibles and dishes, &c. The high melting-point of the metal (1452° C., or 2645° F.), combined with its reasonable price, makes it serviceable for the electrodes of sparking-plugs, and for ionic or wireless valves.

The alloys of nickel are numerous and valuable. The best known is 'nickel silver,' or 'German silver'; it contains copper, zinc, and nickel, the percentage of the latter metal ranging from 5 to 35; it is used for electro-plated goods, railway carriage and cabin fittings, and for making wire of high electrical resistance. The nickel-iron alloy occurs in nature in most meteorites, and Faraday and Stoddart produced it artificially in 1820. Nickel-steel is enormously used. The addition of small proportions of nickel increases the tensile strength of a steel by about 4500 lb. per square inch for each 1 per cent. of nickel. Nickel-steels containing from 3 to 5 per cent. nickel are used in bridge-construction, and in the automobile and aeroplane industries. A steel containing 25 per cent. nickel is almost non-magnetic; it is employed on ships in the neighbourhood of magnetic instruments, and in the manufacture of electrical alternators. 'Invar' is a steel with 36 per cent. nickel; its coefficient of expansion is negligible, a property which makes it valuable for surveyor's tapes, clocks, and scientific apparatus. If the percentage of nickel be increased to 46 we get 'platinite,' whose coefficient of expansion is the same as that of glass. Platinite is employed for leading-in wires passing through the glass of electric-light bulbs, &c.

Where toughness and high tensile strength are necessary, steels having 4 or 5 per cent. nickel and small proportions of manganese and chromium are much favoured; they are adopted for crank-shafts, engine parts, gear-wheels, cams, couplings, &c., in general engineering, and especially in motor-car and aeroplane construction. Nickel-chromium steel is also largely used for armour-plate. Non-rusting and acid-resisting steels also contain nickel and chromium, though the latter metal is, in these cases, in higher proportion.

Nickel and nickel-copper alloy are used by most countries for coinage purposes. Spanish coins introduced after the Great War are of an alloy of nickel, aluminium, and copper. 'Cupro-nickel' (20 Ni, 80 Cu) is a white, ductile, and malleable alloy, used, *inter alia*, for bullet-envelopes. 'Monel metal' (70 Ni, 30 Cu) has high tensile strength, is very resistant to corrosion, and is extensively used for woven-wire gauzes, tubes, &c. Nickel-plating is an important industry, with very wide applications; essentially it consists in depositing a layer of nickel electrolytically on some other metal; the electrolyte is usually a solution of nickel-sulphate or nickel-ammonium sulphate, to which other salts (sodium and ammonium chlorides, boric acid, &c.) are added. New uses for nickel and its multitudinous alloys are found every year.

By far the most important source of nickel is the nickeliferous pyrrhotine (magnetic sulphide of iron) of Sudbury, Ontario; these deposits, of which about thirty are known in an area of 36 miles by 16 miles, yield over 3 million pounds' worth of the metal per annum. The ore is smelted locally, and the resulting matte is treated for the metal in Canada, the United States, and Britain. Monel metal is produced from Sudbury ore. The Sudbury nickeliferous masses are large and of irregular shape,

occurring at or near the margin of a big intrusion of norite (a variety of diorite); associated with them are numerous other intrusives—e.g. granite, quartz-norite, and basic dykes. Second in importance stand the New Caledonian deposits of garnierite (green and brown hydrated nickel-magnesium silicate). Discovered by Garnier in 1865, the New Caledonian deposits ranked for nearly forty years as the world's principal source of nickel, until they were outclassed entirely by those of Canada. The garnierite lies in pockets and patches in serpentine. The average yield of the ore is about 7 per cent. nickel. Nickel is also produced from the arsenical silver-cobalt ores of the Cobalt district, Ontario. Nickel and cobalt are nearly always found together. Of potential significance are the sulphide ores of the Insizwa region, Griqualand East, South Africa; here, as at Sudbury, the nickel occurs with iron and copper sulphides, closely connected with masses of norite and other intrusives. Nickel ore is found in Scandinavia, particularly in Evje, Høle and Torvestad, Norway. The Norwegian and Sudbury deposits are similar, but the former are the lower in grade, the ore containing about 2 per cent. of nickel.

Other nickel minerals are: *Nicolite* or *kupfernickel*, NiAs, found in Norway, Canada, Germany, United States, &c.—until about 1875 the chief source of the metal; *millerite*, NiS; *pentlandite* (Fe Ni)S; *chloanthite*, NiAs₂; *rammelsbergite*, NiAs₂; *breithauptite*, NiSb; *annabergite*, Ni₃As₂O₅·8H₂O. A considerable amount of natural nickel-chromium steel is made in America by the direct smelting of ore from Mayari, Cuba, the pig-iron produced containing from 1 to 1·5 per cent. nickel and 2·5 to 3 per cent. chromium.

The metallurgical treatment of Sudbury ore is as follows: The ore is crushed, and obvious waste removed by hand-picking; it is then reduced by means of blast or reverberatory furnaces to a low-grade matte assaying 15 to 25 per cent. nickel plus copper. The third stage is the conversion of the low-grade into a high-grade matte in Bessemer converters. In the latter operation air is blown through the molten mass; most of the sulphur is expelled as sulphur dioxide, and nearly all the iron is changed to oxide and enters the slag. The resulting Bessemer matte contains about 80 per cent. of nickel plus copper; it is cast into 'bricks,' and is sold to the refiners. There are four refining processes in use—namely, the Mond process worked near Swansea, the Orford process of Canada and the States, the French and Belgian processes adopted for New Caledonian ore, and the electrolytic process.

The Mond process was discovered in 1889. It depends on the fact that nickel, unlike other metals, easily unites with carbon monoxide to form a volatile carbonyl with the formula Ni(CO)₄. The finely-crushed matte is first calcined to expel sulphur; it is then treated with hot, dilute sulphuric acid, which carries off the bulk of the copper in solution as sulphate. The insoluble portion, consisting principally of nickel oxide, is passed through tall iron vessels, where it is brought into intimate contact with water-gas containing 55 per cent. hydrogen at a temperature of 350° C. Here the nickel is reduced to the metallic state. In the next stage the impure metal is treated in 'volatilisers' with carbon monoxide; the carbonyl is formed, and passes forward with the excess of carbon monoxide. Dust is filtered out, and the gas enters an apparatus filled with nickel pellets of various sizes kept in slow movement and at a temperature sufficient to decompose the carbonyl, again liberating carbon monoxide, which returns to the volatilisers. The pure nickel is deposited

as a skin on the pellets, which thus grow in size until they are large enough to be removed for sale. In the Orford process the Bessemer matte is fused with sodium sulphide, which combines with the copper and iron sulphides but not with nickel sulphide; the latter accordingly settles to the bottom of the molten mass, and is removed, ground, and roasted with common salt. During the last operation any residual copper is converted into soluble sulphate and chloride, the nickel remaining as insoluble oxide. The product is leached with water, and the copper thus dissolved away. The nickel oxide is then reduced to the metal in reverberatory furnaces.

Owing to the absence of copper, the treatment of New Caledonian matte is simpler. It is crushed and roasted until almost free of sulphur. The product (nickel oxide) is mixed with a little binding material and shaped into cubes or rondelles; these are dried and reduced with charcoal at 1200° C. or 1300° C. for twenty-four to forty-eight hours, thus yielding the metal.

When electrolytic refining is used, the matte is smelted with reducing agents to give an impure copper-nickel alloy, which is cast into plates. These serve as anodes in large cells, having iron cathodes and an electrolyte of nickel sulphate. The nickel passes across to the cathode, and forms a plate on each side of it. Precautions are taken to prevent copper also being deposited. When the nickel plates are thick enough, the cathodes are removed, washed, and the nickel stripped off.

Nickel forms two insoluble oxides, i.e. the *monoxide*, NiO, and *sesquioxide*, Ni₂O₃. The soluble sulphate, NiSO₄·7H₂O, is the most important of nickel salts. The soluble chloride, NiCl₂, and the insoluble oxalate and carbonate are also well known. The majority of nickel salts are green in colour. The soluble ones have a sweetish, astringent, metallic taste, and act as emetics.

Nicker (O.E. *nicor*, pl. *niceras*, in *Beowulf*), a malignant kind of water-sprite in Teutonic mythology. He often presents himself on the shore in the shape of a horse, and has thus close affinities with the Scottish *kelpie*; while indeed the Old Norse *níkr* (Old High Ger. *nichus*) is thought by some to mean the hippopotamus only. In our own demonology we find both a male *nix* and a female *nicie*. The modern Dutch *nikker* is merely an ordinary evil spirit or devil, recalling our own familiar *Old Nick*.

Nicobar Islands, a group of islands in the Indian Ocean, forming with the Andamans, to the south of which group they lie, an extension of the great island chain of which Java and Sumatra are the principal links. Nineteen in number, of which twelve are inhabited, they consist of two divisions—the northern, low and planted with coconut trees, and the southern, mountainous (2000 feet) and covered with timber. The temperature seldom moves outside the limits 80°–85° F. Excluding the Shom Pen (estimated at 375), a tribe of obscure origin, typically Malay in appearance, inhabiting the interior of Great Nicobar, the Nicobarese form one race of uniform Mongolian origin, but divided by physical characters, language, and customs into groups, each inhabiting a separate island or group of islands. There is a strong Malay element in the languages of the Nicobarese and in the physical appearance of the inhabitants of the southern islands. They collect and export trepang and edible birds'-nests. The archipelago was occupied by Denmark from 1756 to 1848. In 1869, with the consent of the Danish government, it was annexed by Britain, to stop local piracy. From 1869 to 1888 there was a branch of the Port Blair penal settlement at Nankauri on the island Kamorta. The

islands are administered from Port Blair in the Andaman Islands. Pop. (1921) 9017 (Nicobarese 8248; Shom Pen estimated at 375); of these 6352 were on Car Nicobar, the most northerly island (49 sq. m.).

Nicodé, JEAN LOUIS, Prussian pianist, conductor, and composer, born in 1853 at Jerczig, near Posen. Educated at first by his father and Hartkäss, he studied music afterwards at Berlin under Kullak, Wüerst, and Kiel. He taught music in Berlin, then toured with Mme. Artôt in Galicia, was for a time a professor at Dresden Conservatory, and in 1885-88 conducted the Philharmonic concerts. From 1896 he was director of the Dresden Neustadt Chorgesangverein. He retired to Langebrück near Dresden in 1900, and died there 5th October 1919. A conductor of insight and a pianist of considerable art, Nicodé enjoyed wide popularity. Of his numerous compositions may be cited *Marie Stuart* (1881), *Die Jagd nach dem Glück* (1882), *Das Meer* (1888), *Gloria* (1904), all symphonic poems of high rank. See Th. Schäfer, *J. L. Nicodé* (1917).

Nicodemus, GOSPEL OF. See APOCRYPHA.

Nicolai, CHRISTOPH FRIEDRICH, bookseller and publisher at Berlin, was born 18th March 1733, and early distinguished himself by a series of critical letters (1756), in which he exposed the errors of both Gottsched and Bodmer, then carrying on a controversy which was agitating the literary world of Germany. With Moses Mendelssohn he edited the *Bibliothek der schönen Wissenschaften* (1757-58), and contributed with Lessing to *Briefe die neueste deutsche Literatur betreffend* (1759-65). By this he was led to conceive the plan of the *Allgemeine deutsche Bibliothek* (106 vols. 1765-92), a periodical which he edited for many years, and which contributed to the progress of literature and improvement of taste in Germany, but drew ridicule from the inability of its editor to appreciate the new spirit that was stirring in Herder, Goethe, Schiller, Kant, and others, with all of whom he was at feud. He wrote topographical works, satires, anecdotes of Frederick the Great, and an autobiography, in which he describes strange apparitions or obvious hallucinations by which he was visited. He died 8th January 1811.

Nicolai, OTTO (1810-49), musical composer, born at Königsberg, in early life had a sore struggle with poverty and difficulties. He studied in Berlin and in Rome, and in 1847 became Kapellmeister at Berlin. His best-known work is the opera *The Merry Wives of Windsor* (1848).

Nicolaus of Cusa. See CUSA.

Nicolaitans, an immoral sect mentioned in Rev. ii. 6, 15, and sometimes, but apparently on very feeble grounds, connected with Nicolas the proselyte of Antioch, mentioned in Acts, vi. 5. Indeed the name seems rather to be symbolic than historical, the Greek *Nikolaos* being an equivalent to the Hebrew *Balaam*. In this sense the passage in the Apocalypse harmonises closely with what is said of the followers of Balaam in Jude and 2 Peter, and Rev. ii. 15 need not be taken as referring to a different class from verse 14. Their error was a licentiousness which they brought into the Christian church from the heathen world, and the subtler wickedness of defending this as supported by a doctrine and a prophetic illumination (2 Pet. ii. 1). There is no satisfactory evidence of the existence of such a sect after the time of John; still Irenæus mentions the Nicolaitans as a sect of Gnostics of the Ophite class, and in this he is followed by Hippolytus.

Nicolas, ST, the patron saint of Russia, whose life is wrapped in an obscurity that is but little lightened by fable. He was bishop of Myra in

Lycia, and according to Metaphrastes was imprisoned under Diocletian and released under Constantine. The statement that he was present at the Council of Nice is in the highest degree improbable. His supposed relics were conveyed from the East to Bari, in the kingdom of Naples, on 9th May 1087; and it is a curious fact that in the Russian Church the anniversary of this translation is still observed as a festival. In Catholic countries St Nicolas is especially the patron of the young, and particularly of scholars. In England his feast was celebrated in ancient times with great solemnity in the public schools, Eton, Sarum Cathedral, and elsewhere; and still in Germany on the vigil of his feast, which is held on the 6th December, a person in the appearance and costume of a bishop assembles the children of a family or of a school, and distributes among them, to the good children, gilt nuts, sweetmeats, and other little presents, as the reward of good conduct; to the naughty ones, the redoubtable punishment of the 'Klaubauf.' *Santa Claus* is an American corruption of the name Sante Klaas (for Sint Nicolas); the old Dutch settlers of New York kept a San Claus holiday. St Nicolas was patron of merchants, sailors, and travellers; and as he was prayed to for protection against robbers, these came, oddly enough, to be called 'Clerks of St Nicolas.' See Littlewood's *Story of Santa Claus* (1912).

Nicolas, SIR NICHOLAS HARRIS, antiquary, was born 10th March 1799, of a Cornish family of Breton origin. He entered the navy, and had reached the rank of lieutenant by 1815, but at the close of the war left the service to study law, and was called to the bar at the Inner Temple in 1825. He devoted himself chiefly to genealogical and historical studies, and his great work, the *History of the Orders of Knighthood of the British Empire* (4 vols. 1841-42), remains a solid monument of learning. Harris was made K.H. in 1831, and K.C.M.G. in 1840, and died at Cape Curé, near Boulogne, August 3, 1848. He devoted the energies of his later years to works on the naval history of England: *Dispatches and Letters of Admiral Lord Viscount Nelson* (7 vols. 1844-46), and the unfinished *History of the British Navy* (2 vols. 1847), as well as the papers of Sir Hudson Lowe. Harris wrote biographical notices of many of the poets in Pickering's Aldine edition, as well as many useful historical handbooks, as a *Synopsis of the Peerage of England* (1825), *Testamenta Vetusta* (1826), the *Chronology of History* (1835). Other works are *Proceedings and Ordinances of the Privy Council of England* (7 vols. 1833-37); a *Life of William Davison*, Queen Elizabeth's secretary and scapegoat in the execution of Mary, and an ancestor of his wife's (1823); *Memoirs of Ritson* (1833); and a host of books and papers—and all of value—on heraldic, genealogical, antiquarian, and historical questions. A list of these is given in the *Gentleman's Magazine* for October 1848.

Nicolaus de Lyra. See LYRA.

Nicole, PIERRE (1625-95), one of the most distinguished of the Port Royalists (see PORT ROYAL, JANSEN), friend of Arnauld and Pascal.

Nicoll, ROBERT (1814-37), minor poet, born at Little Tullybeltane, in Perthshire, published *Songs and Lyrics* in 1835. In 1836 he became editor of the radical *Leeds Times*, but worked too zealously for his health, and died of consumption.

See the Life by Mrs Johnstone, prefixed to the 1842 and other editions of the poems, including the centenary edition (1914); and the somewhat uncritical life, by P. R. Drummond (published posthumously, 1884).

Nicomedia, the capital of ancient Bithynia, situated at the north-eastern angle of an inlet of the Propontis, was built in 264 B.C. by Nicomedes I.

It soon became one of the most magnificent and flourishing cities in the world, and some of the later Roman emperors, such as Diocletian and Constantine the Great, selected it for their temporary residence. It suffered greatly from earthquakes. Hannibal committed suicide in a castle close by, and Constantine died near the city, which was the birthplace of the historian Arrian. The small town of Ismid now occupies its site. See BITHYNIA for Nicomedes.

Nicopolis, a town of Bulgaria, with 8000 inhabitants, is on the Danube, 56 miles W. of Rustchuk. The Berlin Congress of 1878 provided for the demolition of the fortifications. Here the Hungarians were defeated by the Sultan Bajazet in 1396; and the place has been more than once taken by the Russians (1810, 1827, 1877).

Nicosia, (1) called also LEVKOSIA, the capital of Cyprus, situated near the middle of the northern half of the island, is surrounded with old Venetian walls, and is the residence of the British High Commissioner, and the see of a Greek archbishop. There are numerous mosques and churches, and some manufactures of silk, leather, and cotton. Pop. 18,000.—(2) A city of Sicily, 40 miles NW. of Catania. Pop. 15,000.

Nicot, JEAN, born at Nîmes in 1530, died at Paris in 1600, French ambassador at Lisbon, introduced into France the tobacco-plant, which was called after him *Nicotiana* (see TOBACCO). He also compiled one of the first French dictionaries, *Trésor de la Langue Française* (1606).

Nicotine, $C_{10}H_{14}N_2$, is a volatile liquid alkaloid, and constitutes the active principle of the tobacco-plant, in all parts of which it occurs in combination with malic and citric acids. It is likewise contained in minute amount in the smoke of the burning leaves. When pure and freshly prepared it is a colourless, intensely poisonous liquid, which evolves a very irritating odour of tobacco, but on exposure to the air it rapidly oxidises and becomes brown in colour. It is moderately soluble in water, and dissolves readily in alcohol and ether. The quantity of nicotine in tobacco varies from 2 to 8 per cent.; the coarser kinds contain the larger quantity, while the best Havana cigars seldom have more than 2 per cent., and often less. Locally, nicotine is very irritating. Taken internally, it is one of the most powerful poisons known; $\frac{1}{16}$ grain taken by the mouth has caused in man distinct symptoms of poisoning, there being first seen a short stage of excitement, followed by headache, vertigo, great weakness, and general depression. Larger doses ($\frac{1}{8}$ grain) cause in addition trembling, vomiting, collapse, and great depression of the heart and respiration. A single drop is sufficient to kill a rabbit or cat in a few minutes.

Nitheroy, a town of Brazil, capital of the state of Rio de Janeiro, on the east side of the entrance to the bay, and 5 miles E. of the city of Rio de Janeiro. It has beautiful suburbs. Pop. 86,000.

Nititating Membrane. See BIRD, EYE.

Nidderdale, the valley of the river Nidd, which rises at the foot of Wharfedale, in Yorkshire, flows south-east and east, and joins the Ouse a few miles above York. The upper portion of the stream flows through picturesque scenery, and past Ramsgill, the birthplace of Eugene Aram.

Niebelungen. See NIBELUNGEN.

Niebuhr, BARTHOLOMÆUS GEORG, one of the most distinguished of modern historians, was born 27th August 1776, at Copenhagen, the son of the famous traveller, Karsten Niebuhr. From his infancy he showed unusual promise, and he was carefully educated under his father's eye. After

his studies at Kiel he became private secretary to Count Schimmelmann in Copenhagen, and devoted himself to the study of the natural sciences at London and Edinburgh (1798-99). In 1800 he married and entered the Danish state-service, and held various appointments, which he resigned in 1806 to enter the Prussian civil service on the invitation of Stein. During the next three years, the darkest in the history of Prussia, Niebuhr was actively employed in public business and in various secret financial missions. But his scholar's temperament was but ill adapted for political intrigue, and the opening of the university of Berlin in 1810 proved a new era in his life. He gave (1810-12) a course of lectures on Roman history which, by making known the results of the new and critical theory that he had applied to the elucidation of obscure historical evidence, established his position as one of the most original and philosophical of modern historians. His appointment, in 1816, to the post of Prussian ambassador at the papal court, where he remained till 1823, gave him an opportunity of testing on the spot the accuracy of his conjectures in regard to many questions of local and social bearing. On his return from Rome Niebuhr took up his residence at Bonn, where his admirable lectures gave a powerful impetus to classical and archaeological learning. He was thus employed when the revolution of 1830 led to mental depression and bodily prostration, which ended in his death, 2d January 1831.

Of his *Römische Geschichte* (vols. i. and ii. 1811-12; 2d ed. 1827-28; vol. iii., coming down to end of first Punic war, edited from his papers by Classen, 1832) the first two volumes were translated by Julius Hare and Connop Thirlwall, and the third by Dr W. Smith and Dr L. Schmitz; other works translated by Schmitz into English are *Lectures on the Hist. of Rome, to Fall of Western Empire* (2d ed. 3 vols. 1850), *Lectures on Ancient Hist.* (3 vols. 1852), and *Lectures on Ancient Ethnography and Geog.* (2 vols. 1853). Other works are *Griech. Heroengeschichte* (1842), written for his son Marcus; *Kleine historische und philologische Schriften* (2 vols. 1828-43); besides numerous other essays on philological, historical, and archaeological questions. Niebuhr co-operated with Bekker and others in re-editing *Scriptores Historie Byzantine*; he also discovered hitherto unprinted fragments of classical authors, as of Cicero's *Orations* and portions of Gaius; published the *Inscriptiones Nubienses* (Rome, 1821); and was a constant contributor to the literary journals of Germany. See Madame Hensler's *Lebensnachrichten* (1838; Eng. trans. by Miss Winkworth, 3 vols. 1852), and the studies by Classen (1876) and Eysenhardt (1886).

Niebuhr, KARSTEN, a distinguished geographer and traveller, was born in 1733, in the Hanoverian territory of Hadeln. He spent several years as a day-labourer; but having acquired a small property, he studied at Göttingen, entered the Danish service, and in 1761 joined an expedition to explore portions of Arabia, Persia, Asiatic Turkey, and India. On his return to Denmark in 1767 he published the results of his mission, *Beschreibung von Arabien* (Copenhagen, 1772), and *Reisebeschreibung* (3 vols. 1774-98). He also edited and published at his own cost the natural history notes of his deceased friend and fellow-traveller, P. Forskål, *Descriptiones Animalium* (1775) and *Flora Ægyptiaco-Arabica* (1776). He accepted in 1778 a civil post at Meldorf, in the Ditmarsh district of Holstein, then Danish. He died 26th April 1815. See his son's *Leben Niebuhrs* (1817).

Niederwald, the western termination of the Taunus range, that abuts upon the Rhine over against Bingen. On a commanding site near its summit was erected, on 28th September 1883, the national (German) memorial commemorative of the successful war of 1870-71. An extensive pedestal, ornamented with allegorical figures, is

surmounted by a bronze figure of Germania, 34½ feet in height. The whole was designed by Schilling, a Dresden sculptor. Below are the villages of Rüdesheim and Assmannshausen, both noted for wine.

Niel, ADOLPHE, French marshal, was born at Muret (Upper Garonne) on 4th October 1802, and entered the army as an engineer officer; he took part in the storming of Constantine in Algeria (1836), the siege of Rome (1849), the bombardment of Bomarsund in Finland (1854), the fall of Sebastopol (1856), and in the battles of Magenta and Solferino (1859). His share in these battles won him the marshal's baton. He was made minister of war in 1867, and was busily employed reorganising the French army when he died, 14th August 1869. It is from him that the favourite Marshal Niel (yellow) rose derives its name.

Niello-work (Ital. *niello*, from Low Lat. *niellum*, 'black enamel'), a method of ornamenting silver or gold plates by engraving the surface, and filling up the lines with a black composition to give clearness and effect to the incised design. The plates so ornamented were principally employed in the making of church-plate reliquaries, and for costly personal ornament. Traces of the art are found in ancient Roman work, and it was much practised under the Byzantine empire from the 16th century onwards. The Italian goldsmiths attained remarkable skill in niello-work; and the most eminent and famous of these was the Florentine Maso or Tommaso Finiguerra, whose work, in addition to its artistic excellence, derives peculiar interest from the fact that he, being the first to take paper proofs from his engraved work, directly led the way to the production of line-engravings. The name *niello* is given not only to the engraved and niellated metal-work, but also to the paper proofs taken from them; and as these were only casually taken they are very rare, and bring great prices, as much as 300 guineas having been paid for a single small proof. Niello-work is still practised by goldsmiths, especially in Russia, the silver niellated boxes made in that country being popularly known as 'platina boxes.' See ENGRAVING.

Niemen, or MEMEL, a river of Poland, Lithuania, and East Prussia, rises a few miles south of Minsk, and its two branches reach the Kurisches Haff each by four mouths. See TILSIT.

Niepce, JOSEPH NICÉPHORE (1765-1833), was born at Chalon-sur-Saône, served in the army in Italy, and in 1795 became administrator of the district of Nice. Returning to Chalon in 1801, he made those experiments with sunlight pictures which made Photography (q.v.) possible.—His nephew, CLAUDE MARIE FRANÇOIS NIEPCE DE ST VICTOR (1805-70), also a soldier, wrote a *Traité Pratique* (1856) on photography, and *Recherches Photographiques* (1855).

Nierstein, a Hessian village on the Rhine, 10 miles SSE. of Mainz, famous for its wine.

Nietzsche, FRIEDRICH, the most brilliant writer in point of style that Germany has recently produced, attracted wide-spread attention in the closing years of the 19th century by his uncompromising attack on accepted standards in ethics, religion, and social theory. Born at Röcken, in Saxony, on the 15th October 1844, the son of the village pastor, Nietzsche was educated at the old grammar-school of Schulpforta and at the universities of Bonn and Leipzig. He showed such distinction in classical scholarship that in 1869, before he had formally completed his degree, he was appointed Professor of Classical Philology in the university of Basel, a post which he continued to hold for ten years, till ill-health compelled him to resign it. During his student years at Leipzig he had become an en-

thusiastic disciple of Schopenhauer, whose doctrine of renunciation and whose theory of art as the realm of consolation alike appealed to his nature. He had also made the personal acquaintance of Wagner, of whose music he was an ardent admirer. These were the influences which moulded Nietzsche's thought in its earliest phase. From Basel he was a frequent visitor at Wagner's villa on Lake Lucerne, and to Wagner he dedicated his first book, published in 1871. *The Birth of Tragedy from the Spirit of Music, or Hellenism and Pessimism*, points, indeed, with no uncertain finger to Wagnerian opera as the true successor of the tragic drama of the Greeks. Although an exceptionally brilliant handling of the much-discussed question of the origin of Greek tragedy, the work was coldly received in philological circles, and Nietzsche first attracted more general attention by the four essays, published between 1873 and 1876, under the general title of *Unseasonable Reflections* (*Unzeitgemässe Betrachtungen*). Two of the essays express the author's obligations to Schopenhauer and Wagner; another on Strauss's *Old Faith and the New* is a deliberately planned attack upon an established reputation, in which Nietzsche pours contempt upon the German culture of the day. In the excellent essay on *The Advantage and Disadvantage of History for Life* he gives clear expression to the aristocratic ideal so prominent in his later writings—the view that the significance of history is to be found not in the movements of the masses ('copies on bad paper and from worn-out types,' as he calls them) but in great and heroic individualities. After 1876 a harsh and discordant note comes into Nietzsche's writings. The years between 1876 and 1882 were a period of mental crisis and transition; he described them afterwards as a time of mental sickness and lonely quest. In revulsion from the romantic pessimistic idealism which had hitherto been his inspiration, he flung himself into the analysis and history of the moral sentiments. His next book, *Human, All-too Human* (*Menschliches, allzu Menschliches*), dedicated to the memory of Voltaire, is written in a spirit of cynical naturalism which rejoices in dragging to light the animal impulses and undisguised selfishness to which it would reduce all human conduct. In this work Nietzsche adopted for the first time the literary form of the aphorism, which he used with remarkable success in most of his subsequent writings. Two further volumes, *Dawn* (*Morgenröthe*), 1881, and *The Joyful Science* (*Die Fröhliche Wissenschaft*), 1882, are written in the main from the same point of view, although, as the titles indicate, there is perceptible a gradual growth of new ideas, and in *The Joyful Science* (which Nietzsche described as celebrating his recovery from sickness) we have already a forecast of his final positions. The three books mentioned are frequently described as representing Nietzsche's second, or positivistic, period as distinguished from his earlier Schopenhauerianism and his later Zarathustrianism. The allegorical rhapsody or prose-poem, *Thus Spake Zarathustra*, which is probably the most characteristic product of his genius, appeared in parts between 1883 and 1885. A slender thread of narrative introduces a series of rhythmic chants in which Zarathustra, in the style of an Eastern prophet, develops the idea of the *Uebermensch*, or Superman, who is to revolutionise our accepted morality and religion, and realise in his own person the will for mastery and the cult of personal distinction which Nietzsche preaches as the foundation of all noble virtues. The literary beauty and power of many passages of the book and the elevation of the whole are acknowledged even by those who dissent most strongly from its teaching. Nietzsche's remaining works expound and apply these ideas in a series of brilliant aphorisms and

epigrams. *Beyond Good and Evil*, published in 1886, continues his attack upon existing moral values or standards, and formulates the distinction between two systems of morality—the morality of the masters, and the morality of the slaves. *The Genealogy of Morality* (1887) is an attempt to substantiate this distinction by reference to etymology and history. In 1888 he published *The Case against Wagner*, a strange outburst against the friend and master of former years; and in 1889 appeared *The Twilight of the Idols*, the last of his works given to the world by himself. His health, originally undermined by dysentery contracted in the Franco-German war of 1870, had led to the resignation of his Basel professorship, and from 1880 onwards he had lived at various health-resorts in Italy and the Engadine. Suffering from insomnia and constantly recurring attacks of migraine, he had contracted the habit of dosing himself with powerful drugs, which in the end but aggravated the mischief, and early in 1889 his long nervous derangement culminated in hopeless insanity. For eleven years he was lovingly tended, first by his mother and then by his sister, Frau Foerster-Nietzsche, who has written his Life. He died at Weimar on the 25th of August 1900. His latest works are disfigured by their colossal egotism, amounting to megalomania, and by the hysterical violence of their attack upon Christianity.

Though Nietzsche is fond of the title 'immoralist,' and describes his position as 'beyond good and evil,' his real meaning is better expressed in another of his phrases as 'the transvaluation of all values'—the reversal of all accepted ideals. Zarathustra breaks the old tables of the law, but in the same breath the work of the creative thinker is proclaimed to be the writing of new values, on new tables. Slave-morality, the morality of the herd, has in fact to be exchanged for master-morality, for the aristocratic or 'noble' virtues. Humility, compassion, self-sacrifice, as inculcated by Christianity, are the virtues of the poor, the oppressed, and the suffering, and the pursuit of happiness is the ignoble ideal of the common herd of mankind. But the 'free man is a warrior,' and the virtues of a ruling class are courage, self-reliance, the cult of distinction, a proud consciousness of their own superiority, and a lofty acceptance of the self-sacrifice of others. Nietzsche's later works are one long denunciation of the altruistic, humanitarian, and democratic ideals of modern civilisation, all of which he finds rooted in Christianity, the great 'revolt of the slaves in morality.' He summarises the whole process of European history during the last two thousand years as a conflict between Rome and Judæa; and in the Superman the heroic Roman type is to be revived. Nietzsche's thought was also profoundly influenced by biological conceptions. Interpreting the principle of natural selection on purely naturalistic lines, he condemned sympathy as thwarting the law of development. 'The weak and ill-constituted shall perish,' he says, 'first principle of our charity; and people shall help them to do so.' In the unbalanced writings which preceded his final collapse the violence of his polemic against a scale of values which is responsible, he holds, for the deterioration of the race, leads him to celebrate the beast of prey as the original type of 'noble' virtue, and he comes perilously near abandoning moral standards altogether. But this is a declension from the more strenuous ideal which Zarathustra preaches. Apart from the paradox and suggestion of his negative polemic there is a tonic value in Nietzsche's insistence on the heroic virtues, on the function of great personalities, and on distinction alike in character and in act. The nobler side of his teaching is also seen in his repudiation of the pessimism which is

often the result of a relaxation of moral fibre, in his glorification of life and energy, and the mood of resolution—enthusiasm mingled with defiance—with which he accepts the best and the worst that the universe has to offer. The doctrine of 'eternal recurrence,' which he borrowed from Heraclitus and the Stoics, becomes for him a symbol of this attitude of triumphant acceptance. On the other hand, his naturalistic gospel of the forceful Ego allies itself with the spirit of militarism and the worship of force, which constitutes a standing menace to the future of civilised humanity.

A complete English edition of Nietzsche's works has been published in eighteen volumes, edited by Dr Oscar Levy. Mügge's *Nietzsche, his Life and Works*, contains a very full bibliography of the already voluminous Nietzsche literature.

Nièvre, a central department of France, on the watershed between the Loire and the Seine. Area, 2632 sq. m.; pop. (1881) 347,576; (1921) 270,148. Mountains of the Morvan system, which forms the watershed between the Seine and Rhone, divide the department into two great declivities. There are plateaus more or less fertile, vine-clad hills, and valleys rich in pastures; but the principal wealth of the department consists in its forests and minerals—coal, iron, and gypsum. The Nièvre is an inconsiderable affluent of the Loire from the right. The three chief rivers are the Allier, Loire, and Yonne. The iron industry is important, and pottery and glass are made. The capital is Nevers.

Niflheim. See SCANDINAVIAN MYTHOLOGY.

Nigella, a genus of plants of the natural order Ranunculaceæ, having five coloured spreading sepals; five or ten small two-lipped petals, with tubular claw; the carpels more or less connected together, many-seeded; the leaves divided into threadlike segments, the flowers solitary at the top of the stem or branches. They are annuals, natives chiefly of the Mediterranean countries and warm temperate Asia. Some of them, occasionally seen in gardens in Britain, are vulgarly known as *Devil-in-a-mist*. The seeds are aromatic and somewhat peppery. Those of *N. sativa*, a species common in cornfields in the south of Europe, are supposed to be the Black Cummin of the ancients, and perhaps the Cummin of the Bible.

Niger, the name now generally applied to one of the most remarkable river-systems of West Equatorial Africa, first appears in Ptolemy as designating, it is believed, the modern Wadi Draa, and coupled with a river Gir, which may be identified with the modern O-Guir, flowing southward from the Atlas towards the oases of Tuat. The word not improbably contains the root *gir*, *gar*, or *jur*, not infrequent in the river-names of northern Africa. Mixed up as it was from time to time with the problem of the Nile, the problem of the Niger remained almost till the 19th century one of the most perplexed and bemuddled in the whole range of geography. Though the Portuguese had ascended the river from the sea in the 16th century, the most contradictory opinions were held as to its character and relations down to the later part of the 18th century; it was an affluent of the Nile; an affluent of the Congo; an independent river terminating in an inland basin; and so on. It was still left to Mungo Park and other workers in the service of the African Association to lay the basis of our present knowledge of the system. Lander (1830) proved that it enters the sea through the great delta of which the Nun is the principal mouth. Other explorers were Clapperton, Barth, Houst, and Lenfant.

The Niger proper (Joliba or Dhiuliba, Isa, Kworra or Quorra, &c.) has a total length of 2600 miles, and the area of the entire basin (including that

of the Benué) is estimated at 1,023,280 sq. m. The head-waters are situated in French Guinea, and are contiguous to those of the Senegal. The Tembi (first explored by Zweifel and Moustier in 1879), rising at a height of about 2800 feet above the sea in the Loma Mountains in 9° 5' N. lat. and 10° 47' W. long., is now accepted as the conventional 'source.' This and its sister streams, though draining a comparatively limited area, soon gather into a good navigable river, which holds a north-easterly course to its most northerly point near Timbuktu, first visited by Laing in 1826. About 300 miles above this famous city it is joined by an important right-hand tributary, the Bani or Mayel-Balevel, and develops a tendency to split up into numerous and widely diverging channels, with cross-creeks, back-waters, and swamps. Beyond Timbuktu a more easterly direction is maintained for 200 miles, and then with its now united forces the Niger turns south-east to cut its way through a rocky tract of country, and to pass in succession Gao (Gogo) on the southern skirt of the Sahara; Say, the southern point of Barth's exploration; Gompá, the northern limit of Flegel and Thomson; Bussa, where Park came to his untimely end; and Rabba, one of the largest cities on its course. During this long journey from Timbuktu (1130 miles) a chief characteristic of the Niger has been the insignificance of its tributary streams; but at last, in 7° 50' N. lat., 6° 45' E. long., it meets in the Benué, or Mother of Waters, a rival both in volume and in beauty.

Nigeria, a British protectorate in West Equatorial Africa, constituted 1st January 1900, includes all the territories occupied till that date by the Royal Niger Company, and the Niger Coast Protectorate. Lagos was added in 1906. It lies between Cameroon and Dahomey. Its southern boundary is the Gulf of Guinea. Crossing the Niger near Ilo, the boundary runs northward to about 14° N., whence its course is mainly eastward to Lake Tsad. It includes the whole of the lower basin of the Niger, and nearly the whole of its great tributary, the Benué. Its area is about 335,700 square miles, and the population is 18 millions. The Niger Coast Protectorate (known till 1893 as the Oil Rivers Protectorate), formed in 1844, extended from Lagos to the Rio del Rey River, including the so-called Oil Rivers, the whole Benin region (in 1897), and the Niger delta, except the portion between the Forcados and Brass rivers, and was administered under the Colonial Office by a commissioner and consul-general. The Niger territories were first occupied by the British United African Company in 1879, which by treaties with many native states and tribes finally acquired rights over the whole region now called Nigeria except the Niger Protectorate (about one-tenth). The territory of the company, which in 1886 obtained a charter as the Royal Niger Company, included the Fulah empire of Sokoto, the kingdom of Gando, the Borgu and Mossi countries, part of Adamawa, the western parts of Bornu, and other native states. In 1899 the government arranged to take over all the powers and rights of the company on 1st January 1900. Southern Nigeria, originally the Coast Protectorate and part of the Niger Protectorate, absorbed Lagos (q.v.) in 1906, and the whole was constituted the colony and protectorate of Southern Nigeria. In 1912 the colony and protectorate of Nigeria was reorganised under Sir F. Lugard as governor of the whole at Lagos, with lieutenant-governors for the Northern and the Southern Provinces. The Northern Provinces are fertile, with great agricultural resources, and fairly healthy. Cotton, indigo, rubber, hides, ivory, and minerals (silver, tin, and lead) are the chief products. The Hausa race form a large proportion of

the population, and are civilised and industrious. The chief towns are Kano (with railway to Lagos), Yola (capital of Adamawa), Wurno (capital of Sokoto), Gando, Bida, Ilorin, Yakoba, Sokoto, and Zaria. In the Southern Provinces Asaba, Benin, and Idda are the chief inland towns; and on the coast, Lagos, Wari, Barutu, Akassa, Brass, New Calabar, Port Harcourt, Bonny, Opoba, and Old Calabar. The chief products are palm oil and kernels, cocoa, rubber, ivory, indigo, gums, coffee, and hides. Coal is mined in the Enugu district, which has a railway to Port Harcourt and to the Benué.

See J. Scott Keltie, *The Partition of Africa* (2d ed. 1895); Möckler Ferryman, *British Nigeria* (1902); C. H. Robinson, *Nigeria* (1900); Hazzledine, *The White Man in Nigeria* (1904); Lady Lugard, *A Tropical Dependency* (1905); Dennett, *Nigerian Studies* (1910); E. D. Morel, *Nigeria: its Peoples and its Problems* (1911); C. W. I. Orr, *The Making of Northern Nigeria* (1912); and works by Falconer and by Trehearne (1912).

Niger Seed, the seed of a compositous plant, *Gnuzotia abyssinica*, cultivated in India and East Africa. It yields a substitute for linseed oil.

Night. See DAY.

Night-hawk. See GOATSUCKER.

Night-heron (*Nycticorax*), one of the genera of Herodiones (see HERON), including nine species. One species, *N. griseus*, widely distributed over the whole of Africa and southern Asia, and a migrant to places near the Baltic, has now become an almost annual visitor to the British Islands in spring and autumn. *N. naevius* (*Nyctiardea gardeni*, Baird) is the common American night-heron.

Nightingale (*Daulias*) a genus of Passerine birds of the family Turdidae. The bill is straight, slender, not quite as long as the head; the wings do not much pass beyond the base of the tail; the first quill is very short, the third is the longest; the tail is slightly rounded; toes long, claws rather short. The Common Nightingale (*D. lusciniæ*) is well known as the finest of songsters. It is rather larger than the hedge-sparrow, with about the same proportionate length of wings and tail. It is of a rich russet-brown colour above, shading into reddish chestnut on the tail-coverts and tail; the lower part grayish white; bill, legs, and feet brown.



Common Nightingale
(*Daulias lusciniæ*).

The sexes are alike in plumage. It is a native of many parts of Europe and Asia, and of the north of Africa, extending as far as to Abyssinia, and to the Gold Coast in West Africa, and it is a bird of passage, extending its summer migrations on the continent of Europe as far north as the south of Sweden, though in Britain it has scarcely ever been seen farther north than Yorkshire. It is plentiful in some parts of the south and east of England, but is less common in the western counties, and does not visit Scotland, Ireland, or Wales, except Glamorganshire and

Beacon. It frequents thickets and hedges and damp meadows near streams. The market-gardens near London are among its favourite haunts. It feeds very much on worms, insects and their larvæ. It arrives in England about the middle of April, the males about ten days before the females. It is at this season, and before pairing has taken place, that bird-catchers generally procure nightingales for cage-birds, as they then become easily reconciled to confinement, whilst if taken after pairing they fret and pine till they die. If nightingales, however, are to be kept in confinement they ought to be taken from the nest when young and reared by hand. The nightingale makes its nest generally on the ground, but sometimes on a low fork of a bush. It is loosely constructed of dead leaves, rushes, and stalks of grass, with a lining of fibrous roots. The eggs are from four to six in number, of a uniform deep olive-brown. The song of the male ceases to be heard as soon as incubation is over. In captivity, however, it is often continued through a more considerable period. The male bird sings by day as well as by night, but at night its song is most noticeable and characteristic. The variety, loudness, and richness of its notes are equally extraordinary; and its long quivering strains are full of plaintiveness as well as of passionate ecstasy. The nightingale has been a favourite from most ancient times, and is often mentioned in the poetry of India and Persia, of Greece and Rome, as well as by Shakespeare and Herrick, Keats and Coleridge, and many others, who are often thinking rather of Philomela (q.v.) than of the bird. The loves of the Bulbul (q.v.) and the rose are a fanciful theme in which eastern poets delight. The nightingale, as a rule, is not a shy bird, for although it is but seldom seen it seems to prefer to live near the abode of man; nor is it quarrelsome with others of its own species except at pairing time. A closely allied species (*D. golzii*) is found from the Caucasus to Turkestan and Persia, and in north-eastern and central Europe the Northern Nightingale or 'Sprosser' (*D. philomela*) is found, quite a distinct species, of rather larger size, less russet in hue, and slightly spotted on the breast.

Nightingale, FLORENCE, the daughter of W. E. Nightingale of Embley Park, Hampshire, was born at Florence, 15th May 1820. Keenly interested in the alleviation of suffering, she visited civil and military hospitals all over Europe; and in 1849-51 went into training as a nurse with the Deaconesses at Kaiserswerth and the Sisters of St Vincent de Paul in Paris. When after the battle of the Alma in September 1854 the sick and wounded were dying in thousands in the overcrowded hospitals on the Bosphorus, she offered to go out and organise a nursing department at Scutari. Lord Herbert had already written requesting her to go; and on the 21st of October she departed with thirty-four nurses. She arrived in time to receive the wounded from Inkermann into wards already filled with 2300 patients, and soon had 10,000 sick men under her care. She saw in the bad sanitary arrangements of the hospitals the causes of their frightful mortality, and devotedly set herself to the removal of these. Her devotion to the sufferers can never be forgotten. In the spring of 1855, while in the Crimea organising the camp-hospitals, she was prostrated with fever, yet remained at Scutari till Turkey was evacuated by the British in July 1856. A fund of £50,000 was subscribed to enable her to form an institution for the training of nurses at St Thomas's and King's College Hospitals. She gave valuable help in the reform of army hospitals, and published important *Notes on Nursing* (1858), *Notes on Hospitals* (1859), *Notes on Lying-in Institutions* (1871), *Life or Death in India*, and (in

Fraser's Magazine, 1873) 'A Note of Interrogation' on religious beliefs; also, in 1890, the article on Hospitals in *Chambers's Encyclopædia*. She assisted in founding the Red Cross Society. Lord Stanmore's Life of Lord Herbert (1906) shed new light on her somewhat autocratic management of affairs in the Crimean time. She died 13th August 1910. See Life by Sir E. Cook (1913).

Night-jar. See GOATSUCKER.

Nightshade, the English name of certain plants of the natural order Solanaceæ (q.v.), possessing the narcotic properties frequently developed in that order. Among them are some species of *Solanum* (q.v.), particularly the Common Nightshade, or Black Nightshade (*S. nigrum*), an annual or biennial, with erect angular stem, ovate, sinuate-dentate leaves, drooping lateral umbels of white flowers, and globose black berries; a frequent weed in waste places in England and in most parts of the world. Few plants are more widely diffused. It is only slightly narcotic. The leaves in a fresh state are said to be injurious to animals which eat them, but seem to lose almost all narcotic property by boiling, and are used as spinach, particularly in warm climates. The berries, although generally dreaded or suspected, may also, it is said, be eaten, at least in moderate quantity, without danger. They contain, however, the alkaloid *Solanine*, found also in the shoots of the potato. For the Woody Nightshade, see BITTERSWEET; for the Deadly Nightshade, see BELLADONNA; and for Enchanter's Nightshade, see CIRCEA.



Common or Black Nightshade
(*Solanum nigrum*).

Nihilism is a term used to describe various negative systems of metaphysics, ethics, and atheist philosophy. The Nihilism, or Nihilianism, of the middle ages was a heretical view of the nature of Christ. In the 19th century the name of Nihilist was applied to Russian revolutionists, and especially (though improperly) to those of the 'terrorist' wing. In *Fathers and Sons*, Turgeniev in 1862 described as Nihilists a new type among the Russian educated classes—men who bowed before no authority of any kind, and defied 'the fathers' 'to find out, in our present life, family and social, one single institution which would not deserve an absolute and pitiless negation'; and, 'abandoning all talk about art, unconscious artistic creation, parliamentarism, reformed tribunals, and what not else,' they put above all 'the question of daily bread for all,' and reformed their own lives according to truth and sincerity. Tchernyshevsky represented the Nihilists not as simple philosophers of negation, but as people engaged either in science or in social reforms, or as revolutionists; and laid stress upon their treatment of woman as an intellectually equal comrade in work. Nihilism was in its philosophical aspects an outcome of the philosophy of the 18th century as modified by modern science; Buckle, Darwin, H. Spencer, and J. S. Mill were the most popular

authors among Nihilists. But the doctrine had its roots deep in the past life of the Russian educated classes; Pushkin was already nicknamed Nihilist by his adversaries. Nihilist novelists and writers on art and politics exercised a deep influence upon the life of the educated classes in Russia, and contributed to the movement for the higher education of Russian women. The revolutionists who were described in western Europe as Nihilists or Anarchists had political programmes directly borrowed from western Europe. The Russian revolutionary movement was due to the influence of Herzen about 1860, when the hopes of thorough reforms awakened by the proposed emancipation of the serfs were frustrated by the ascendancy acquired by the serf-owners' party in the councils of the tsar. Proclamations appealing to the peasants to revolt were issued in 1861, and two secret societies were organised. The poet Mikhailov, Tchernyshevsky, and others were sent to hard labour in Siberia. When, after the Polish insurrection (1863), the old party took the upper hand in the Winter Palace a new revolutionary propaganda resulted in a peasants' outbreak at Kazan (1864). Societies organised for self-education took a revolutionary character, under the influence of Bakunin, the ideas of the International and the socialist writings of Lavrov. Young men and women of rich families abandoned their homes, and went to the villages and factories as workers, schoolmasters in villages, medical helps, midwives, and so on, either simply to share with the people their life of privation or to carry on a revolutionary propaganda. More than 2000 of them were arrested (1873-76) and kept for years in prison; some were exiled, some tried and condemned. The flogging of a prisoner in the St Petersburg prison by the prefect of police, General Trepov, moved Vera Zasulich to make an attempt upon his life (1878). When she was acquitted, trials for political offences were transferred to courts-martial; while on the other side the revolutionists, abandoning more and more the propaganda among the people, resorted to a policy of terror. They killed several spies, one police official, the governor-general of Kharkov, and the chief of the state police, and several attempts against the life of the tsar were made. A number of revolutionists were hanged and hundreds exiled to Siberia during the same twelve months (1878-79). The executive committee of the party of the 'Will of the People' prosecuted its underground work, and Alexander II. was killed by bombs (1881). Alexander III. dismissed his father's ministers and proclaimed his resolution to remain an absolute sovereign. He lived almost a prisoner in Paul I.'s palace at Gatchina, and fresh plots continued to be discovered. Nicholas II., who succeeded his father in 1894, continued his policy, and so became obnoxious to the revolutionists. The disasters of the war with Japan in 1904-5 enormously extended and deepened the discontent of all classes. In the strikes and other riotous and revolutionary demonstrations in the populous centres in the spring of 1905, Nihilism, Anarchism, and Socialism were associated with economic distress and industrial revolt. During later constitutional struggles the name of Nihilist was superseded by those of the several irreconcilable sections of the opponents of the tsarist régime.

See works by Stepniak and Kropotkin (1883-95), and works on the history of Russia (q.v.).

Niigata, a seaport of western Japan, situated on a narrow strip of land at the mouth of the Shinano River, was opened to foreign trade in 1859. The harbour did not admit of the entrance of vessels of foreign build, and the roadstead was

exposed; the foreign trade therefore long remained only nominal until improvements were made in the 20th century. The apples and water-melons of the province are noted for their excellence, and petroleum is got. Pop. 100,000.

Nijmegen. See NIMEGUEN.

Nijni-Novgorod ('Lower Novgorod'), a famous commercial city of Russia, and capital of a government, is situated at the confluence of the Oka with the Volga, 274 miles E. of Moscow by rail. It is made up of an upper city, containing the Kremlin and many of the fifty churches, a lower city, and a suburb. The great fair in normal times brings buyers and sellers from all climes between Germany and China, and is, or at least was, the greatest in the world. During the fair, the normal population (almost 100,000) is increased about fourfold. During the civil wars the Russian fairs were discontinued. The great fair of Nijni-Novgorod was started again in 1923. It runs now from 1st August to 15th September. Nijni-Novgorod, founded in 1221, was devastated on several occasions by the Tatars; its prosperity dates from the year 1817, when the great fair was removed to Nijni-Novgorod from Makarief after a great fire. A university was founded in 1918.—The government, which has an area of 30,000 sq. m. and a population of 2,600,000, produces timber, iron and iron goods, salt, copper, gypsum, wool, and leather.

Nijni-Tagilsk, a town of Russia, amid the Ural Mountains, 150 miles E. of Perm by rail, with great platinum, copper, and iron works; pop. 38,000.

Nikolaevsk, a port of eastern Siberia, 23 miles from the mouth of the Amur, was burned down in 1920; pop. 13,000. Coal is found in the district.

Nikolaiev, a port of Ukraine, at the confluence of the Ingul with the Bug, and 42 miles from the Black Sea, was the headquarters of the Russian Black Sea fleet. The joint estuary of the Bug and Dnieper was defended by the forts of Otchakoff and Kinburn; and Nikolaiev was a great fortified naval station. It has shipbuilding and engineering works, and exports grain. Pop. 70,000.

Nikolsburg (Czech *Mikulov*), a town in the south of Moravia, 27 miles S. of Brunn by rail, lies at the foot of hills famous for their rich red wines. In its midst, on a rock, stands the castle of the (till 1918) princely Dietrichstein family. It is chiefly known through the preliminary peace between Prussia and Austria (26th July 1866) and Prussia and Bavaria (28th). Pop. 8500.

Nikon (1605-87), the Russian patriarch and primate whose revision of the very incorrect Slavonic service-books caused the secession of the Raskolniks (q.v.).

Nikosia. See NICOSIA.

Nile, the longest river of Africa, if not of the world, hydrographically, historically, and geographically a river of the greatest interest, and to the ancient Egyptians pre-eminently the sacred river, draws its largest supplies of water in the country of its sources from the Victoria and Albert Nyanzas. The only important streams flowing into the Victoria Nyanza are the Kagera, Nzoia, Nyando, and several others of less importance on the east side. The largest of these, the Kagera, originates in a number of small streams rising in the mountains on the north-east shores of Tanganyika. It flows northwards, studded with a few small lakes, and finally turns eastwards and falls into the Victoria Nyanza a little north of the first degree S. lat. The Kagera is understood now to be the undoubted source of the Nile. The Nile leaves Victoria Nyanza at its northern end, pouring over the Ripon Falls, 150 to 170 yards wide but only 12

feet high, and then for 300 miles races between high rocky walls, over rapids and cataracts, at first north-west, then west, until it joins Lake Albert near its north-east corner. About 20 miles from this lake the river leaps down 120 feet into a wild gorge, with high rocky walls. The section between the two lakes is called the Victoria Nile or Somerset River. At its south-western extremity Lake Albert is joined by the river Senliki, which drains away the surplus water of Lake Edward (discovered by Stanley in 1889); and this lake in its turn drains the slopes of the snowy Ruwenzori and adjacent mountains. The combined river leaves the northern extremity of Lake Albert as the Bahr-el-Jebel, and from that point flows in a general northerly direction to the Mediterranean. The first 130 miles to Dufile it passes through a level country, and frequently expands into lakes. From Dufile to Lado (120 miles) the bed is contracted by rocky hills from a mile to a quarter of a mile in width; and the stream is forced over the Yarborah Rapids. At Lado (5° N. lat.) the river enters the plains, and



The Nile.—The First Cataract, looking down the river towards Assuan.

moves thence slowly and sluggishly down to Khartum, 900 miles to the north. From Refaj downwards the Nile is navigable for river-steamers of fairly large size. In 7½° N. lat., however, the main channel divides; whilst the right arm, the Bahr-el-Zeraf, goes almost due north, the left arm, which still continues to be called the Bahr-el-Jebel, trends slightly to the west. Both streams flow through a low swampy region, during the rainy season inundated for miles wide. The banks are lined with tall reeds and papyrus, the abode of numerous aquatic birds and swarms of gnats and other insect plagues. Since the year 1863 both channels had been rendered wholly or in part impassable by vast accumulations of vegetable débris (*sudd*), but in 1900–2 it was cleared out with a view to improving the navigation of the upper river. In 9½° N. lat. the Bahr-el-Jebel meets the Bahr-el-Ghazal, which, coming from the west, gives the united stream, now called the White Nile, an easterly course. Although this tributary, navigable for some 200 miles above the confluence, runs nearly dry in the dry season, it gathers to itself the contributions of a very large number of rivers, some of them 300 and 400 miles long, which have their sources to the south and south-west in the country of the Niam-Niam tribes; one only, the Bahr-el-Arab, comes from the northern side—from Darfur, to the north-west.

Sixty miles east of the confluence the White Nile receives the Bahr-el-Zeraf, and 30 miles farther east the navigable Sobat from the Galla country. Some 60 miles below the Sobat mouth is Kodok (Fashoda), whose occupation by Marchand in 1898 threatened to bring war between France and England. From Kodok the White Nile flows almost directly north to Khartum without being augmented by a single tributary stream. At Khartum (in 15° 37' N. lat.) the White Nile, or Bahr-el-Abiad, is joined from the south-east by the Blue Nile, the Bahr-el-Azrak, the water of the respective streams being of the colour indicated in the names. The Blue Nile, 950 miles long, gathers its volume principally from Lake Tzana (5658 feet above sea-level), situated on the Abyssinian plateau, in which region it is known as the Abai. It leaves the lake towards its southern end, and, after running south-east, curves right round by way of the south till it comes to flow north-west. After leaving the mountains it traverses an extremely fertile plain, the capital of which is Sennaar. From Khartum the Nile flows north-north-east, and 200 miles below that city is joined from the right by the Atbara, called also the Bahr-el-Aswad, or Black Nile. It is the black sediment brought down by this river that settles in the Nile delta, and makes it so extraordinary fertile. This affluent, too, has its source on the Abyssinian plateau, and its volume is increased by two large tributaries, the Takazze and Mareb, both striking into it from the right. During its course from the confluence of the Atbara through the Nubian Desert the great river makes two deep bends, first round by the north, then round by the south, and subsequently resumes its northerly flow. Below Khartum navigation is rendered extremely dangerous by the cataracts which obstruct the bed of the river, the sixth occurring not far north of Khartum, the first near Assuan, in Egypt, just beyond 24° N. lat. The

course of the river from Assuan to the sea is sufficiently described under Egypt (q.v.). The total length of the river cannot be stated precisely; from Lake Victoria it is estimated to measure 3400 miles. The Nile begins to rise at Gondokoro in April, the Bahr-el-Ghazal perhaps a week or two earlier. At Khartum the rise begins in May, and reaches its maximum in September, whilst the Blue Nile rises from July to the third week in August (see NILOMETER). Irrigation is largely regulated by barrages at Rosetta and Damietta, constructed by French engineers in 1843–61, and practically reconstructed in 1886–90. A vast reservoir was completed in 1912 at Assuan (q.v.; and see also PHILÆ); the Blue Nile was dammed in 1914–25 at Makwar (see GEZIRA); and similar works on the White Nile have been partly carried out (see GEBEL AULIA).

The ancients had little knowledge of the Nile above Meroe, between Berber and Khartum. The place of accurate knowledge was taken by myth, to the effect that the river had its origin in Mauretania (now Morocco), and flowed several days' journey underground until it came to the south of Ethiopia; thence it passed northwards as the Astapus. The Emperor Nero began the fascinating work of searching for the sources of the Nile by sending two expeditions, which seem to have ascended beyond the confluence of the

Sobat and White Nile. Ptolemy speaks of two streams issuing from two lakes 6 and 7 degrees south of the equator and uniting in 2° N. lat., and being joined in 12° N. lat. by the Astapus, which likewise flowed from a lake (Coloe). The two lakes in the far south were fed by the melting snows of a great range of mountains, the Mountains of the Moon (which Stanley identified with Ruwenzori, Gordon Bennett, and the adjoining peaks). This remained the sum total of information about the river down to the 19th century, except that in 1770 Bruce discovered that the Blue Nile issued from Lake Tana. The Egyptian government in the years 1839-42 sent three expeditions up the river, which got as far as Gondokoro. In 1858 Speke reached Lake Victoria, and in 1862 discovered Ripon Falls. Two years later Sir Samuel Baker discovered Lake Albert, and in 1868-71 Schweinfurth explored the western feeders of the White Nile. Stanley, in 1875, sailed all round Lake Victoria, and in 1889 traced the course of the Semliki, and discovered Lake Edward or (Albert) Edward Nyanza, and Mount Ruwenzori.

See works of the explorers named, also others by Marno, Von Klöden, Wilson and Felkin, Schuber, Petherick, Junker, &c.; Sir H. H. Johnson's *Nile Quest* (1903); and Captain Lyons's *Physiography of the River Nile* (1906). For the battle of the Nile, see ABOUKIR.

Nilgiri. See NEILGHERRY.

Nilometer, an arrangement for measuring the height of the Nile in Egypt. On the island of Rhoda, opposite to Cairo, is a square well, connected with the river by a canal, and containing a graduated marble pillar, divided into 24 cubits, each measuring 21·386 inches. A rise of 18 cubits is traditionally regarded as the height of the lowest inundation; 19 cubits is considered tolerable, 20 excellent, 21 adequate, and 22 complete, but 24 is ruinous. The ordinary maximum of the rise at Cairo is stated at from 24 to 26 feet. For the inundations from 1849 to 1878, see *Nature*, vol. xxv. The nilometer of Rhoda was constructed during the reign of the khalif Al-Mutawakkil, in the year 847. Anciently there seem to have been various nilometers of different kinds, all along the river, as at Memphis (probably the oldest), Ekhmin, Elephantine, and elsewhere.

Nilsson, CHRISTINE, was born the daughter of a farmer at Sjöabel near Wexiö, in Sweden, 20th August 1843, and singing at a fair in 1857 so impressed a magistrate of Ljungby that he sent her for a musical education to Stockholm and Paris. She made her début at Paris in *La Traviata* in 1864; and in London, where she appeared in 1867, soon took rank as one of the foremost soprano singers. Marguerite was one of her best-known parts. She married (1872) M. Rouzaud (d. 1882), and (1887) Count de Miranda (d. 1902). She died 22d November 1921.

Nimach, a town of India, in the territory of Gwalior, on the north-western border of Malwar 370 miles SW. of Delhi by rail, 1613 feet above sea-level, with an agreeable and healthy climate. There has been a British cantonment there since 1817. Pop. of town, 3900; of cantonment, 10,500.

Nimbus, in Art, especially in sacred art, is the name given to the disc or halo which encircles the head of the sacred personage who is represented. Its use is almost universal in those religions of which we possess any artistic remains—the Indian, the Egyptian, the Etruscan, the Greek, and the Roman. Some, indeed, have sought directly to derive it from the Greek *mēniskos*, or metal disc placed over the heads of statues to keep off the droppings of birds. Nevertheless, the nimbus, strictly so called, is comparatively recent in Christian art, not appearing before the 6th century. Later

in Christian art it became almost a necessary appendage of all representations of God or of the saints. Its ordinary form is the circular or semi-circular; but the nimbus of the Eternal Father is often in the form of a triangle, and that of the Trinity an emanation of light, the rays of which form the three arms of a cross. The nimbus of the Virgin is sometimes a simple ring, and sometimes a crown or diadem; occasionally it is encircled by an ornamental border, on which twelve stars are sometimes represented. Her nimbus, as well as that of the Divine Persons, is commonly of gold; but occasionally it is in colours, as blue, red, purple, or white. The nimbus of the saints is ordinarily the semicircle or lunula. In later art the nimbus became lighter and more aerial, melting, as it were, into the picture. In connection with the nimbus may also be mentioned the *Aureole*, an illumination surrounding, not the head only, but the entire figure. If the figure be upright the aureole is commonly oval, when it is called the *vesica piscis*, and is supposed to contain an allusion to the sacred Christian emblem, the *ichthys*. With a seated figure it becomes circular, and is occasionally divided by radiating bands, in the form of a wheel; sometimes it takes a quatrefoil form. It is commonly of gold, but occasionally also is in colours. The *Glory* is a combination of the nimbus and the aureole, and is chiefly seen in Byzantine pictures and those of the early South German school.

Nimeguen (Dutch *Nijmegen*), a town of Holland, in the province of Guelderland, on the left bank of the Waal, 73 miles by rail E. of Rotterdam. It is built on the slope of the Hoenderberg ('Hill of the Huns'), on which the Romans formed the permanent camp of *Noviomagus*; and some of its streets are steep and narrow, but others are broad and handsome. On a neighbouring height stood till 1796 a castle, said to have been founded by Caesar and inhabited by Charlemagne; and towards the brow of this height there still stands a little sixteen-sided Romanesque baptistery of the 12th or 13th century. On another eminence is the modern Belvedere, whose summit commands a wide view. The fortifications have been demolished; but Nimeguen retains its Renaissance town-hall (1544), adorned with medallions of German emperors, and the fine Gothic church of St Stephen (dating from 1272). The manufactures include tobacco, eau de Cologne, metal-work, beer, &c. Pop. (1875) 22,929; (1923) 71,514. Regained by the Spaniards (1585-91), Nimeguen is celebrated in history for its great peace congress, which on 12th August 1678 concluded a treaty between France and Holland, on 13th December between France and Spain, and on 5th February 1679 between Austria and France.

Nîmes, the capital of the French department of Gard, lies in a fertile plain, engirt by the vine-clad Cevennes, 31 miles by rail NE. of Montpellier and 30 SW. of Avignon. The old town, with narrow crooked streets, is separated by shady boulevards from the well-built faubourgs; and mediæval and modern edifices are a much mutilated cathedral, the prison (formerly citadel, 1687), the palais de justice, St Paul's (1850), St Baudile's (1875), &c., with a most magnificent fountain, and a monument (1874) to Antoninus Pius. But the glory of Nîmes is its Roman remains of the ancient *Nemausus*. These include the 'Maison Carrée' (now a museum, with Delaroche's masterpiece, 'Cromwell looking on Charles I.'s corpse'), a splendid specimen of Corinthian architecture; an amphitheatre (now a bull-arena), 70 feet high, and seating 20,000 spectators; the exquisite Nymphæum; a mausoleum ('La Tour Magne'), baths, and two gates,

whilst 14 miles NE. is the 'Pont du Gard,' most perfect of Aqueducts (q.v.). Nîmes is a seat of great commerce and manufactures, these comprising silk and cotton goods, carpets, shawls, wine, brandy, boots, &c. Pop. (1872) 60,020; (1921) 82,774, of whom one-third are Protestants. Supposed to have been colonised from *Massilia* (Marseilles), and the capital of the *Volcæ Arecomici*, Nîmes flourished under the Romans, and was one of the great cities of Gaul. It was taken by the Visigoths (465), the Franks (507), and the Saracens (725), and subsequently became an appanage of Aragon, but was finally restored to France by the treaty of Corbeil (1259). The inhabitants adopted Calvinism in the 16th century; and it was a stronghold of the Camisards (q.v.). In 1791 and 1815 it was the scene of bloody religious and political reactions. Nicot, Guizot, and Daudet were natives.

Nimrod. See BABYLONIA, BABEL; as a *nom de guerre*, see APPERLEY.

Nine Eyes, a popular name for the young lampreys found in rivers. See LAMPREY.

Nineveh, the modern *Kuyunjik*, capital of the ancient kingdom of Assyria. Its original capital was Assur, the ruins of which are now called *Kalaat Sherghat*; but the group of cities some sixty miles to the north, above the Greater Zab, and on the eastern side of the Tigris, namely Nineveh, Kalakh (*Nimrâd*), and Dur-Sargon (*Khorsabad*), ultimately supplanted it in importance. When Nineveh itself fell, the whole Assyrian empire—essentially a military power—perished with it. In the Sassanian period a village was built on the mounds which covered its ruins; but when its buildings had also crumbled into ruins, the very site of the proud ancient city remained for centuries unknown. Rich in 1818 conjectured that the mounds of Kuyunjik, opposite the modern town of Mosul, concealed its ruins beneath, but it was not until the excavations of Botta in 1842 and Layard in 1845 that the remains, first of Dur-Sargon, then of Nineveh itself, were revealed to the world. The sculptured monuments of its ancient kings and the relics of its clay-inscribed library soon yielded up their secrets to the investigations of scholars, and ere long the life and history of the ancient kingdom of Assyria were known almost with as much certainty as those of Greece and Rome. See ASSYRIA, and CUNEIFORM INSCRIPTIONS.

Ning-po, a treaty-port of the Chinese province of Che-keang, stands in a fertile plain, 16 miles from the mouth of the Takia (Ning-po) River and about 100 miles S. of Shanghai. It is surrounded by a wall 25 feet high and 16 feet thick, and contains numerous temples, colleges, &c., chief amongst them the temple of the Queen of Heaven; the temple was founded in the 12th century, but the present building, elaborately and richly ornamented, dates from 1680. The people, 670,000 in number, make sedge hats and mats, grow cotton, catch cuttle-fish, and carry on an active trade, especially in the export of green tea. Ning-po is a great mission station.

Ninian, St, the first known apostle of Scotland, was born of noble parentage, about 360, on the shores of the Solway Firth. Of studious and ascetic habits, he was moved by the Holy Spirit to make a pilgrimage to Rome, and there, after some years' stay, was consecrated bishop by the pope. On his homeward way he visited St Martin (q.v.) at Tours, and after his arrival in Galloway he founded the 'Candida Casa,' or church of Whithorn, dedicating it to St Martin, the news of whose death had just reached him (397). Later he laboured successfully for the evangelisation of the Southern Picts,

and in 432 (according to the Bollandists) died 'perfect in life and full of years,' and was buried in his church at Whithorn. His festival falls on 10th September. His Life by St Ailred (1109–66), abbot of Rievaulx in Yorkshire, who visited Galloway, has been edited by Bishop Forbes (1874), who enumerates sixty-six dedications in Scotland to St Ninian or 'Ringan'—the Lowland Scots form of his name—including the Episcopal cathedral at Perth.

Ninon. See LENCLOS.

Niobe, in Greek Mythology, the daughter of Tantalus and wife of Amphion, king of Thebes, to whom she bore six sons and six daughters. Proud of her children, she despised Leto or Latona, who had only two children, Apollo and Artemis; whereupon Latona, enraged at her presumption, moved her children to destroy all the children of Niobe with their arrows. They lay nine days in their blood unburied, when Zeus changed them into stone, and on the tenth day they were buried by the gods themselves. Niobe was changed into stone on Mount Sipylus, in Lydia, from which tears flowed every summer. Such is the Homeric legend, which, however, was afterwards much varied and enlarged. Only fragments exist of the tragedies of Æschylus and Sophocles on this theme, which was a favourite subject of ancient art. The so-called Niobe on Mount Sipylus is probably Hittite work. A noble group representing Niobe and her children was discovered at Rome in 1583, and is now in the Uffizi Palace at Florence. Even the ancient Romans were in doubt whether the work proceeded from Scopas or Praxiteles.

Niobium (sym. Nb; atom. number 41; equiv. 93.1) is a rare metal discovered by H. Rose in the mineral *Tantalite*. It may be obtained by passing the vapour of the chloride along with hydrogen through a red-hot tube. It is of a steel-gray colour, specific gravity 4.06, and takes fire when heated in the air or in chlorine gas. It is but little acted on by hydrochloric or nitric acid, but is soluble in strong sulphuric acid. It forms compounds with oxygen, chlorine, sulphur, &c., but these are of little practical importance.

Niort, the capital of the French department of Deux-Sèvres, pleasantly situated on the navigable Sèvre Niortaise, 43 miles NE. of La Rochelle and 109 SW. of Tours. An important railway junction, it has an old castle, an hôtel-de-ville (1530), a fine public garden, and the 16th-century church of Notre Dame, with a spire 246 feet high. The dressing of leather and the manufacture of gloves are the leading industries. Pop. (1921) 23,559. Niort in the 14th century was held for eighteen years by the English. It was the birthplace of Madame de Maintenon.

Nipa, an Old World 'stemless palm' (*Nipa fruticans*), grows in brackish swamps. The sap yields alcohol and sugar.

Nipigon, a lake of Ontario, 30 miles NW. of Lake Superior, with which it is connected by the Nipigon River. It is about 70 miles long, but its deeply-indented coast-line measures 580 miles. Its greatest depth is 540 feet. The lake is studded with hundreds of islands.

Nipissing, a lake of Ontario, north-east of Lake Huron, into which (Georgian Bay) it drains through French River (55 miles). It measures 50 by 28 miles, and is 644 feet above sea-level.

Nippon. See JAPAN.

Nippur, one of the oldest cities of Babylonia (q.v.).

Nirvāna. See BUDDHISM.

Nish (Serb. *Niš*), the chief town and commercial and railway centre of middle Serbia,

stands in mud in the midst of a vine-growing district, 152 miles by rail S.E. of Belgrade. It is the seat of a Greek bishop, and has a fairly strong citadel (1737). The place has played a conspicuous part in the Turkish wars from 1375 down to 1878, when it was regained by Serbia. Here, on 23d September 1689, the Austrians defeated the Turks. On the outbreak of war in 1914 the Serbian government was transferred at first to Nish, which was taken by the Bulgars in November 1915. Pop. 25,000.

Nishapur, a town of the Persian province of Khorasan, 53 miles W. of Meshhed, in a beautiful and fertile valley, has 20,000 inhabitants and a trade in turquoises. It was the birthplace, and contains the grave, of Omar Khayyám.

Nisibis, the capital of ancient Mygdonia, was a city of great antiquity, important as a place of strength and as an emporium of trade between east and west. It was twice taken by the Romans (under Lucullus and Trajan), and again given up by them to the Armenians; but being a third time taken, in 165 A.D., it remained the chief bulwark of the Roman empire against the Persians, till it was surrendered to them after the death of Julian in 363. The name *Nisibin* is retained by a small village on the Bagdad railway and the Syrian frontier of 1921, round which are numerous remains of the ancient city.

Nisi prius is the name (borrowed from the first two words of the old writ which summoned juries) usually given in England to the sittings of juries in civil cases. Thus, a judge sitting at *nisi prius* means a judge presiding at a jury trial in a civil cause, and a *nisi prius* lawyer is one who devotes himself to jury practice.—For the decree *nisi*, see DIVORCE.

Nith, a beautiful Scottish river, rising in Ayrshire, and flowing 71 miles south-south-eastward (mainly through Dumfriesshire), until, 14 miles below Dumfries, its estuary joins the Solway Firth.

Nithsdale, WILLIAM MAXWELL, EARL OF, was born in 1676, and at seven succeeded his father as fifth earl. In 1699 he married at Paris Lady Winifred Herbert (c. 1679–1749), youngest daughter of the Marquis of Powis, and thenceforward lived almost constantly at his Kirkcudbrightshire seat, Terregles, much embarrassed in circumstances, and sorely troubled as a Catholic by the neighbouring Presbyterian ministers. In 1715 'Nithsdale's bonnie lord' at once joined the English Jacobites under Forster and Derwentwater, and was taken prisoner at Preston. He was tried for high-treason in London, and sentenced to death in spite of abject excuses; but on 23d February 1716—the night before the day fixed for his execution—not knowing he had just been reprieved, he escaped from the Tower in woman's apparel, through the heroism of his countess. Naturally delicate and then advanced in pregnancy, she had ridden up to London in the depth of winter; and after her lord's escape she came back to Terregles, and dug up the family deeds, which she had buried in the garden, and by one of which the estates had been disposed in 1712 to their only son. They now settled at Rome, where the earl died on 20th March 1744. See Sir W. Fraser's *Book of Carlaverock* (2 vols. 1873).

Nitrates. See NITRE, NITRIC ACID, NITRIFICATION, MANURE.

Nitre, or SALTPETRE (Lat. *sal petrae*, 'salt of the rock,' through Old French), is potassium nitrate, KNO_3 . It usually occurs in long, colourless, striated, six-sided prisms; its taste is cooling, and very saline; it is soluble in seven times its weight of water at 60° (15.5° C.), and in less than one-third of its weight of boiling water, but is

insoluble in alcohol. When heated to about 660° (348° C.) it fuses without decomposition into a thin liquid, which, when cast in moulds, solidifies into a white, fibrous, translucent mass, known as *sal prunelle*. At a higher temperature part of the oxygen is evolved, and potassium nitrite is formed. Owing to the facility with which nitre parts with its oxygen, it is much employed as an oxidising agent. Mixtures of nitre and carbon, or of nitre and sulphur, or of nitre, carbon, and sulphur, deflagrate on the application of heat with great energy; and if nitre be thrown on glowing coals it produces a brisk scintillation. *Touch-paper* is formed by dipping paper in a solution of nitre, and drying it.

Nitre occurs as a natural product in India and Persia, where it is found sometimes as an efflorescence upon the soil, and sometimes disseminated through its upper stratum. The crude salt is obtained by lixiviating the soil, and allowing the solution to crystallise. The occurrence of nitre in this situation is commonly the result of the natural decay, with the aid of atmospheric oxygen, of nitrogenous animal matters in presence of the ash from wood fires (which supplies the requisite potassium in the form of carbonate), and it depends upon the vital activities of several organisms (nitrifying bacteria, see NITRIFICATION). Much nitre used to be artificially formed in Europe by imitating the conditions under which it is naturally produced. Animal matter, mingled with ashes and lime rubbish, is placed in loosely aggregated heaps, exposed to the air, but sheltered from rain. The heaps are watered from time to time with urine or stable runnings; at suitable intervals the earth is lixiviated, and the salt crystallised. As there is always present a considerable quantity of calcium and magnesium nitrates which will not crystallise, potassium carbonate in the shape of wood ash is added so long as any precipitation of calcium and magnesium carbonates occurs. The potassium nitrate formed remains dissolved. The clear liquor is then evaporated and the nitre crystallised.

The bulk of the nitre of commerce is now made from Chile nitre (sodium nitrate, see below) by interaction with potassium chloride from the Stassfurt deposits. The operation is carried on in aqueous solution at an elevated temperature, such that, while the greater part of the less soluble sodium chloride produced by the interaction separates and can be removed in the solid form, most of the potassium nitrate remains in the solution, and can be recovered from this by evaporation and crystallisation.

Nitre is employed as an oxidising agent in various chemical processes, as an ingredient in making fireworks, and especially in the manufacture of Gunpowder (q.v.). Its place in the manufacture of sulphuric and nitric acids has now been taken largely by the cheaper sodium nitrate (see below). It is used, further, in pickling meat and has various applications in medicine. In moderate doses (from five to twenty grains) it acts as a diuretic and diaphoretic, but the acetate or citrate of potassium is preferable for this purpose, and nitre is now seldom used for internal administration. It is a popular remedy in sore throat, in the form of nitre balls, which should be retained in the mouth till it melts, and the saliva impregnated with it gently swallowed. The inhalation of the fumes produced by the ignition of *touch-paper* often gives speedy relief in cases of spasmodic asthma.

Cubic Nitre, or *Chile Nitre*, is sodium nitrate, NaNO_3 . It occurs in enormous deposits in association with common salt (sodium chloride), gypsum, and earthy matters at or near the surface of the

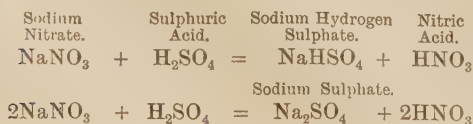
soil in almost rainless desert regions of Chile—especially Atacama and Tarapacá. The natural deposit is known as *caliche*, and it may contain 60 per cent. or more of sodium nitrate with as much as 25 per cent. of common salt. To separate the sodium nitrate from its less soluble or insoluble accompaniments the crushed *caliche* is lixiviated with boiling water, the solution being eventually made as concentrated as possible at the temperature employed, which is 248° (120° C). As this solution cools, sodium nitrate crystallises out and is separated from the mother liquor, which is used over again for extracting further quantities of *caliche*. The crystallised nitre, after drying in the air, is packed in sacks for transportation. It contains about 95 per cent. of sodium nitrate with about 2 per cent. of sodium chloride and some other impurities. When purified by re-crystallisation from aqueous solution, sodium nitrate forms cube-like rhombohedra, whence its name cubic nitre, although the crystals are not true cubes. In most of its properties it resembles ordinary nitre, but in consequence of its deliquescent nature it cannot be employed instead of that salt in the preparation of gunpowder, since the latter would tend to become damp. Being much cheaper than potassium nitrate, the sodium salt is now employed in the manufacture of sulphuric and nitric acids. Very large quantities of the salt as exported from Chile now find application as nitrogenous fertilising material in agriculture, the export having in some recent years approximated to three million tons. See CHILE, and books there cited. For Sweet Spirits of Nitre, see NITROUS ETHER.

Nitrian Desert. See NATRON LAKES.

Nitric Acid (HNO_3). This acid—the *aqua fortis* of the older chemical philosophers—may be regarded as the most important of all the compounds of nitrogen, its applications in the arts, in manufactures, and in chemical processes being very extensive. It has been known from very early times, its production being described by Geber, in the 8th century, by the distillation of nitre with copper sulphate and alum, the water of crystallisation of these salts furnishing the hydrogen, which is a constituent element of the resulting acid. It was Glauber, in the 17th century, however, who first prepared it by distilling nitre with oil of vitriol (sulphuric acid).

In the earlier manufacture of the acid by the distillation of a nitrate with sulphuric acid, ordinary nitre (potassium nitrate) was used, but the much cheaper cubic nitre (sodium nitrate) is now almost universally employed instead. In the modern operation the sodium nitrate and sulphuric acid are introduced into cast-iron retorts, and the nitric acid formed by their interaction is distilled off at a temperature which, at first, does not reach that of boiling-water, but which rises as the operation proceeds. The vapours arising during the distillation are passed into water-cooled condensing apparatus of silica or of an iron-silicon alloy, and the condensed acid is collected in earthenware, lead, or silicon-iron alloy receivers.

In the interaction between the cubic nitre and the sulphuric acid, the hydrogen of the acid may be regarded as capable of displacement in two stages, such that the quantity of the nitre required for the first stage is just one-half of that required to complete both stages. This is illustrated by the following equations:

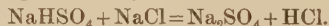


It is not economically satisfactory, however, to carry on the reaction to the completion of the second stage, since this requires a considerably higher temperature than that necessary for the first stage, and instead of much of the nitric acid there would be obtained the products of its decomposition, viz. water, nitrogen peroxide, and oxygen:



Even at the lower temperature at which the first stage takes place, decomposition of the nitric acid occurs to a slight extent in the sense represented above, and its occurrence can be recognised when the operation is carried out in a glass retort by the yellowish colour of the vapour in the retort due to the nitrogen peroxide which is produced.

In actual manufacturing practice, the quantities of the materials are so adjusted that there is more sodium nitrate than is required for the first stage only, but not nearly enough to complete the second also, and the temperature is not permitted to rise too high. The material left in the retorts after the removal of the nitric acid by distillation is mainly a mixture of sodium hydrogen sulphate with a certain proportion of sodium sulphate. It is liquid while hot and can be run off from the retorts, but on cooling it solidifies, and in this condition is known as 'nitre cake.' It can be made use of in the production of sodium sulphate, the sodium hydrogen sulphate which it contains being converted into sodium sulphate by interaction with sodium chloride, and hydrochloric acid being liberated during this change:



The nitric acid obtained in the process outlined above contains a small proportion of water and is yellow in colour owing to the presence of dissolved nitrogen peroxide. The water can be almost completely separated by mixing the acid with concentrated sulphuric acid and re-distilling at as low a temperature as possible, and the nitrogen peroxide can be removed by blowing dry air through the heated acid. The resulting acid is a nearly colourless liquid which fumes in moist air, possesses specific gravity 1.52, and boils, with slight decomposition, at 187° (86° C). It is a highly corrosive substance, vigorously attacking animal and vegetable tissues, and dissolving many metals and other inorganic substances. Its activities may conveniently be referred to more than one class of chemical change. In the first place it acts as a strong acid, i.e. an acid in which the usual characteristics of acids (see ACIDS) are strongly exhibited. Its employment in the formation of various nitrates by its interaction with oxides, hydroxides, carbonates, &c., depends upon its character as an acid. Then it acts as a vigorous oxidising agent, since it readily yields up part of its oxygen to substances which tend to combine with this element, and is itself reduced thereby to one or more of the lower oxides of nitrogen, such changes being frequently accompanied by the evolution of brown fumes of nitrogen peroxide. The oxidising effect of nitric acid is illustrated by its action on various metals, whereby nitrates are produced and a part of the nitric acid is simultaneously reduced. A further type of action is illustrated in the formation of the so-called nitro-substitution compounds such as Nitrobenzene (q.v.) and tri-nitrotoluene, in which one or more nitro-groups, NO_2 , may be substituted for one or more hydrogen atoms. In connection with the nitro-substitution compounds it may prevent confusion to note that the explosive substances known as nitro-glycerine and nitro-cellulose (gun-cotton) are not nitro-compounds in the sense here stated but are really nitrates. During the period of the Great War, the production

of nitric acid was carried on upon an enormous scale for the manufacture of tri-nitrotoluene (T.N.T.) and other nitro-compounds as well as for that of nitro-glycerine, gun-cotton, ammonium nitrate, &c., to be used as explosives.

It has been known since the experiments of Cavendish, in 1785, that when electric sparks are passed through moist air, or any other mixture of nitrogen and oxygen in presence of water vapour, nitric acid is produced. A similar combination on a larger scale takes place naturally during thunderstorms, and the occurrence of this is manifested by the carrying down of traces of dissolved nitrates in rain. Since 1905 processes have been devised and successfully carried out on the manufacturing scale in which atmospheric nitrogen and oxygen are employed in the synthetic production of nitric acid by aid of electricity. (See NITROGEN.)

Another modern mode for preparing synthetic nitric acid depends upon the oxidation of ammonia, the latter being itself obtained as a product of the direct combination of nitrogen with hydrogen. Under appropriate temperature conditions and in presence of a suitable catalyst, such as platinum wire gauze, ammonia in intermixture with air undergoes oxidation to form nitric oxide (see NITROGEN), and from this nitric acid can be obtained.

When the hydrogen of nitric acid is replaced by a metallic or other radical, a nitrate is formed. The nitrates of the metals are mostly soluble in water. Important inorganic nitrates are ordinary nitre or saltpetre (potassium nitrate), cubic nitre or Chile saltpetre (sodium nitrate), ammonium nitrate, and silver nitrate. The last named, when fused and cast into thin sticks, is known as lunar caustic.

'Fuming nitric acid' is an orange-brown strongly fuming liquid which consists of concentrated nitric acid containing a considerable quantity of dissolved nitrogen peroxide. It acts as a more vigorous oxidising agent than pure nitric acid.

Nitrification is the term applied to the oxidation by bacteria of ammonium salts to nitric acid. It takes place in two stages. First the ammonium salt is oxidised to nitrous acid. Accumulation of nitrous acid, however, rapidly inhibits the growth of the organism which produces it. Very little oxidation, therefore, takes place unless a substance capable of neutralising the acid formed is present. The second stage in the process is the conversion of the nitrite, formed as described, to nitrate. Each stage is due to the activity of its own particular type of micro-organism. Nitrification plays a considerable part in the purification of sewage and in the series of chemical changes which are responsible for rendering available for plant nutrition the nitrogenous substances present in soils.

The nitrifying bacteria require sources of carbon, nitrogen, and the other elements which compose their cell substance. The great majority of bacteria obtain their carbon and nitrogen from organic compounds. The nitrifying bacteria, however, are rather exceptional in that they are unable to utilise organic compounds and obtain both carbon and nitrogen from purely inorganic sources. Soluble organic substances are, in fact, highly injurious to these organisms. They completely inhibit growth when they are present in considerable concentration in nutrient solutions otherwise suitable to the activities of the organisms. For example, 0.2 to 0.3 per cent. of dextrose is sufficient to inhibit growth of the nitrifying bacteria under these conditions. In the media in which the organisms occur in nature (sewage and soil) organic compounds are not nearly so injurious as they are in culture solutions.

The oxidation of ammonium salts and nitrites respectively is the means by which the two groups of the nitrifying organisms obtain the energy necessary for their vital activities. The nitrogen necessary for building up cell substance is obtained from the nitrogenous compounds oxidised. The nitrogen requirements of the organisms for nutritional purposes (as distinct from energy-yielding purposes) are very small. On the completion of nitrification, therefore, very little of the nitrogen supplied remains locked up in the body substance of the bacteria. Under favourable conditions almost the whole of the ammoniacal nitrogen originally present in the medium is oxidised to nitrate. To allow of active nitrification ammonium salts and nitrites must be present in comparatively low concentration. The optimum concentration of both of these substances is about one part per thousand of solution. When the concentration is increased above this level nitrification is retarded and finally inhibited. Ammonium salts are not so injurious as free ammonia; 0.015 per cent. of free ammonia will completely inhibit the growth of the organism which oxidises nitrite to nitrate. The nitrifying bacteria obtain their carbon from carbon dioxide. They refuse to grow in an atmosphere entirely free from this gas.

The optimum reaction for the growth of the nitrifying bacteria is one of neutrality or very slight alkalinity. In culture solutions the organisms are highly sensitive to the presence of acid. It would appear, however, that they are less sensitive to acidity in soil than in solution cultures, as nitrification has been frequently observed to take place in distinctly acid soils. Insoluble carbonates like calcium carbonate are particularly suitable for neutralising the acid formed by the bacteria and so promoting nitrification.

Winogradsky, who first cultivated the nitrifying bacteria in pure culture, i.e. free from other organisms, gave the generic names *Nitrosomonas* and *Nitrosococcus* to the forms which oxidise ammonium salts to nitrous acid. The former appears as a short, plump rod, and is motile at one period in its development; the latter is a spherical, non-motile organism. The organism which oxidises nitrite to nitrate was named *Nitrobacter*. It is smaller than the others, pear-shaped, and non-motile. Owing to the fact that the nitrifying bacteria are sensitive to the presence of soluble organic substances they refuse to grow on the ordinary bacteriological media. The most suitable media for their growth are silicic acid gels containing an ammonium salt (for *Nitrosomonas* and *Nitrosococcus*) and a nitrite (for *Nitrobacter*), along with other suitable inorganic nutrient salts. On this medium small brownish granular growths are produced, which in the case of *Nitrosomonas* are surrounded by less dense zones consisting of small numbers of bacterial cells which have migrated a short distance from the original colony.

In the purification of sewage the material is generally first placed in deep tanks, where organic compounds are broken down by bacterial action. A large proportion of the organic nitrogenous substance in the sewage is thus converted to ammonium salts. The liquid is then allowed to flow over special filters, where it is strongly aerated. The conditions obtaining on the filters favour the activity of the nitrifying bacteria, which rapidly oxidise the ammonium salts to nitrates.

In soil the nitrifying bacteria perform a very important function in connection with the nutrition of plants. Most plants prefer to take up their supply of nitrogen from the soil in the form of nitrates. The nitrogen of plant and animal remains along with that of organic nitrogenous manures applied to the soil is first converted to ammonium

salts by certain groups of soil bacteria. The ammonium salts so formed, as well as ammoniacal nitrogen supplied in the form of fertilisers like sulphate of ammonia, are then oxidised by the nitrifying bacteria to nitrates. It is thus essential that the condition of the soil should be such that it favours the activity of these organisms. Adequate aeration is necessary to supply oxygen for the oxidation. This is secured by drainage, which removes superfluous moisture and prevents it from filling up the spaces between the soil particles and so excluding air, and by cultivation, which breaks up and aerates the soil. An adequate supply of lime to neutralise the acid formed is also desirable.

Nitro-benzene, $C_6H_5NO_2$, is a yellow, oily fluid, of sp. gr. 1.2, which may be distilled without decomposition, and boils at 415° (213° C.). It has a sweet taste, is insoluble in water, but dissolves freely in alcohol and ether. Its odour is very similar to that of oil of bitter almonds, which has led to its use in perfumery under the name of *Essence of Mirbane*. It is obtained by treating benzene, C_6H_6 , with warm fuming nitric acid, when one atom of hydrogen is replaced by the group of atoms NO_2 , so that the benzene, C_6H_6H , becomes converted into nitro-benzene, $C_6H_5NO_2$. The vapour of nitro-benzene when inhaled produces, after from 6 to 12 hours, coma and sometimes death. The fact that its action is so long delayed seems to indicate that its poisonous action is due to some product of its decomposition rather than to itself. In cases of poisoning artificial respiration and powerful stimulants should be resorted to.

Nitrogen (Fr. *azote*; sym. N; atom. wt. 14.01; atom. number 7) is an elementary gas, which in the free state forms nearly four-fifths by volume of our atmosphere. In combination with other elements nitrogen is a necessary constituent of every organised body, and it forms a very large number of most important compounds. For its relation to that gas, see ARGON. Its name was given to it shortly after it had been proved to be an essential constituent of nitre or potassium nitrate. Its presence in the atmosphere was discovered in 1772 by Rutherford, at that time a professor of botany in the university of Edinburgh. It was more particularly investigated soon after by Priestley, Scheele, and Lavoisier. It is a colourless, tasteless, inodorous gas, and was formerly regarded as permanent or incondensable; but it can be reduced to the liquid state by the application of sufficient pressure after it has been cooled to a very low temperature. The Critical Temperature (q.v.) of nitrogen, or the point of temperature above which it cannot be condensed into a liquid by the application of any pressure however great, is -149° C. When cooled to this temperature a pressure of 27.5 atmospheres must be applied in order to liquefy it.

Nitrogen is fourteen times as heavy as hydrogen, and is slightly lighter, bulk for bulk, than atmospheric air, its sp. gr. being 0.9713, compared with air = 1. It is but slightly soluble in water, one hundred volumes of water at ordinary temperatures dissolving only about one and a half volumes of it.

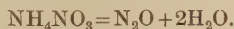
Whilst nitrogen is a constituent of all plant and animal organisms and of many important compounds, it is rather inert towards other elements, and, under ordinary circumstances, does not readily enter into direct combination with them. Atmospheric nitrogen and oxygen unite, however, to some extent during thunderstorms, in the immediate vicinity of lightning flashes, to form nitric oxide, and methods have been devised for bringing this union about, by aid of electricity, as a step in the synthetic production of calcium nitrate (see *Nitro-*

gen Peroxide, below). Nitrogen is not combustible, nor does it act in the atmosphere as a supporter of combustion, a lighted taper plunged into a jar containing nitrogen being at once extinguished. It is almost unnecessary to say that nitrogen is not poisonous, since it is breathed freely along with oxygen by all animals; but it cannot support animal life, and an animal placed in it will die from suffocation for want of the oxygen necessary for respiration. Its function in the atmosphere seems to be mainly that of diluting the oxygen with which it is there associated. Although nitrogen forms about 79.1 per cent. of the total volume and 77 per cent. of the total weight of the atmosphere, the free gas does not appear to play any important part in supplying nitrogen for the construction of the tissues of plants in general. It has been proved by experiment, however, that leguminous plants, in association (SYMBIOSIS, q.v.) with certain micro-organisms present in nodules which become developed upon the roots of those plants, do derive nitrogen from the air and accumulate combined nitrogen in their tissues largely in excess of the quantity originally present in the seed and the soil. To a small extent free atmospheric nitrogen becomes converted by the aid of micro-organisms present in the soil into nitrogen compounds capable of serving there as plant food. On the other hand, it has been conclusively shown that certain plants are unable to exist unless appropriate compounds of nitrogen are supplied to them in the soil in which they grow. The main supply of the nitrogen of plants is certainly drawn from nitrogen compounds existing in or artificially supplied to the soil. The most important of such nitrogen compounds are nitrates, which are present in every fertile soil. These may be produced by the decay in the soil of nitrogenous animal or vegetable matters existing in it or supplied to it as manure (see NITRIFICATION); or they may be added to it ready formed.

There are numerous methods for preparing pure or nearly pure nitrogen. One method by which it is obtained very nearly pure is to remove the oxygen as completely as possible from atmospheric air. This can be done by passing a current of air slowly through a red-hot tube packed with copper turnings or with spirals of copper wire gauze. The oxygen of the air combines with the copper to form an oxide of copper, whilst the nitrogen passes on. Or the oxygen can be very completely removed from a confined portion of moist air by suspending in it pieces of phosphorus until the volume of the gas ceases to diminish. Otherwise than from atmospheric air, nitrogen can be prepared by passing a current of chlorine gas into a solution of ammonia. In this method care must be taken always to use ammonia in excess, otherwise chloride of nitrogen would be produced, which is a dangerously explosive substance. A steady current of nitrogen can be very easily obtained by heating together strong solutions of ammonium chloride and of potassium nitrite. The preparation of nitrogen on the large scale, for manufacturing purposes, is now almost exclusively effected by the fractional distillation of liquid air, from which, being more volatile than the accompanying liquid oxygen, it can be obtained in a high degree of purity. Amongst the most important compounds of nitrogen are the nitrates which are found in the soil in very considerable quantity in different parts of the world, and in some places occur in large deposits, as in the nitrate regions of South America. From these nitrates Nitric Acid (q.v.) and other compounds of nitrogen are derived. Several compounds of nitrogen with oxygen are known.

Nitrous Oxide, or laughing-gas, N_2O , was discovered in 1772 by Priestley, who obtained it by the action on nitric oxide of easily oxidisable sub-

stances. It is now prepared by the action of heat on ammonium nitrate:



It is a colourless gas, which can pass with moderate ease be reduced to the liquid state, a pressure of thirty atmospheres being required to liquefy it at 0° C. Davy discovered in 1800 that it possessed anaesthetic properties, and it is now used as an anaesthetic in minor surgical operations. For such purposes it is stored in the liquid state by dentists and others in wrought-iron bottles. It is a supporter of combustion, and burning materials placed in it continue to burn with almost as great brilliancy as if placed in free oxygen.

Nitric Oxide, NO, is produced by the action of nitric acid on copper, silver, or mercury. It is a colourless gas, which like nitrogen can only be reduced to the liquid state by pressure after it has been cooled to a very low temperature. Its most striking character is the great readiness with which it unites with free oxygen, forming dense brown fumes, which consist mainly of nitrogen peroxide (see below).

Nitrous Anhydride has been described as a gas easily condensable to a liquid, possessing the composition represented by the formula N_2O_3 . It seems very questionable whether a single substance exists either in the state of gas or of liquid possessing this composition. The gas which was supposed to be nitrous anhydride was certainly a mixture. Although nitrous anhydride cannot be obtained pure, and the corresponding acid—nitrous acid—is an unstable substance at ordinary temperatures, a number of nitrites, salts corresponding to nitrous acid, are known.

Nitrogen Peroxide, NO_2 or N_2O_4 , is produced when oxygen and nitric oxide are mixed. It is a dark-brown liquid at ordinary temperatures, which boils at 22° C., yielding a brown vapour, and solidifies at -9°, forming colourless crystals. Nitrogen peroxide is produced from atmospheric nitrogen and oxygen in the Birkeland-Eyde electrical process for the manufacture of calcium nitrate, in which the two gases combine at a very high temperature with formation, at first, of nitric oxide. The latter then unites, at a lower temperature, with more oxygen. By the interaction of the resulting nitrogen peroxide with water, dilute nitric acid is formed, and from this, by neutralising it with limestone, calcium nitrate is obtained in solution. The calcium nitrate recovered from the solution by evaporation, and heated with concentrated sulphuric acid, yields nitric acid.

The following are some of the other more important nitrogen compounds: ammonia and the ammonium salts (see AMMONIA); the vegetable alkaloids (see ALKALOIDS); aniline and its derivatives; cyanogen and the cyanides, including hydrocyanic acid; albumenoid substances; urea and uric acid; nitro-benzene, and other nitro compounds; pyridine and allied substances, hydrazine compounds, ptomaines, &c. See AZOTISED BODIES.

Nitrogen Fixation. Two groups of bacteria are known which are capable of utilising the free nitrogen of the air for the purposes of nutrition. A considerable quantity of nitrogen is thus 'fixed' or converted to complex organic compounds in the cells of the organisms. The more important group of the nitrogen-fixing bacteria lives in the nodules on the roots of leguminous and certain other plants and supplies the plants with nitrogen. In return energy-yielding material is received from the plant (see SYMBIOSIS). The organism of the Leguminosæ has been given the name *Bacillus radicicola*. It generally appears as a motile rod, but in the nodules peculiar club-shaped or Y-shaped structures are formed. The bacillus will grow on ordinary

bacteriological media, and also on media containing no combined nitrogen. Several distinct varieties of the organism exist, each of which is associated with a particular genus or with several genera of leguminous plants. The best results, so far as the growth of the plant is concerned, are only obtained when the latter contains in its nodules the type of organism suited to it. It sometimes happens that suitable bacteria for a particular plant are absent from the soil in which it is desired to grow the plant. In those cases beneficial results usually follow the inoculation of the soil with the organism concerned. Most soils in this country contain strains of bacteria generally associated with the majority of leguminous plants. Lucerne, however, is an exception, and inoculation as a rule benefits this crop.

The second group of the nitrogen-fixing bacteria includes forms which live free in the soil. The most important species is an organism generally known as *Azotobacter chroococcum*. This is a large oval or rod-shaped organism which tends to vary greatly in form. It is not present in all soils, the determining factor with regard to its occurrence being the reaction of the soil. *Azotobacter* does not succeed in acid soils; if the acidity of the soil is increased beyond a certain limit the organism will die out. Another of the free-living nitrogen-fixing bacteria is *Bacillus amylobacter*. It is a rod-shaped organism, which is capable of producing spores—bodies which are more resistant to adverse conditions than the ordinary cells of the organism. Most strains of this organism are anaerobic, i.e. they refuse to grow in the presence of free oxygen. *Bacillus amylobacter* is widely distributed, but is not so important as *Azotobacter*, because it fixes much smaller quantities of nitrogen. The nitrogen fixed by free-living bacteria remains in their cells till they die. Then the complex nitrogenous compounds of the bacterial cell are broken down by other bacteria. The nitrogen is converted to nitrates (see NITRIFICATION), in which form it becomes available to the majority of plants.

Nitro-glycerine (known also as *Glonoine* or *Glonoine-oil*) can be readily prepared by dissolving glycerine in equal measures of strong nitric and sulphuric acids and pouring the solution into water, when the nitro-glycerine becomes precipitated. Nitro-glycerine was discovered by Ascanio Sobrero, professor of chemistry at Turin, who in 1846 found that by the above process he could produce a highly explosive mixture. There was little idea at the time of the value of the discovery, which was treated solely as a chemical curiosity, until about fifteen years later, when Alfred Nobel, a Swedish engineer and chemist, perceiving the value of the unrecognised explosive, and turning his attention to its development, rapidly introduced it as a blasting agent for industrial purposes. The new explosive was eminently satisfactory so far as blasting power was concerned; but a considerable number of serious accidents with it, when transported in its liquid state in canisters, led to practically prohibitive legislation in Britain and other countries; and there is little doubt that its manufacture for practical use would have ceased had not Nobel in 1864 discovered that kieselguhr (an infusorial earth) would absorb it and form a plastic mass containing, as a maximum, about three parts by weight of nitro-glycerine to one of kieselguhr. This mixture can be safely handled, and is formed, by suitable means, into cylindrical cartridges which are wrapped in parchment paper. Confidence in the new explosive being gradually restored, its properties were carefully studied by Nobel and others, with the result that it now forms part not only of the majority of blasting explosives but of many propellants, notably of *Cordite* (q.v.), the

smokeless explosive used for cannon and small-arms by Great Britain. Nitro-glycerine was first manufactured in the British Isles in 1871 at Ardeer, in north Ayrshire, by the British Dynamite Company, which in 1876 became, and still is, Nobel's Explosives Company. This factory held a practical monopoly of the manufacture of nitro-glycerine for the British Isles from 1871 to 1881.

Nitro-glycerine, as manufactured on a large scale for commercial purposes, is formed by the mixture of strong nitric and sulphuric acids, cooled by water previous to being introduced into a large leaden vessel, the temperature of which is kept down by water circulating through coils inside. Glycerine is then injected by compressed air as a fine spray from the bottom of the vessel, and becomes immediately nitrated, considerable heat being evolved. On the completion of the nitration, as indicated by the fall of temperature, the mixture is cooled down to about 60° F. (15° C.) and then run off into another leaden vessel, termed the 'separating tank,' where it is allowed to stand. In about an hour the separation of the nitro-glycerine from the acids is complete, and the former, having a specific gravity of 1.6, as compared with about 1.74 for the mixture of acids, floats and forms a layer on the top of the latter. From this position it is run off into washing tanks and thoroughly washed in water, and subsequently in an alkaline solution, to remove every trace of acid; and, having been passed through a filter of common salt contained in a bag of flannel, is ready for manufacture into Dynamite (q.v.) or other nitro-glycerine compounds. A variant of the process described is one in which the nitration and separation take place in the same vessel. The utmost care is exercised in the above processes, and any abnormal rise in temperature is strictly guarded against, or accidents would arise. For similar reasons the materials employed in the manufacture of nitro-glycerine are in every particular the best and purest attainable. Colourless when pure, but having as an article of commerce a pale yellow colour, nitro-glycerine is a dense, oily liquid. It is inodorous, but has a sweet, pungent, aromatic taste; a single drop, however, if placed on the back of the tongue, the inhaling of the vapour, or even in some cases the mere handling, of the explosive will produce headache and pain in the back lasting for hours; but by those accustomed to handling this substance no inconvenience whatever is experienced. Nitro-glycerine enters into medical prescriptions for certain diseases of the heart.

The formation of nitro-glycerine, $C_3H_5(ONO_2)_3$, from glycerine, $C_3H_5(OH)_3$, by the action of nitric acid, HNO_3 , is expressed by the formula,



The sulphuric acid used in the process described above, in the proportion of about 1.7 part to 1 part of nitric acid, plays no part in the reaction, but is essential in order to maintain the strength of the nitric acid by combining with the water formed in the reaction as shown in the equation given above. If a small quantity of nitro-glycerine be ignited in the open air it will usually burn quietly, but if confined in any way burning will lead to detonation. It is readily detonated by a blow or by a detonator (for an explanation of detonation see GUN-COTTON); but when frozen the blow needed to detonate it is considerably increased, and as it freezes at a comparatively high temperature—which varies for different samples, but is approximately 50° F. (10° C.)—and contracts by about one-twelfth of its volume on freezing, these characteristics are distinctly objectionable when it is used absorbed by kieselguhr or other substances,

or dissolved with nitro-cellulose, as in ballistite or cordite, though in solution the freezing-point is considerably lowered. A further but lesser objection to it is that it vaporises slightly at ordinary temperatures, and decomposes readily at about 270° F. (132° C.). On detonation the products are carbonic acid gas (CO_2), water (H_2O), nitrogen (N), and oxygen (O), according to the following equation,



from which it will be seen that there is oxygen available for further combustion if a combustible be mixed with it, and this property is made use of in certain explosives. One volume of nitro-glycerine produces 1141 volumes of gas (the water formed being reckoned as gaseous) when detonated; and this enormous expansion, rendered still greater by the immense heat, estimated at 6152° F. (3400° C.), generated on detonation enables this explosive to exert a pressure some three times as great as that obtained from gunpowder when the latter is exploded in its own volume, a condition which cannot obtain practically. As the maximum velocity of detonation of nitro-glycerine is about 28,000 f.s. as compared with about 800 f.s. for gunpowder, no comparison is possible between the effects of these explosives when untamped. See DYNAMITE, GUN-COTTON.

For fuller details see Berthelot, *Explosives and their Power* (1892); Guttman, *The Manufacture of Explosives* (1895); *Treatise on Service Explosives* (Official, 1907); and similar works.

Nitrous Ether, or NITRITE OF ETHYL, $C_2H_5NO_2$, is a very volatile ether, with an agreeable apple odour, and having a specific gravity of .900. It boils at 64.4° (18° C.), and is highly inflammable. It is readily soluble in alcohol and glycerine, less so in water. It is very liable to decomposition, becoming acid on keeping. It may be prepared by the action of sulphuric acid and alcohol on nitrite of potash. In itself it is of little importance, but on account of its relation to the *sweet spirits of nitre* or *spirit of nitrous ether* is one of the most important drugs. It was for long thought that the virtues of this valuable remedy were proportionally due to the nitrous ether present, and attention was directed to the preparation of the pure substance. When this was administered in the form of solution of the strength of sweet spirits of nitre, it was found that its action was different from and inferior to that of the latter. The sweet spirits of nitre contains in addition aldehyde and paraldehyde, and it is believed that to these we must ascribe much of its virtue. Be this as it may, the legal test is based on the presence of some ethereal body, presumably nitrite of ethyl, and yet many a sample may be efficacious and fail to satisfy the standard test. The *spirit* should be freshly made, be kept in well-closed bottles, and should not be acid. Its specific gravity should not exceed .845, as an admixture of water tends towards decomposition. It may be prepared by the action of nitric and sulphuric acids on alcohol in the presence of copper, but manufacturers attain the same end by other processes. It is used, in conjunction with other medicines, as a diuretic, especially in the dropsy which follows scarlatina; and it is employed, in combination with acetate of ammonia and tartarised antimony, in febrile affections. The dose in febrile cases is from half a drachm to a couple of drachms; while for a diuretic two or three drachms should be given.

Nitrous Oxide. See NITROGEN.

Nivelles (Flem. *Nyvel*), a town in the Belgian province of Brabant, on the Thines, 19 miles by rail

S. of Brussels. Its fine Romanesque church (1045) contains the relics of Pepin's daughter, St Gertrude. In 1381 the townsfolk of Ghent were defeated here by Count Louis of Flanders, and 6000 burned in a monastery. Nivelles has manufactures of cotton, paper, lace, &c. Pop. 12,000.

Nivernais, formerly a province in the middle of France, nearly corresponding to the present department of Nièvre. Its towns enjoyed municipal privileges at a very early period. The principal landowners were the counts, afterwards dukes, of Nevers, who held under their vassalage more than 1800 fiefs.

Nix, NIXIE, a class, mostly malignant, of northern water-spirits. See DEMONOLOGY.

Nizam's Dominions. See HYDERABAD.

Noah. See DELUGE.

Noailles, a distinguished French family which dates from the 11th century, and played an important part in history from the reign of Louis XIV. to the Revolution. Antoine (1504-62) was ambassador in England in 1553-56, and admiral of France. Anne Jules (1650-1708), son of the first duke, commanded against the Huguenots and in Spain during the war of the Spanish succession, and was made marshal; whilst his brother, Louis Antoine (1651-1729), was Archbishop of Paris from 1695 till his death, and was made cardinal in 1700. The third duke, Adrien Maurice (1678-1766), won the marshal's baton in the wars of Louis XV. in Spain, Italy, and Germany. The fifth duke, Paul François (1739-1824), attained eminence as a chemist and was elected to the Academy of Sciences in 1777; his brother, Emmanuel Marie Louis (1743-1822), was French ambassador at Amsterdam (1770-76), London (1776-83), and Vienna (1783-92). The sixth duke, Paul (1802-85), wrote historical works, and was elected to Chateaubriand's chair in the Academy in 1849. A grandson of the third duke, Louis Marie (1756-1804), served in America under his brother-in-law Lafayette, embraced for a while the French Revolution, and defended San Domingo against the British.

Noailles, PRINCESSE ANNA ELISABETH BRANCOVAN, COMTESSE DE, born in Paris in 1876, of noble and princely Wallachian-Moldavian-Greek origin (a granddaughter of Musurus Pasha, Turkish ambassador in London), lived for a time in the East, married Comte Mathieu de Noailles, and was hailed by some critics as the world's greatest poet of her time. *Le Cœur Innombrable* (1901), *L'Ombre des Jours*, *Les Éblouissements*, *Les Vivants et les Morts* (1913), *Les Forces Éternelles*, comprise her voluptuous melancholy poetry. Her novels have enjoyed a lesser repute.

Nobel, ALFRED (1833-96), was born at Stockholm and educated at St Petersburg, where he afterwards joined his father in the manufacture of explosives and torpedoes. He studied mechanical engineering in the United States, and in 1867 invented dynamite, and subsequently the first smokeless powder. He held 129 patents in Britain, and controlled fifteen explosive factories in different parts of the world. He left £1,680,000 for the founding of five prizes to be awarded annually to the five most deserving persons in (1) physics, (2) chemistry, (3) physiology or medicine, (4) literary work of an idealistic nature, (5) the cause of universal peace. The first four are awarded by the Academies of Sweden, the fifth by the Norwegian Storting. These prizes are open to all nations without restriction of sex. The awards were first made in December 1901, and have been continued annually.

Nobility, that distinction of rank in civil society which raises a man above the condition of

the mass of the people. Privileges originally acquired by wealth or political power are secured to the family of the possessor of them; and the privileged class come to constitute an order, admission into which requires the consent of society or of the order itself.

The ancient Romans were divided into *nobiles* and *ignobiles*, a distinction at first corresponding to that of patricians and plebeians. A new nobility afterwards sprang out of the plebeian order, and obtained (336 B.C.) the right to rise to high offices in the state; and in course of time the descendants of those who had filled curule magistracies inherited the *jus imaginum*, or right of having images of their ancestors—a privilege which, like the coat-of-arms in later ages, was considered the criterion of nobility. The man entitled to have his own image was a *novus homo*, while the *ignobilis* could neither have his ancestor's image nor his own.

The origin of the feudal aristocracy of Europe is in part connected with the accidents which influenced the division of conquered lands among the leaders and warriors of the nations that overthrew the Roman empire, and is sketched in the article Feudalism (q.v.); and the evolution of the dignities of Baron, Count (*Comes*), Earl, Marquis, Duke, and other ranks will be found under those several heads. In the subinfeudations of the greater nobility originated a secondary sort of nobility, under the name of Vavasours, Castellans, and lesser barons; and a third order below them comprised vassals, whose tenure, by the military obligation known in England as knight's service, admitted them within the ranks of the aristocracy. In France the allegiance of the lesser nobles to their intermediary lord long continued a reality; in England, on the other hand, William the Conqueror obliged not only his barons who held in chief of the crown, but their vassals also, to take an oath of fealty to himself; and his successors altogether abolished subinfeudation. The military tenant, who held but a portion of a knight's fee, participated in all the privileges of nobility, and an impassable barrier existed between his order and the common people. Over continental Europe in general the nobles, greater and lesser, were in use, after the 10th century, to assume a territorial name from their castles or the principal town or village on their demesne; hence the prefix 'de,' or its German equivalent 'von,' considered over a great part of the Continent as the criterion of nobility or gentility. Britain was, to a great extent, an exception to this rule, many of the most distinguished family names of the aristocracy not having a territorial origin. See NAMES.

Under the feeble successors of Charlemagne the dukes, marquises, and counts of the empire encroached more and more on the royal authority, and by the end of the 9th century the Carolingian empire had been parcelled into separate and independent principalities, under the dominion of powerful nobles, against whom, in Germany, the crown never recovered its power. In France, however, the royal authority gradually revived under the Capetian race, the great fiefs of the higher nobility being one by one absorbed by the crown. In England, where the subjection of the feudal aristocracy to the crown always was, and continued to be a reality, the resistance of the nobles to the royal encroachments was the means of rearing the great fabric of constitutional liberty. All those who, after the Conquest, held *in capite* from William belonged to the nobility. Such of them as held by barony (the highest form of tenure) are enumerated in Domesday. Their dignity was territorial, not personal, having no existence apart from baronial possession. The *comes* was a baron of superior dignity and greater estates; and these

were in England the only names of dignity till the time of Henry III.

After the introduction of Heraldry (q.v.), and its reduction to a system, the possession of a coat-of-arms was a recognised distinction between the noble and the plebeian. On the Continent whoever had a shield of arms was a nobleman; and in every country of continental Europe a grant of arms, or letters of nobility, was conferred on all such a noble's descendants. In England, on the other hand, the words noble and nobility are restricted to the five ranks of the peerage constituting the greater nobility, and to the head of the family, to whom alone the title belongs. Gentility, in its more strict sense, corresponds to the nobility of continental countries (see GENTLEMAN). This difference of usage is a frequent source of misapprehension on both sides of the Channel; at some of the minor German courts the untitled member of an English family of ancient and distinguished blood and lineage was sometimes postponed to a recently-created baron or 'Herr von,' who had received that title, and the gentility accompanying it, along with his commission in the army. It was taken for granted that the latter belonged to the 'Adel' or nobility, and not the former. For the German nobility (abolished at the revolution), see GERMANY. Throughout the middle ages the lesser nobility of Britain preserved a position above that of most continental countries, being, unlike the corresponding class in Germany, allowed to intermarry with the high nobility, and even with the blood-royal of their country.

The higher nobility, or nobility in the exclusive sense, of England consist of the five temporal ranks of the peerage—Duke, Marquis, Earl, Viscount, and Baron (in the restricted signification of the word, q.v.), who are members of the Upper House of Parliament. Archbishops and bishops are lords temporal, but not peers. The dignity of the peerage is hereditary, but in early times was territorial, the dignity originally being attached to the possession of lands held directly from the crown in return for services to be performed to the sovereign. Later, peers were created by writ of summons to attend the king's council or parliament, but now the creation of a new peer is always made by letters-patent from the crown. In order to the efficient carrying out of the appellate jurisdiction of the House of Lords there are now a limited number of life peers, styled Lords of Appeal in Ordinary. By the Appellate Jurisdiction Act, 1876, as amended 1887, it is enacted that every such lord, unless he is otherwise entitled to sit in the House of Lords, shall by virtue and according to the date of his appointment be entitled during his life to rank as a baron, and shall be entitled to a writ of summons to attend and to sit and vote in the House of Lords. But his dignity is not to descend to his heirs. A peerage is forfeited by attainder for high-treason; attainder for felony forfeits a peerage by writ, not by patent; on attainder, peerage cannot be restored by the crown, only by an act of parliament. Ladies may be peeresses in their own right either by creation or by inheritance. The wives of peers are also styled peeresses. The question as to descent through males only or heirs-female will be found noted at the articles on the several orders of nobility. The oldest English peerage is the earldom of Arundel, dating from 1155, and now held by the Dukes of Norfolk; the Irish barony of Kingsale dates from 1181; to the period 1181–1205 belong four baronies now merged in other titles; the Scottish earldom of Sutherland goes back to 1228; and the baronies of Le Despencer, De Ros, and Hastings are all of the year 1264.

By the Act of Union between England and

Scotland the Scottish peers elect sixteen of their number to represent their body in the House of Lords in each parliament. The peers of Ireland, in virtue of the Irish Act of Union, elect twenty-eight of their number to sit in the House of Lords for life. The Act of Union with Scotland has been understood to debar the sovereign from creating any new Scottish peerages; all peers created in either England or Scotland between that date and the union with Ireland are peers of Great Britain; and peers created in any of the three kingdoms subsequently to the union with Ireland are peers of the United Kingdom, with this exception that one new peerage of Ireland may be created on the extinction of three existing peerages. When the Irish peers are reduced to one hundred, then on the extinction of one peerage another may be created. All peers of Great Britain or of the United Kingdom have a seat in the House of Lords. A Scottish peer, though not one of the sixteen representative peers, is debarred from sitting in the House of Commons, a disability which does not attach to Irish peers. The privileges belonging to peers as members of parliament will be explained under PARLIAMENT; as peers, they also possess the following immunities: they can only be tried by their peers for felony, treason, or misprision of treason, when the whole members of the peerage are summoned. All the privileges belonging to the English peers, except the right of sitting in the House of Lords, were extended to the peers of Scotland by the Treaty of Union. A peer who has different titles in the peerage takes in ordinary parlance his highest title, one of the inferior titles being given by courtesy to his eldest son. Certain Courtesy Titles (q.v.) belong also to the daughters and younger sons of a peer, but do not extend to their children. British subjects can hold foreign titles of nobility only by consent of the crown. The Scottish barony of Fairfax (1627) was from 1800 confirmed to American citizens, landholders in Virginia. The sixth baron was a friend of Washington, the tenth (1829–69) speaker of the California House of Representatives, the twelfth a Scottish representative peer (1917). The Canadian barons of Longueuil obtained recognition in Britain in 1880 (see LE MOYNE).

In France a limited body of the higher nobility, styled the peers, were in the enjoyment of privileges not possessed by the rest. The title of Duke was subject to strict rule, but many titles of Marquis and Count, believed to be pure assumptions, were recognised by the courtesy of society. The head of a noble family often assumed at his own hand the title of marquis; and if an estate was purchased which had belonged to a titled family the purchaser was in the habit of transferring to himself the honours possessed by his predecessor—a practice to which Louis XV. put a stop. Immediately before the Revolution 80,000 families claimed nobility, many of them of obscure station, and less than 3000 of ancient lineage. Nobles and clergy together possessed two-thirds of the land. Practically, the estimation in which a member of the French nobility was held depended not so much on the degree of his title as on its antiquity, and the distinction of those who had borne it. The higher titles of nobility were not borne by all members of a family; each son assumed a title from one of the family estates—a custom productive of no small confusion. Unlike 'roturier' lands, which divided among all the children equally, noble fiefs went to the eldest son. The Revolution overthrew all distinction of ranks. On 18th June 1790 the National Assembly decreed that hereditary nobility was an institution incompatible with a free state, and that titles, arms, and liveries should be abolished. Two years later the records of the nobility were burned. A new

nobility was created by the Emperor Napoleon I. in 1808, with titles descending to the eldest son. The old nobility was again revived at the Restoration. All marquises and viscounts are of pre-revolution titles, none having been created in later times.

Commercial pursuits have more or less in different countries been considered incompatible with nobility. In England this was less the case than in France and Germany, where for long a gentleman could not engage in any trade without losing his rank. A sort of commercial 'Bürger-Adel,' or half-gentleman class, was constituted out of the patrician families of some of the great German cities, particularly Augsburg, Nürnberg, and Frankfurt, on whom the emperors bestowed coats-of-arms. In semi-feudal Italy there was on the whole less antagonism between nobility and trade than north of the Alps. The aristocracy of Venice had its origin in commerce; and, though untitled, they were among the most distinguished class of nobles in Europe. On the other hand, in Florence, in the 14th century, under a constitution purely mercantile, nobility became a disqualification from holding any office of the state. In order to the enjoyment of civil right, the nobleman had to be struck off the rolls of nobility; and an unpopular plebeian was sometimes ennobled in order to disfranchise him. A little later there grew up, side by side with the old nobility, a race of plebeian nobles—as the Medici—whose pretensions were originally derived from wealth, and who eventually came to be regarded as aristocrats by the democratic party.

The nobility of Spain boasts of a special antiquity and purity of blood, a descent from warriors and conquerors alone. 'Hidalgo' (q.v.) is a term which implies gentility or nobility; the hidalgo alone has in strictness a right to the title 'Don,' which has latterly been used by persons who have no proper claim to it about as extensively as 'Esquire' in England. The higher nobility are styled *Grandees* (q.v.); the class of nobility below them are called 'Titulados.' Red blood is said to flow in the veins of the hidalgo, blue in that of the grandee. The preservation of noble blood, untainted by plebeian intermixture, has often been reckoned a matter of much moment. In Spain most of all this purity of lineage has been jealously guarded. In the German empire no succession was allowed to feus holding immediately of the emperor, unless both parents belonged to the higher nobility. In France the offspring of a gentleman by a plebeian mother was noble in a question of inheritance or exemption from tribute, but could not be received into any order of chivalry. Letters of nobility were sometimes granted to reinstate persons in this position. In Norway titular hereditary nobility was abolished in 1821; in Sweden it still survives. It was in Germany important for many purposes to possess eight or sixteen quarterings—i.e. to be able to show purity of blood for four or five generations, the father and mother, the two grandmothers, the four great-grandmothers, and also, in case of the sixteen quarterings, the eight great-great-grandmothers, having all been entitled to coat-armour. Among the higher grades of the peerage in England many do not possess this complete nobility. By the German constitution of 1919 titles of nobility count only as parts of a name. Austria and Czechoslovakia abolished nobility in 1919 and 1918.

See especially *The Complete Peerage*, by G. E. Cokayne (new ed., revised and enlarged by the Hon. Vicary Gibbs, 12 vols. 1910 *et seq.*); the works of May, Hallam, Stubbs, Herbert Spencer, and Round; Sir H. Nicolas's *Historical Peerage* (1825; new ed. by Courthope, 1856); Freeman's *Comparative Politics* (1873); also the *Peerages of Debrett* (since 1802), *Burke* (since 1826), and *J. Foster* (since

1880); and Balfour Paul, *Scots Peerage* (1904 *et seq.*, founding on Douglas 1764 and Wood 1813).

Noble, a gold coin first minted by Edward III., and so called from its being of noble metal: on the one side was a ship, in allusion to Edward's victory at Sluys. The original value was half a mark, or 6s. 8d. A later issue (Edward IV.) bore a rose on the same side as the ship. These were called *rose-nobles* and *ryals*. Silver having depreciated, the value of the noble rose to 10s. (much greater purchasing value than now), and a new coin of the old value was issued, called the *Angel* (q.v.).

Nocera Inferiore, an episcopal city of South Italy, 8 miles NW. of Salerno; pop. (commune) 24,000. *Nocera Superiore*, a village near by, has 8000 inhabitants.

Noctiluca (lit., 'night-light'), a very abundant, luminescent, marine Infusorian, in the group of Cystoflagellates. In shape like a miniature melon, $\frac{1}{8}$ in. or more in diameter, it has a strong locomotor flagellum as long as the rest of the animal, and a small food-wafting flagellum in the mouth-groove. There is a firm cuticle, and the living matter is much vacuolated. One may become two (fission) or two may become one (conjugation), the latter process being followed by spore-formation. The luminosity is excited by any form of irritation, and is the commonest marine 'phosphorescence.' See INFUSORIA, PHOSPHORESCENCE.

Nocturn. See BREVIARY.

Nocturne ('night-piece'), a dreamy musical piece, generally for the piano, especially associated with the names of Field (q.v.), its inventor, and Chopin. See MUSIC.

Nodal Lines. See HARMONICS, SOUND.

Noddy (*Anous*), a genus of birds of the family Laridae, differing from terns in having the bill slightly angular, thus exhibiting an approach to



Noddy (*Anous stolidus*).

gulls, and the tail not forked, but somewhat wedge-shaped. Altogether seven species are enumerated, widely distributed throughout the tropics and in the temperate zones. One species (*A. stolidus*) has been recorded as found off Wexford and in Dublin Bay, but no specimens other than the two obtained there have been taken in the British Isles or on the Continent. It is a familiar bird in the Atlantic and Pacific Oceans, not unfrequently alighting on vessels and suffering itself to be taken by the hand; and so at its breeding-places also, where, not accustomed to the visits of man, it scarcely gets out of the way, and the female sits undisturbed on the nest. Hence it commonly shares with the booby the reputation of unusual stupidity. It is about 15 or 16 inches long, from the tip of the bill to the end of the tail, the general colour being a brownish black. The food consists chiefly

of small fish and molluscs. Particular islands seem to be specially selected as the breeding-places of noddies, among them being the Bahamas, many of the Keys of the West Indies, the Laccadives, St Helena, Ascension, and many islands of Polynesia and Australia. Their nests, which are built on shelves of rocks or patches of sand or on trees, are sometimes very closely placed together. Each nest generally contains only one egg, which is about two inches long and of a buff colour, sparsely speckled with reddish brown. The eggs are very good to eat, and in some places are collected in large numbers. The other species of noddy are distinguished by their smaller size and slightly different colour.

Nodes, in Astronomy, are the two points in which the orbit of a planet intersects the plane of the ecliptic, the one through which the planet passes from the south to the north side of the ecliptic being called the *ascending node* (Ω), and the other the *descending node* (ϖ). As all the bodies of the solar system, whether planets or comets, move in orbits variously inclined to the ecliptic, the orbit of each possesses two nodes, and a straight line drawn joining these two points is called the *line of nodes* of each body. It is scarcely necessary to add that as the earth moves in the plane of the ecliptic she has no nodes. The places of the nodes are not fixed points on the plane of the ecliptic, but are in a constant state of fluctuation, sometimes *advancing* (eastward), and at other times *receding* (moving westward). This motion is produced by the mutual attractions of the planets, which tend to draw each of them out of the plane of its orbit; and it depends upon the relative positions of the planets with respect to another planet whether that planet's nodes shall advance or recede. On the whole, however, the majority of possible 'relative positions,' or *configurations*, as they are called, is in favour of a retrograde motion; and we find by observation that in an average of many revolutions round the sun a constant retrogradation of the node takes place. The determination of this retrogradation in the case of the planets is a most complicated problem, as the separate action of each on the others has to be taken into account. The revolutions of the planetary nodes are accomplished very slowly, never amounting to as much as a single degree in a century. The nodes of the lunar orbit retrograde with much greater speed under the disturbing influence of the sun. It is owing to the fact that they complete a revolution in nearly eighteen Julian years and eleven days that series of eclipses regularly recur in that period. See ECLIPSES, ORBIT, PERTURBATIONS; and Herschel's *Outlines of Astronomy*.

Nodes, in Botany. See STEM.

Nodier, CHARLES, a considerable French writer, was born at Besançon, 29th April 1780 (Sainte-Beuve), in 1781 (Weiss), or even 1783 (Quérard), the son of a revolutionist lawyer. He lived a shiftless life at Paris, Besançon, Dôle, Laibach, and last again at Paris, where he was appointed in 1823 to the librarianship of the Bibliothèque de l' Arsenal. As a child an ardent Jacobin, he became a royalist at the Restoration, was elected to the Academy in 1833, and died 27th January 1844. He was a devoted student of entomology, philology, and bibliography, but his importance in literature depends mainly upon the influence his personality exerted on the group of Romanticists of 1830. Of his delightfully fresh and fantastic short stories may here be named *Smarrar*, *Histoire du Roi de Bohême et de ses sept Châteaux*, *La Fée aux Miettes*, *Inès de las Sierras*, *La Légende de Sœur Béatrix*, *Franciscus Columna*, and his volume of Fairy-tales.

His *Souvenirs de Jeunesse* (1832) must not be taken too seriously; the *Œuvres Complètes* (12 vols. 1832-34) are far from complete. There are Lives by Wey (1844) and Mme. Ménessier-Nodier (1867). See also Mérimée's *éloge*, Sainte Beuve's *Portraits Littéraires*, and *Main Currents of 19th Century Literature*, by Brandes.

Noé. See CHAM.

Noetians. See PATRIPASSIANS.

Nogent-le-Rotrou, a town in the French department of Eure-et-Loir, 93 miles SW. of Paris, with the ruined château of the great Sully. The Germans here won two fights in 1870-71. Pop. 7400.

Nogi, COUNT MARASUKE, a Samurai, born in 1849, served in the Satsuma Rebellion, held high command in the war with China in 1894, and in the Russian war, 1904-5, commanded the third army, took Port Arthur, and at the battle of Mukden turned the Russian right. His two sons fell in the war. On the funeral of the Emperor Mutsuhito (14th September 1912) Count Nogi and his wife solemnly committed suicide. See books by Kinya Tamaru (1913) and Stanley Washburn (1913).

Noisseville, a village of Lorraine, 5 miles E. of Metz, where, on 31st August—1st September 1870, Bazaine unsuccessfully attacked the German besiegers of Metz.

Nola, an episcopal city of Italy, 16 miles ENE. of Naples. It is built on the site of one of the oldest cities of Campania, founded by the Ausonians, and taken by the Romans in the Samnite war, 313 B.C. Augustus died here, 14 A.D. Pop. 16,000.

Noli me tangere. See LUPUS, TUBERCLE.

Nollekens, JOSEPH, was born in London, 11th August 1737, the son of a painter from Antwerp. Being placed in the studio of Scheemakers the sculptor, he made such progress that the Society of Arts repeatedly awarded him valuable prizes. In 1760 he settled in Rome. Garrick, whom he met there in the Vatican, immediately recognised his countryman as the young sculptor to whom the prizes had been awarded by the Society of Arts, sat to him for his bust, and paid him handsomely for it. He also executed in Rome a bust of Sterne in terra cotta, which added greatly to his reputation. After residing ten years in Rome he returned to London, where he set up his studio; and the reputation he had acquired in Rome was such that he immediately had full employment, and within a year after (in 1771) was elected an Associate of the Academy, and a Royal Academician the following year. His forte was in modelling busts; and through them he has handed down the likenesses of most of the important personages who figured in Great Britain in the end of the 18th and at the commencement of the 19th century—of Samuel Johnson, who was his friend and frequent visitor, of Fox, Pitt, and other political characters. George III. also sat to him. Besides busts, Nollekens executed numerous commissions for public monuments and statues. He also executed a number of classical and mythological statues and groups. He died in London, 23d April 1823, leaving no children to inherit a fortune of £200,000. See Life by J. T. Smith (1828; new ed. 1920).

Nolle Prosequi, a term used in English law to denote that the plaintiff does not intend to go further with the action.

No Man's Land, originally a name applied to outlying districts in various regions, especially at one time to what now corresponds mainly to Griqualand East (q.v.), and also to a territory of 80,000 sq. m. in South Australia. More recently the term has come to mean the strip of land lying between the entrenchments of opposing armies during war.

Nom de Plume, somewhat doubtful French for *nom de guerre* or Pseudonym (q.v.).

Nominalism, a famous controverted doctrine of the middle ages, respecting the nature of our general or abstract ideas, or of 'universals.' It was contended by some that abstractions—as a circle in the abstract, beauty, right—had a real existence apart from round things, beautiful objects, right actions. This was called Realism. Those who held the opposite view were called Nominalists, because they maintained that there is nothing general but *names*; the name 'circle' is applied to everything that is round, and is a general name; but no independent fact or property exists corresponding to the name. Specifically the controversy was as to the existence of 'universals' or of genera and species, and arose out of a passage in the Latin translation of Porphyry's *Isagoge*. The watchwords of three schools were *universalia ante res*, 'the universals before the concrete things,' of Platonic Realism; *universalia in re*, 'the universals in the thing,' held to be Aristotelian Realism; *universalia post rem*, 'the universals after the thing,' covering both Nominalism (that the universals were but *flatus vocis*, sounds) and Conceptualism (that the universals had an existence in the mind of the thinker).

Scholastic Realism of what was regarded as the Aristotelian type prevailed until the 11th century, when Roscelin defended a distinctly Nominalistic doctrine. Unhappily he applied his philosophy to the doctrine of the Trinity, and arrived at a tritheistic heresy, which (and Nominalism with it) was condemned by the church. Henceforward Nominalism carried with it, not unreasonably altogether, a savour of heresy and rationalism, and Realism was dominant, though the controversy raged throughout the 12th century. Abelard was a modified Realist; Albertus Magnus, Aquinas, and Duns Scotus were Realists of a kind, though in the 13th and 14th centuries the feud between Nominalists and Realists was no longer the central debate of scholasticism. Nominalism triumphed with William of Ockham (died 1347), with whom scholasticism may be held to have begun to dissolve. See SCHOLASTICISM, and works quoted there; the articles on the chief mediæval thinkers; the article PHILOSOPHY; and monographs by Exner (1841), Köhler (1858), and Löwe (1876).

Non-combatants. See COMBATANTS.

Non-commissioned Officers, in the British army (*sous-officiers* in the French, and *unter-offiziere* in the German), form a most valuable and important class, intermediate between the commissioned officers and the men. It is essential that some persons in authority should live amongst the men, superintend their Mess (q.v.), teach them their drill and duties, take charge of small parties on duty and in the field, and, generally, overlook them in every way. None are so well fitted to do so as those who are selected from amongst the men themselves, after several years' service as private soldiers, for promotion to non-commissioned rank. They must be well qualified by good conduct, tact, temper, education, and knowledge of military duties—in the two last mentioned they must pass examinations—and the efficiency of the corps will largely depend upon the way in which they do their duty. Besides extra pay, they enjoy special privileges, and many obtain commissions as officers. All quartermasters and riding-masters are selected from amongst them, and it is becoming more and more common to promote picked men to commissioned rank in all branches of the service. They can only be reduced to the ranks, or to a lower grade, by sentence of a court-martial, and cannot be subjected to any minor

punishment except a reprimand. The following are included in the term 'non-commissioned officer': master-gunners, 3d class (who have charge of the armament and magazines in a fort), staff-clerks, all Sergeants (q.v.), Corporals (q.v.), and Bombardiers (q.v.). Sergeants have a separate Mess (q.v.), and in most barracks there is a corporals' room. The proportion of non-commissioned officers to other soldiers in a battalion at war strength is 91 to 959; in a regiment of cavalry, 83 to 551; and in a battery of artillery, 21 to 149. Warrant officers rank above non-commissioned officers, from whom they are nearly all selected. For the Navy, see PETTY OFFICERS, WARRANT OFFICERS.

Nonconformists, a name sometimes given generally to all sectaries who, at any period in English history since the establishment of Protestantism, have refused to conform to the doctrine and practices of the Episcopal Church. It is used in a restricted sense to denote the clergy who in 1662—two years after the Restoration—left the Church of England rather than submit to the conditions of the Act of Uniformity. In 1727 the Presbyterians, Independents, and Baptists received some special legal recognition, and came to be known as the Three Denominations. See ENGLAND (CHURCH OF), PRESBYTERIANS, INDEPENDENTS, &c.

Non-effective (Fr. *non-activité*) is the term used to describe the status of officers of the British army or navy who are on retired or half-pay. Non-commissioned officers and men who are discharged, die, or desert are also said to become 'non-effective.'

Nones. See CALENDARS.

Nonius Marcellus, a Latin grammarian, of whose life nothing is known. Probably a Numidian, born in Thubursicum, as his surname *Tuburticensis* suggests, he seems to have lived about the end of the 3d or the beginning of the 4th century. His name is attached to a treatise in eighteen chapters, without arrangement or critical sagacity, but precious as preserving many words in forgotten senses, and passages from books of ancient Latin authors now lost. See edition by J. H. Onions.

Nonjurors, the name given to that portion of the clergy in both England and Scotland who, having taken the oath of allegiance to James II., refused at the Revolution to take it to William and Mary. An act of parliament required them all to take this oath by 1st August 1689, six months' grace being allowed before deprivation; but it was refused by Archbishop Sancroft of Canterbury, by Bishops Ken of Bath and Wells, Turner of Ely, Frampton of Gloucester, Lloyd of Norwich, White of Peterborough, Thomas of Worcester, Lake of Chichester, and Cartwright of Chester (the three last died during the year), and by about 400 of the English clergy. In Scotland, where all the bishops refused the oath, Episcopacy was abolished in 1689, and more than 300 clergymen were thrust out; and not till the death of Prince Charles Edward in 1788 did the Protestant bishops in Scotland, 'upon mature deliberation with their clergy, unanimously agree to comply with and submit to the government of King George III.,' nor until four years later did the bill for their relief receive the royal assent. South of the Tweed the schism was perpetuated by the consecration in 1694 of Hickeys (q.v.) and Wagstaffe as suffragan bishops of Thetford and Ipswich, in 1713 of Jeremy Collier (q.v.) and two others, as also by the introduction in 1718 of the 'usages' (a new communion office, prayer for the dead, mixed chalice, &c.). Thereby, however, for some thirteen years the Nonjurors themselves were split into two bodies, both ordaining bishops, till the

dispute was terminated by the general adoption of the 'usages.' A fresh breach occurred through the consecration in 1733 of Roger Lawrence by a single Scotch bishop; and this branch supplied some adherents to the rebellion of the '45, in which none of the regular body were involved. For, High Churchmen as were all the Nonjurors, and believers in the doctrine of passive obedience, it is a great mistake to imagine that they were all Jacobites, or, at anyrate, active Jacobites; while, on the other hand, there were many active Jacobites who were not Nonjurors (for instance, Atterbury). Robert Gordon, the last of the regular Nonjuring bishops, died in 1779; Booth, the last of the irregular Nonjuring bishops, in 1805; and James Yeowell, probably the very last Nonjuror, long the sub-editor of *Notes and Queries*, in 1875. Nonjurors, not mentioned already, were Thomas Baker, Carte, Hearne, William Law (q.v.), Charles Leslie, and Robert Nelson (q.v.).

See JACOBITES, and works there cited; Lathbury's *History of the Nonjurors* (1845); Canon Overton's *The Non-jurors* (1902); H. Broxap's *The Later Non-jurors* (1924).

Non Nobis Domine. See GRACE.

Non Possumus (Lat., 'we cannot'), a papal formula taken from Acts, iv. 20 (Vulgate), and said to have been used by Pope Clement VII. in reply to Henry VIII.'s demand for the dissolution of his marriage with Catharine of Aragon; used in general expression for the refusal of the Roman curia to yield to the demands of the temporal power.

Non-residence. See PLURALISM.

Non-suit is a legal term in England, which means that, where a plaintiff in a jury trial finds he will lose his case owing to some defect or accident, he is allowed to be non-suited, instead of allowing a verdict and judgment to go for the defendant. But there is now, in general, no difference between the effect of a non-suit and that of a verdict for the defendant.

Non-user. See DESUETUDE.

Nootka Sound, a harbour on the west coast of Vancouver Island, British Columbia. Its entrance is protected by Nootka Island.

Norbertines. See PREMONSTRATENSIS.

Nord, the most northerly department in France (whence its name), corresponding with the former province of French Flanders, and bordering on Belgium and the Strait of Dover. Area, 2228 sq. m.; pop. (1881) 1,603,259; (1911) 1,961,780; (1921) 1,787,918. It is watered by the Scheldt and the Sambre, with their affluents, and has many canals. For density of population it ranks third among the departments of France, Seine and Rhône preceding it; Lille has over 200,000 inhabitants, Roubaix 113,000, and several towns have over 30,000. The people are largely Flemish and Walloon, though the Flemish tongue is rarely heard now except in the regions of Dunkirk and Hazebrouck. The soil is fertile, the fisheries are productive, the mineral wealth very great, especially in coal; and for manufactures Nord is one of the foremost of French departments. It possessed five first-class fortresses prior to 1914, and has been the scene of many great campaigns and battles.

Nordau, MAX SIMON, son of a Jewish rabbi, Gabriel Südfeld, was born at Budapest, 29th July 1849, studied medicine there, and made a series of travels in France, Spain, and Italy, in England, Scandinavia, and Russia, establishing himself as physician at Budapest (1878), and then at Paris (1886). He wrote several works on his travels, but became known by his work proving that current ethical, religious, and political principles were but *Conventional Lies of Society* (1883); *Paradoxes*

(1886), and *Degeneration* (1893; Eng. trans. 1895), maintaining that most that is conspicuous in contemporary art, literature, and the characters of the great men of the time, is but a proof of physical and psychical degeneration. His novels (*Gefühlskomödie*, *Drohenschlacht*, &c.) have been more successful than his dramas and poems. He died 22d January 1923.

Nordenfelt. See MACHINE GUN.

Nordenskiöld, BARON NILS ADOLF ERIK, Arctic navigator, son of the superintendent of Finnish mines, was born at Helsingfors in Finland, on 18th November 1832, and studied at home and in Berlin. In 1857 he naturalised himself in Sweden, and in the following year was appointed head of the mineralogical department of the Royal Museum at Stockholm. During the next twenty years he frequently visited Spitsbergen; in 1864 he completed the measurement of an arc of the meridian there, and mapped the south of the island. After two preliminary trips to the mouth of the Yenisei, by which he proved the navigability of the Kara Sea, he successfully accomplished (June 1878—September 1879), in the celebrated *Vega*, the navigation of the North-east Passage, from the Atlantic to the Pacific along the north coast of Asia. On his return he was made a baron of Sweden (1880), and during the next five years published the results of the journey in *Voyage of the Vega round Asia and Europe* (Eng. trans. 2 vols. 1881), *Scientific Results of the Vega Expedition* (1883), and *Studies and Investigations* (1885). To Greenland he made two expeditions. Members of his party on the second occasion (1883) reached a point 140 miles distant from the east coast, but without finding the ice-free interior Baron Nordenskiöld believed to exist. Three years later he published a book on the icy interior of Greenland. He died 12th August 1901. His *Facsimile Atlas* (1889) and *Periplus* (1897) are contributions to historical geography. See Leslie's *Arctic Voyages of Nordenskiöld* (1879).

Norderney, a small treeless island, lying 3 miles off the coast of the Prussian district of East Friesland. Area, 4 sq. m. It enjoys a great reputation for sea-bathing, and in summer may have 20,000 or 30,000 visitors.

Nordhausen, a flourishing town of Prussian Saxony, pleasantly situated at the southern base of the Harz Mountains, and the west end of the fertile *Goldene Aue* ('golden plain'), on the Zorge, 48 miles by rail NNW. of Erfurt. St Blasius, one of its seven churches, contains two paintings by Cranach; and there are also a quaint town-hall, many extensive distilleries of corn-brandy or 'Nordhäuser Schnapps,' and manufactures of tobacco, sugar, leather, chemicals, &c. Dating from 874, and in 1253 created a free imperial city, Nordhausen embraced the Reformation in 1522, and in 1803 and 1815 fell to Prussia. Pop. 33,000.

Nördlingen, a town in the west of Bavaria, is situated on the river Eger, 44 miles NW. of Augsburg by rail. It has a Gothic church (restored 1880), with a high tower and fine organ, and manufactures carpets. It was an important trading centre in the Middle Ages. Here took place, 6th September 1634, the great battle in which the Swedes were defeated by the Imperialists with a loss of 12,000 killed and wounded. Pop. 8500.

Nore is a sandbank in the estuary of the Thames, 3 miles NE. of Sheerness and 47 from London. Off its east end is the floating light, which revolves 50 feet above high-water. The name is commonly applied to the portion of the estuary in the vicinity of the Nore light and sandbank. It was here that the outbreak of the fleet,

known as the 'mutiny at the Nore,' broke out on 20th May and lasted until 13th June 1797. The ringleader, Richard Parker, who had styled himself President of the 'Floating Republic,' was hanged on the 30th from the yardarm of his ship; and a few other men soon afterwards executed or flogged through the fleet. *The King's Own*, by Marryat, gives a sketch of the mutiny.

Norfolk, an important county on the east coast of England, oval in shape, and in size yielding only to Yorkshire, Lincolnshire, and Devonshire, is bounded N. and NE. by the North Sea, SE. and S. by Suffolk, and W. by Cambridgeshire, Lincolnshire, and the Wash. With an extreme length and breadth of 67 miles by 42, it has an area of 2055 sq. m. or 1,315,064 acres. Population of the administrative county with the county boroughs of Norwich and Yarmouth (1901) 476,553; (1911) 499,116; (1921) 504,293. Its coast-line, over 90 miles long, is mostly flat, and skirted by low dunes, except near Cromer, and again at Hunstanton, where cliffs, from time to time undermined by the sea, rise to a height of from 100 to 200 feet. Inland the surface is undulating, well timbered, and well watered, the principal rivers (by which, and by the London and North Eastern Railway and Midland and Great Northern Joint Railway, communication throughout the county is kept up) being the Ouse, which flows northward to the Wash, and the Bure, Yare, and Waveney, which flow into the sea near Yarmouth, and in their course link together the numerous Broads (q.v.) situate in the north-eastern district. The soil consists chiefly of light loams and sands—in places there are extensive rabbit-warrens, and with so varied a surface there is naturally an abundance of wild birds. The climate, though in the spring-time cold owing to the prevalence of east winds, is on the whole dry (average rainfall, 26 inches) and healthy. Apart from lime, chalk, and excellent brick-earth, no minerals of any importance are worked, but agriculture in all its different branches is here brought to the highest state of perfection: all the usual crops, especially turnips, swedes, and mangold, are extensively cultivated; upwards of 3400 acres are occupied as market-gardens and orchards; whilst great attention is paid to the rearing of turkeys and geese for the London markets, and on the rich marsh-lands in the extreme west of the county, as well as on the pastures bordering the various rivers, great quantities of cattle are grazed. The principal manufactures are noticed under NORWICH, and of other industries the most important is the herring-fishery connected with Yarmouth and other ports. Norfolk comprises 33 hundreds; the city and county borough of Norwich; Great Yarmouth (county borough); the municipal boroughs of King's Lynn and Thetford; 10 urban districts and 20 rural districts; and 700 civil parishes. It is mostly in the diocese of Norwich. Its parliamentary divisions are five in number, each returning one member. Towns other than the foregoing are Dereham, Diss, Downham Market, North Walsham, Swaffham, and Wymondham. In the history of the county the most notable incidents have been the settlements within its borders of the Flemish refugees and Walloons in the reigns of Henry I., Edward III., and Queen Elizabeth; and Kett's rebellion (1549). Many interesting traces of the handiwork of its former occupants are still extant in the ruins of priories at Castle Acre, Thetford, and Walsingham, in the castles of Norwich, Castle Rising (where Queen Isabella was confined a prisoner), and Caistor, in earthworks at Buckenham, Caistor, and Thetford, and in the old halls of Blickling (the home of the Boleyns), Holkham, Houghton, Oxburgh, and East Barsham. Among Norfolk

'worthies' (omitting those noticed under Norwich) are to be found the names of Gonville (founder of the college at Cambridge which bears his name), Sir John Fastolf, the Earl of Surrey, Sir Thomas Gresham, Skelton and Shadwell, Sir Edward Coke, his descendant the Earl of Leicester, Spelman (the antiquary), Sir Roger L'Estrange, Sir Cloudesley Shovel, Sir Robert Walpole and his son Horace, Thomas Paine, Windham, William Godwin, Lord Nelson, Porson, Manby, Sir Astley Cooper, Fowell Buxton, Captain Marryat, Cattermole, George Borrow, Bulwer Lytton, Dr Jessopp, and Sir H. Rider Haggard. For the Dukes of Norfolk, see HOWARD.

See the histories by Blomefield (11 vols. 1805–10), Rye (1885), White (new ed. 1890), and the 'Victoria History' (1901 *et seq.*); also A. D. Bayne's *Eastern England* (1873), Jessopp's *Arcaedy* (1887), W. Rye's *Norfolk Families* (1911–12), topographical works by W. A. Dutt, natural history works by A. H. Patterson, *Memorials of Old Norfolk*, edited by Astley (1908); F. W. Harmer's *Glacial Geology of Norfolk and Suffolk* (1911); W. G. Clarke's *Norfolk and Suffolk* (1921); J. Clayton's *Robert Kett and the Norfolk Rising* (1912), and books named at BROADS.

Norfolk, a city and port of entry of Virginia, on the right bank of the Elizabeth River, 8 miles from Hampton Roads, and 33 miles from the ocean. The city is irregularly built on low ground, and contains a city hall, mechanics' and masonic halls, custom-house, military academy, and Catholic seminary. Its large deep harbour is defended by Fort Calhoun and Fortress Monroe. A government navy yard, dry-dock, and hospital are at Gosport, a naval suburb of Portsmouth, on the opposite bank of the river. Norfolk ships considerable quantities of cotton, oysters, and early fruits and vegetables; lines of steamers connect it with New York and other cities, and three canals end here. The town was burned by the British in 1776. For the engagement between the *Merrimac* and the *Monitor*, fought off Norfolk, see NAVY. Pop. (1880) 21,966; (1920) 115,777.

Norfolk Island lies in the Western Pacific, about half-way between New Zealand and New Caledonia, 400 miles NNW. of the former. The coasts are high (mean altitude, 400 feet) and steep, and the surface generally uneven, rising in Mount Pitt to 1050 feet. The island is 6 miles long, and has an area of 13½ sq. m. The soil is fertile and well watered, and the climate healthy. The Norfolk Island Pine (*Araucaria excelsa*) grows to a height of 200 feet. Interesting endemic palms are *Howea Belmoreana* ('curly palm'), *H. Forsteriana* ('thatch palm'), and *Kentia Baueri*. Norfolk Island was discovered by Cook in 1774. Between 1788 and 1806, and again between 1826 and 1855, it was a penal settlement for convicts sent from New South Wales. In 1856 many of the inhabitants of Pitcairn Island (q.v.) were transferred thither by the British government. The island has an administrator, and advisory and executive councils under the superintendence of the Australian Commonwealth (until 1914 New South Wales). Whaling and fruit-farming are carried on, while the island is also a transpacific cable-station. Pop. (1921) 717.

Norham Castle, the Border fortress of the Bishops of Durham, on the right bank of the Tweed, 8 miles SW. of Berwick. Founded in 1121, and deemed impregnable in 1522, it has memories of Kings John, Edward I., and James IV., but is known best through *Marmion*. The picturesque ruins comprise a great square keep, 70 feet high.

Noricum, a Roman province, situated between Rætia on the west and Pannonia on the east,

and corresponding to Upper and Lower Austria south of the Danube, Styria, Carinthia, and part of Salzburg. The Roman emperor Drusus subdued the native Celtic Norici or Taurisci in 15 B.C. The name survives in the Noric Alps; see ALPS.

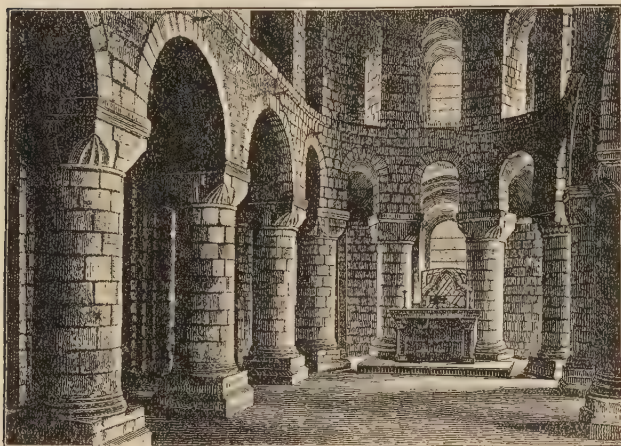
Normal Schools, TRAINING-COLLEGES, or **TRAINING CENTRES**, institutions where teachers are instructed in the principles of their profession and trained in the practice of it. See **EDUCATION**.

Norman Architecture, a style originated and chiefly used by the Normans. Soon after their conquest of the north of France they began to erect churches and cathedrals in memory of their victories; and, not contented with the small churches

they had done in Normandy, preserving, however, many local peculiarities of the Saxon style, which they found in the country. The chapel of St John, on the second floor of the White Tower of London, is the earliest example of pure Norman work in England, that ancient keep having been built by William the Conqueror in 1078. There are, however, many buildings, both in England and Scotland, which date from before the end of the 12th century, when the pointed style began to be used; Durham, Lindisfarne, Canterbury, Dunfermline are partially Norman, besides many other churches and castles. The Anglo-Norman is heavier than the French-Norman, the cylindrical nave piers of the English buildings being much more massive than those of French works. To relieve this heaviness the chevron, spiral, and other groovings were cut in the piers. The mouldings and forms of doors and windows are the same as those of Normandy. But whereas in France the apse at the east end is always semicircular, in England this form was gradually given up, and towards the end of the Norman style the square east end was generally adopted. For the most characteristic type of Norman domestic architecture, see **CASTLE**.

Normanby, a town in the North Riding of Yorkshire, within the parliamentary boundary of Cleveland. —Another Normanby, in the Vale of Pickering, gave the title of marquis in 1694 to John Sheffield (q.v.), Earl of Mulgrave and afterwards Duke of Buckinghamshire, as also in 1838, to Constantine Henry Phipps (1797–1863), previously Earl of Mulgrave, and a distinguished statesman. Its church has an interesting early English chancel arch.

Normandy, formerly a province of France, lying along the seaboard of the English Channel, between Brittany and French Flanders, its eastern boundaries being marked by the little rivers Eu and Epte, and its western by the Couesnon. In area it corresponded approximately to the modern departments of Seine-Inférieure, Eure, Orne, Calvados, and Manche, its capital being Rouen. It is on the whole a fertile region, with well-cultivated fields and many orchards, filled with apple-trees, from the fruit of which cider is made. The people are intelligent and industrious, and rank amongst the best and most energetic of French provincials. When the Romans were masters of Gaul this portion of the country formed part of *Gallia Lugdunensis Secunda*; after the Franks' invasion it made a constituent part of the kingdom of Neustria, and was given by Charles the Bald to the Duke of Paris. From the middle of the 9th century its coasts were harried by the vikings or sea-rovers of the north (see **NORTHMEN**); shortly after the 10th century began they established themselves in such force along the Seine that Charles, king of the Western Kingdom, was glad to make a definite agreement with their leader Rolf (Rollo, Rou) at Clair-sur-Epte in 912. Rolf, Duke of the Northmen, became the vassal of the king, but wrested his lands from the Duke of Paris, and consequently had him for an enemy all his life. Rolf at the same time became nominally a Christian, taking at his baptism the name of Robert. His successor was his son William Longsword, who declared himself King Charles's vassal in 927. His father had conquered



St John's Chapel, Tower of London.

then common in France, they desired to erect monuments worthy of their great conquests. They accordingly expanded the dimensions, while to a great extent retaining the style of the buildings they found in the north of France; though they seem also to have borrowed some of their ideas from the Rhine (see **GOthic ARCHITECTURE**).

The leading characteristics of their style were size and massiveness. They adopted the old Latin plan (derived from the Basilica) of central and side aisles; and at the east end they invariably placed a semicircular apse. They seized on the tower as a distinguishing feature, and developed it as their style progressed. The ornaments are simple and of great variety, but the most common and distinctive are the zigzag, billet, chevron, nail-head, &c. The windows and doors are simple, with semicircular arched heads—the former without tracery. The tympanum of the door-arch is occasionally filled with sculpture. The nave-arches are carried sometimes on single pillars, but more frequently, especially as the style advanced, on piers with shafts. The shafts are almost always recessed in nooks (or 'nook shafts'). Owing to the great size of the buildings the architects were unable at first to vault the main aisle, which, accordingly, had usually a wooden roof, the side aisles only being vaulted. The masonry is rude, the joints being large, and the stones generally unhewn. The style prevailed from about the beginning of the 10th century till the death of William the Conqueror, near the end of the 11th century. There are many examples in Normandy, the churches at Caen being well-known buildings of the date of William.

This style of architecture was brought into England by the Normans at the Conquest, 1066. They there extended the scale of the buildings, as

lands to the west of those originally granted to him; William added the Cotentin, or peninsula of Manche, and thus extended the duchy westwards to Brittany and the sea. This he seems to have done partly with the help of new-comers from the north, who settled there. Thus there were striking differences between eastern and western Normandy: the former rapidly adopted Christianity, the French language (*langue d'oïl*), manners, and customs, whilst the newer districts stuck sturdily to their heathen faith and customs and their native Norse tongue. Open war was waged between the rival parties not only during the lifetime of William, but in the reign of his son and successor, Richard the Fearless (943-996), who only overcame the heathen and Scandinavian party with the help of King Louis and the Duke of Paris. Louis then attempted to make himself master of Normandy—Richard being a youth—but was frustrated by Hugh of Paris, who now sided with the Normans. In 987 Hugh became king of the Western Kingdom of France; and the good understanding established between Normandy and France lasted from that time down to the accession of William, the Conqueror of England. Richard the Good, son of Richard the Fearless, began to rule in 996, and, dying in 1026, left his son Richard as his successor. It was during his reign that Nortmannia began to be substituted for Land of the Northmen; hence Normandy and Normans. The second Richard's sister Emma married, first Ethelred of England, and second Cnut (Knut) of Denmark and England; this knit the first close ties between the ruling families of England and Normandy. The third Richard was succeeded after a reign of two years by his brother Robert, who died on his way back from a pilgrimage to Jerusalem in 1035, leaving as the heir to his duchy his natural son William, at that time a boy. During William's minority the duchy was the scene of anarchy and confusion. The western portion made an attempt to assert its independence, an attempt crushed by William with the help of the king of France at Val-ès-Dunes (1047). The next twenty years are written glorious in the annals of Normandy. William ruled with vigour and prudence; he fostered the noble houses, but kept a firm hand on the nobles; encouraged the churches, yet preserved the control of church matters himself; thoroughly established the feudal system; gave countenance and support to learning (Lanfranc, Anselm); and favoured the building of magnificent abbeys. He also waged war with the Count of Anjou, his southern neighbour, for the county of Maine, and conquered it in 1063; and even fought against the king of France, who gave assistance to rebels against William's rule. After the conquest of England (q.v.) Maine revolted and had to be subdued again, William's son Robert rebelled against him in Normandy, and a war broke out with France, in which William (q.v.) lost his life. The incapable Duke Robert mortgaged his duchy to his brother William Rufus, and went crusading to the East. After his return he was defeated and imprisoned by his brother Henry I., who ruled Normandy till his death (1135), notwithstanding the efforts of Robert's son William to dislodge him. After the accession of Stephen in England Matilda's husband, Geoffrey of Anjou, gradually made himself master of Normandy (1139-45), but after reigning five years he resigned it to his son, afterwards Henry II. of England. Richard I. and John were the next dukes. But the duchy was taken away from John by the king of France (1203-4), on the plea that as the murderer of his nephew Arthur he (John) had forfeited his French fiefs. The claim to the title was, however, only formally renounced by Henry III. in 1259. Twice subsequently

Normandy was in English hands; Edward III. conquered it in 1346, and Henry V. in 1417-18; but the English were finally driven out in 1450. The Channel Islands (q.v.) are a remnant of the Norman possessions still belonging to the descendants of the Norman kings of England. For map, see France in provinces. See also ENGLAND, SICILY, NORMAN ARCHITECTURE, NORTHMEN.

CUSTOMARY LAW OF NORMANDY.—The duchy was governed by customary law, which grew up principally out of local usages; at first it was the same as the customary law of England. Even down to the present day the law administered in the royal courts of the Channel Islands is virtually the old customary law of Normandy. One feature survives in the Cry of Haro (q.v.). This ancient customary law of Normandy seems to have been collected in writing on three separate occasions. The earliest collection was apparently written down by private persons in 1200 and about 1220, and had no official character; the third collection (1585) is a revised edition of the second, the *Grand Coutumier*, completed early in the 14th century.

See French histories by Dumoulin (1631), Goube (1815), Depping (1835), Barthélemy (1857); Freeman, *Norman Conquest* (5 vols. 1877); Palgrave, *History of Normandy* (4 vols. 1878); Planché, *The Conqueror and his Companions* (1874); Powicke, *The Loss of Normandy* (1913); C. H. Haskins, *Norman Institutions* (1918).

Normanton, a town in the West Riding of Yorkshire, by rail 3 miles NE. of Wakefield and 10 SE. of Leeds, an important railway junction and seat of coal-mining. Pop. 16,000.

Norns, the *Paræ* of Scandinavian mythology, were three maidens, by name Urd, Verdandi, and Skuld—i.e. Past, Present, and Future. They sit by the well of Urd, under the world-tree Yggdrasil in Asgard, and there determine the fate both of gods and men. Besides these three there are many inferior norns, both good and bad, answering to the genii of classical mythology; to such are attributable the unequal destinies of men in the world. Women who possessed the power of prediction or magic also bore this name.

Norristown, capital of Montgomery county, Pennsylvania, on the left bank of the river Schuylkill (crossed by three bridges to Bridgeport), 17 miles by rail NW. of Philadelphia. It contains a fine marble court-house, a state asylum for the insane, a number of cotton-mills and woollen-factories, rolling-mills and foundries, flour-mills, and manufactories of glass, tacks, &c. Pop. (1880) 13,063; (1910) 27,875; (1920) 32,319.

Norrköping, an important manufacturing town of Sweden, at the head of the Bråvik, 113 miles by rail SW. of Stockholm, is a well-built modern town. Founded in 1384, it has been several times destroyed by fire. The rapid river Motala, which connects Lake Vetter with the Bråvik, and which is spanned by several bridges, gives water-power; there are cloth-mills, cotton spinning and weaving, manufactures of sugar, paper, and tobacco, and shipbuilding. Here Charles IX. and Gustavus IV. were crowned. Pop. 60,000.

Norrland. See SWEDEN.

Norse. See ICELAND, SCANDINAVIA, NORTHMEN, NORWAY, &c.

North, a family famous in the history of England, the most illustrious members of which were three of the sons of Dudley, fourth Baron North of Kirtling in Cambridgeshire, all of whose lives fortunately were written by their youngest brother Roger, who also bequeathed to posterity an interesting and characteristic, but unfinished, autobiography. These have all been collected by Dr Jessopp (3 vols. 1890).—SIR EDWARD NORTH (1496-

1564) was famous as a lawyer, and was created Baron North of Kirtling in Cambridgeshire in 1554. His second son was SIR THOMAS NORTH, of whose life we know but little save that he probably died in 1601. In 1579 appeared the first edition of his memorable translation of Plutarch. This work, a translation from the French of Amyot, remains a noble monument of English, and was beyond doubt one of the fountains from which Shakespeare drew his knowledge of ancient history. There is an admirable edition of the portions relating to Shakespeare by Professor Skeat (1875). Other translations by North were *The Diall of Princes*, from a French version of Guevara (see EUPHUISM), and *The Morall Philosophie of Doni*, from the Italian (1570; new ed. by Joseph Jacobs, 1888).—CHARLES, the eldest son of the fourth Baron North, was created Lord Grey of Rolleston, but on the death *s.p.* of his son, William, sixth Baron North (1734), the barony of Grey ceased, and that of North devolved upon his cousin, Francis, third Baron Guilford. He was created Earl of Guilford in 1752, and his son, the second Earl of Guilford and eighth Lord North, was the famous statesman under George III. The third earl had only three daughters, between whom the barony of North of Kirtling fell into abeyance on his lordship's death in 1802, until in 1841 it vested in Susan, Baroness North (1797-1884), whose son, William-Henry John, succeeded as eleventh Baron North in 1884. The other honours of the third earl devolved upon his brother, Francis, fourth earl; and next on another brother, Frederick, fifth earl; on whose death in 1827 the earldom reverted to his cousin, Francis, sixth earl; who was succeeded by his grandson, Dudley-Francis, seventh earl; and he in his turn, in 1885, by his son, Frederick-George, eighth Earl of Guilford.—FRANCIS NORTH, second son of Dudley, fourth Baron North, was born 22d October 1637. He had his education at Bury and St John's College, Cambridge, studied law at the Middle Temple, and was called to the bar in 1655. He worked hard, was judicious in his drinking, and more than prudent in his marriage, and was knighted and made Solicitor-general in 1671, and Attorney-general in succession to Sir Heneage Finch but two years later. In 1674 he became Lord Chief-justice of the Court of Common Pleas. As far from being the despicable creature of Macaulay's picture as the saint and sage of his brother's eulogium, he knew how to make interest for himself, and quickly became a privy-councillor, and in 1682 Lord-keeper of the Great Seal, and Baron Guilford (September 1683). We know of his love for music, his kindness to his brothers and sisters, his dislike of witchcraft trials, and his distrust of all the many plots of the time. After the king's death he was much vexed by the intrigues and insolence of Sunderland and Jeffreys, but soon after died, 5th September 1685.—SIR DUDLEY NORTH, the third son, was born 16th May 1641, and, like his brothers, educated at Bury. Even at school he was a trader, and at an early age he was bound to a Turkey merchant in London. Ever the industrious apprentice, he yet solaced himself with cock-fighting and swimming. He made a voyage to Archangel, next to Smyrna, where he settled for some years in trade. Afterwards he settled in Constantinople, returning to England some years after with a considerable fortune, which he continued to increase by keeping an interest in the Levant trade. He became one of the sheriffs of London, and was pliant enough in the interest of the crown. He was knighted, married the widow Lady Gunning, and was appointed a Commissioner of Customs, next of the Treasury, then of the Customs again. Under James II. he sat in parliament for Banbury, and after the Revolu-

tion made but a sorry defence of his actions as sheriff. He was a keen-eyed observer of men and manners, had great mechanical genius, a passion for architecture, and quite extraordinary ability as a financier. Indeed, his *Discourses upon Trade* (1691) anticipate in a striking manner some of the ideas of Adam Smith. He died 31st December 1691.—DR JOHN NORTH, the fifth son, was born in London, 4th September 1645, was educated at Bury, and entered Jesus College, Cambridge, in 1661, becoming fellow there in 1666. He was strangely timid, yet a severe student, solacing himself by book-buying and by keeping great spiders in wide glass bottles. He succeeded Barrow as Master of Trinity College in 1677, became clerk of the closet to Charles II., and died, after a long and grievous sickness, in April 1683.—ROGER NORTH, the sixth and youngest brother, was born at Tostock in Suffolk, 3d September 1653, educated at Bury and Jesus College, Cambridge, entered the Middle Temple, and under the influence of his brother the lord-keeper, soon rose to a lucrative practice at the bar. At the Revolution his hopes of advancement were closed, and, casting in his lot with the nonjuring party, he retired to his estate of Rougham in Norfolk, where he indulged the family passion for building, and acted as trustee for his great brother's estate at Wroxton. In 1696 he married, and lived henceforth the life of a country gentleman and virtuoso. He died 1st March 1734. His three hyper-eulogistic biographies, his autobiography, with its amusing prejudices, his *Examen* (1740) of Dr White Kennet's *History of England*, and his *Memoirs of Music* (1846) give him a place in English literature.—FREDERICK NORTH, eighth Lord North and second Earl of Guilford, a famous English minister, was born 13th April 1732, and educated at Eton and Trinity College, Oxford. When only twenty-two he entered the House of Commons, and he was made a Lord of the Treasury in 1759, having inherited the Tory politics of his ancestors. On the death of Charles Townshend in 1767 he was made Chancellor of the Exchequer and leader of the House of Commons, a post for which he was well qualified by his eloquence, good-humour, wit, and readiness of resource, even against such antagonists as Fox and Burke. In 1770 he succeeded the Duke of Grafton as prime-minister. North was largely responsible for the measures that brought about the loss of the American colonies; as a minister he was too ready to surrender his own judgment to that of the narrow-minded and obstinate king. Indeed, North was called by Horace Walpole the *ostensible* minister; the *real* minister was George III. In 1778 he renounced the right of taxing the colonies, already seeing that the war was hopeless, and in 1782 he resigned. With North's retirement came to an end the king's scheme of governing the country by his own will, and ruling the House of Commons by thinly-disguised corruption. North was succeeded by the Marquis of Rockingham, on whose death Lord Shelburne became premier. Fox's dislike of the terms of peace with America led him to enter into a coalition with North, whom he had for so many years inveighed against as a minister without foresight, treacherous, vacillating, and incapable. North and Fox took office under the Duke of Portland in 1783, but the coalition destroyed Fox's popularity, and the Portland administration only lasted a few months. North was afflicted by blindness during the last five years of his life. He succeeded to the earldom of Guilford in 1790, and died 5th August 1792. See his *Life* by R. Lucas (1913).

North Adams, a manufacturing city of Massachusetts, picturesquely situated on the Hoosac River, near the west end of the Hoosac Tunnel, 143 miles by rail W. by N. of Boston. It has a

large number of woollen and cotton mills, shoe and print-cloth factories, a foundry, &c. Pop. 22,000.

Northallerton, the capital of the North Riding of Yorkshire, 30 miles NNW. of York. It has a town-hall (1874); a fine cruciform church, Norman to Perpendicular in style; a cottage hospital (1877); and sites of a Roman camp and a Norman castle of the bishops of Durham. At Standard Hill, 3 miles N., was fought, on 22d August 1138, the great battle of the Standard, in which Archbishop Thurstan routed David I. of Scotland, and which got its name from the banners of SS. Peter, John of Beverley, and Wilfrid, which were displayed in the English host. Pop. 4800.

Northampton, the capital of Northamptonshire, and a county, parliamentary, and municipal borough, is seated on rising ground on the left bank of the river Nen, 66 miles NW. by N. of London and 50 SE. of Birmingham. It has a fine town-hall (1861-64), to which other municipal offices have been added; a county hall, noticeable for its decorated ceiling; two museums, a public library, and schools of science and art (enlarged 1889); several large hospitals; a theatre; infantry barracks; and numerous churches, the most interesting of which are St Peter's (Norman), St Sepulchre's (Norman and Decorated, one of the few remaining round churches in England), All Saints' (rebuilt subsequent to 1675, but with a fine west tower partly Norman), and St Giles' (cruciform). The principal manufacture is that of boots and shoes, the town being the English centre of that industry; a considerable trade is carried on in the dressing of leather, some lace is made, extensive breweries are in operation, and there are iron-foundries and flour-mills. On the outskirts of the town is a fine racecourse, on which meetings are held annually in April and November. Pop. (1801) 7020; (1831) 15,351; of the municipal borough (1921) 90,923, and of the parliamentary borough, which returns one member, 75,000.—Of the many stirring events of which Northampton has been the theatre, the principal are its burning by the Danes (1010); the rebuilding, and erection of its castle (of which few traces now remain) by one Simon de St Liz (c. 1075); its siege by the barons (1215), when garrisoned for King John; the establishment of its university (1260), which was abolished some few years later; the conclusion of a treaty (1318) by which the independence of Scotland was formally recognised; the holding of many parliaments; royal visits by Richard I. (in whose reign a royal mint was established here), John, Henry III. (who here received homage from Alexander II. of Scotland), Edward I., Queen Elizabeth, and Charles I.; a battle (10th July 1460) between Henry VI. and the Yorkists, in which Henry was defeated and made prisoner; a visitation of the plague (1637), which in five months claimed 500 victims; the mustering in 1642 of the parliamentary forces under Essex on the outbreak of the Civil War; and a great fire (1675).

See the *Records of the Borough of Northampton* (2 vols. 1898), and Cox and Sergeantson's history of the church of St Sepulchre (1898).

Northampton, capital of Hampshire county, Massachusetts, stands near the west bank of the Connecticut River (here crossed by a bridge to Hadley), 103 miles by rail W. of Boston and 3 miles NW. of Mount Holyoke. It contains a state lunatic asylum, the Clarke Institute for deaf-mutes, a public library, housed in the handsome Memorial Hall, and Smith College for women. The manufactures are of importance, and include silk, woollen goods, sewing-machines, cutlery, baskets, brushes, jet ornaments, &c. Pop. 22,000.

Northamptonshire, or **NORTHANTS**, a mid-land county of England, 67 miles long, and 25 at its broadest. Area (including the Soke of Peterborough), 998 sq. m., more than half pasture. Pop. (1801) 131,757; (1841) 199,208; (1891) 302,184; (1911) 348,515; (1921) 349,363 (whereof 46,954 were in the Soke of Peterborough). In the north-east near Peterborough the county is flat, and forms part of the Bedford Level (q.v.), but elsewhere the surface is undulating, the highest ground—about 800 feet above the sea-level—being found near Daventry. It is traversed by the London, Midland, and Scottish and the London and North-Eastern railways, and communication by water is maintained by the Nen and the Welland, which are the chief rivers, as also by the Grand Junction, Union, and Oxford canals. The soil, a black, peaty mould in the north-east, and a brown loam on the uplands, is on the whole very productive. Corn and green crops are largely grown, but the area of land devoted to those crops decreases, while more and more land is devoted to stock-raising. On the broad pastures many cattle are grazed, and dairy-farming is carried on, but, although Northants is a great hunting county, the breeding of horses is not much encouraged. The principal minerals are limestone, which is quarried in the north-east, and iron ore of excellent quality, which is found near Kettering, Wellingborough, and Thrapston, and in the neighbourhood of Stamford. Part of the ore is smelted within the county. The manufactures are considerable apart from those noticed under Northampton. The county comprises twenty hundreds, the municipal boroughs of Brackley, Daventry, Higham Ferrers, Northampton, and Peterborough. Northamptonshire is included almost entirely in the diocese of Peterborough. The Soke of Peterborough is a separate administrative county. The parliamentary divisions are four, each returning one member. In history the principal incidents connected with the county, omitting those noticed under Northampton (its capital), have been the battles of Edgecote (1469) and Naseby (1645), the beheading of Mary Queen of Scots at Fotheringhay Castle (1587), and the imprisonment of Charles I. at Holmby House (1647). Of its natives, besides Richard III. and (perhaps) Catharine Parr, the best known are Archbishop Chichele (the founder of All-Souls' College at Oxford), Sir Christopher Hatton (the courtier), Catesby (of Gunpowder Plot renown), Thomas Fuller, James Harrington, Bishop Cumberland, Dryden, Charles Montagu, Earl of Halifax, William Law, Gill and Carey (the eminent Baptists), Doddridge (the Nonconformist), James Hervey, Cartwright ('the father of Reform'), Dr Paley, William Lisle Bowles, Clare (the peasant poet), the Earl of Cardigan (leader of the Balaclava charge), and Dean Mansel.

See histories by Bridges (1791), Baker (1822-41), Dryden (1903), and the 'Victoria History' (1902 & seq.); and topographical work of H. A. Evans, *Highways and Byways in Northamptonshire and Rutland* (1918).—Hampshire (q.v.) is the county of Southampton.

North Berwick, a fashionable watering-place of Haddingtonshire, at the entrance to the Firth of Forth, 23 miles ENE. of Edinburgh and 10 by water SSE. of Elie in Fife. It has a ruined nunnery. Behind it rises conical North Berwick Law (612 feet); and westward and eastward stretch splendid golf-links. Tantallon Castle, 3 miles E., fronting the Bass Rock (q.v.), is a magnificent ruin, finely described in Scott's *Marmion*. A stronghold of the Douglasses, it resisted James V. in 1528, but in 1639 was 'dung down' by the Covenanters. Robert III. made North Berwick a royal burgh, and till 1885 it

returned, with Haddington, &c., one member to parliament. Pop. 4500.

Northbrook. See **BARING**.

North Cape, reckoned the northernmost point in Europe, in $71^{\circ} 10' N.$ lat., is on the island of Magerö. The northernmost point on the continent is Cape Nordkyn ($71^{\circ} 6' N.$ lat.), 6 miles farther south than the North Cape, and some 45 miles to the east of it.

North Carolina, popularly known as 'Old North State' and as 'Turpentine State,' is one of the thirteen original United States of America, on the Atlantic seaboard, south of Virginia, in $33^{\circ} 50' - 36^{\circ} 33' N.$ lat., and $75^{\circ} 27' - 84^{\circ} 39' W.$ long. Length 500, breadth 186 miles; area, 52,426 sq. m. —larger than that of England.

The eastern part of the state is low, and in some parts swampy, the central part undulating, and the western mountainous; but everywhere, except in limited areas in the eastern section, the soil is remarkably fertile and the climate salubrious. The highest mountains in the United States east of the Mississippi are in North Carolina, more than fifty exceeding 6000 feet in altitude—Mitchell's Peak (6711 feet) the highest. Most of these are clothed to their tops with thick forests, but some have prairie-like summits covered with deep turf. All this picturesque region, known as 'the Land of the Sky,' is a favourite resort in summer for southerners and in winter for northerners.

North Carolina is rich in minerals. Some gold is still mined. A branch U.S. mint was established at Charlotte in 1838, and has since 1873 been continued as an assay office. Silver occurs associated with lead in Clay and Davidson counties, and zinc in the latter county. Iron is widely disseminated in the form of specular ores, hematites, and magnetites; copper and plumbago also are found in many counties. Coal of excellent quality has been profitably mined in the vicinity of Deep River, and is abundant, too, near the Dan River. In the west there are valuable deposits of corundum and extensive beds of mica, in the production of which North Carolina ranks first among the states; and more than 150 species of gems, &c. are found in the state, including the rich 'hiddenite' or lithiopyroxene, which is not known to occur elsewhere. Granite and marble abound in some localities, and there are valuable phosphate beds in the eastern section.

Cotton is by far the most valuable crop. Tobacco, maize, hay, and sweet potatoes are the next most valuable products of the soil. One of the chief industries in eastern North Carolina has long been the production of tar, rosin, and spirits of turpentine from the forests of long-leaved pine (*Pinus palustris*) and allied species. The manufacturing industries until 1880 were limited, but since that date North Carolina has assumed a premier position among the states for the number of its cotton-mills; tobacco-factories have been enlarged, and in 1888 the first silk-factory in the southern states was established. Furniture-making is important, while the state ranks tenth as regards output of lumber. Fisheries constitute a profitable industry along the coast.

North Carolina contains 100 counties, and returns ten representatives to congress. It has about 5500 miles of railway. The chief port and largest city is Wilmington, the capital Raleigh. Parts of the state are deficient in good schools, but there are excellent graded schools in the principal towns. Besides several denominational colleges, there is a state university (1795) at Chapel Hill, and a state agricultural college was established at Raleigh in 1889. There are asylums for the insane at Goldsboro, Raleigh, and Morganton—the first for negroes only; and provision is also made by the state for the blind and deaf-mutes, both white and black.

History.—In 1584 Raleigh's first expedition landed on Roanoke Island, and found the natives kindly disposed. In 1585, 1586, and 1587 Raleigh planted colonies on the island, but the first returned with Drake in 1586, and the others were destroyed. In 1629 Charles I., on the strength of Cabot's discovery, granted to Sir Robert Heath the territory, also claimed by Spain and called by them Florida, from lat. 30° to 36° as *Carolana Florida*. By the English it was called both Carolana and Carolina. In 1653 a colony from Virginia settled on the banks of the Roanoke and Chowan rivers: this was the first permanent settlement in North Carolina. In 1663 Charles II. granted the region across the continent between lat. 31° and 36° to eight of his favourites, under the name of Carolina. In June 1665 the king extended the limits of Carolina to 29° on the S. and to $36^{\circ} 30' N.$ The proprietors, 'to avoid erecting a numerous democracy' in Carolina, adopted a utopian form of 'fundamental constitutions,' prepared by John Locke and Shaftesbury, which recognised a nobility of landgraves and cassiques. The eldest proprietor was palatine, and the other seven had high-sounding titles. The people opposed this scheme, and in 1729 the king bought out the claims of the proprietors for £2500 each, and North Carolina became a royal province. Under the administration of the second royal governor, Gabriel Johnston (1734-53), the colony increased in population from 14,000 to 45,000, and became very prosperous. The arbitrary rule of Governor Dobbs (1754-66) and Governor Tryon (1766-73) served to intensify the dislike of the people to the taxation policy of parliament; and when the colonial assembly at Wilmington protested against taxation without representation it was dissolved by Governor Tryon. The Mecklenburg Convention met at Charlotte and adopted a declaration of independence on 20th May 1775. The early years of the war (1775-83) were marked by bitter local and partisan conflicts between Whigs and Tories. In the years 1779-81 North Carolina furnished about one-tenth of the American army, the war being transferred to the south. It ratified the federal constitution, 21st November 1789. It was the last of the eleven Confederate States to pass in convention an ordinance of secession, 21st May 1861, which was not submitted to the people. The capture of Fort Fisher in January 1865 led to the federal occupation of Wilmington, the advance of the union forces on Raleigh, and the surrender of General Johnston, which practically ended the war of secession. Presidents Jackson, Polk, and Johnson were natives. Pop. (1800) 478,103; (1840) 753,419; (1880) 1,399,750; (1900) 1,893,810; (1920) 2,559,123. See histories by Hawks (1857), Lawson (1860), Moore (1880), and Raper's *North Carolina, a Study in Colonial Government* (1904).

Northcliffe, ALFRED CHARLES WILLIAM HARMSWORTH, 1st VISCOUNT, son of a barrister, was born near Dublin in 1865. His parents coming to England, he was educated at Stamford Grammar School and Henley House School, West Hampstead. He turned early to journalism and was with a firm of publishers at Coventry till 1889, when he established a similar business of his own in London. *Answers* (1888) proved a success, to be followed in 1896 by the *Daily Mail*. Created Baron Northcliffe in 1905, he continued to add to the structure of the Amalgamated Press, obtaining possession of the *Times* in 1908. During the Great War his influence was powerful not only in the press but also in private political circles. The title of viscount was bestowed on him in 1917, and, after a world tour in 1921, he died in August 1922. See Max Pemberton, *Lord Northcliffe*, and article **NEWSPAPERS**.

Northcote, JAMES, R.A. (1746–1831), son of a Plymouth watchmaker, painted many historical paintings, was eminent as a portrait-painter, wrote the *Memoirs of Sir Joshua Reynolds* (whose assistant he was), a *Life of Titian*, and two illustrated books of fables. See Hazlitt's *Conversations* with him (new ed. by Gosse, 1894), his with James Ward (ed. Fletcher, 1901), and Gwynn's *Memorials of an Eighteenth-century Painter* (1898).

Northcote, SIR STAFFORD. See IDDESLEIGH.

North Dakota, one of the northernmost of the United States, ranking sixteenth in area and thirty-sixth in population. It is an elevated land of plains and prairies, bounded on the north by the Canadian provinces of Manitoba and Saskatchewan, by Minnesota in the east, Montana in the west, and South Dakota in the south. In the neighbourhood of the Red River, which forms the state's eastern frontier, there is a narrow but extremely fertile plain. Thereafter the land rises, steeply in the north, to the higher and more westerly region of prairies, also a prolific agricultural district. From the glacial and alluvial deposit found here, it has been surmised that during the Silurian age a shallow sea or saline lake must have passed over it, while evidence seems to indicate its partial submergence at the end of the glacial period. The enclosed and saline Devil's Lake is the only remaining lake worthy of note. The more lofty plains of the Coteau du Missouri occupy the western half of the state, and through them, in a roughly south-easterly direction, the Missouri makes its way, attended by numerous tributaries. The mountains are not conspicuous, consisting chiefly of the Pembina Mountains in the north-east, the Turtle Mountains in the north, and the high ground of the south-west, where are the celebrated Bad Lands, the soft soil of which is fancifully moulded by the wind and the heat of the burning lignite coal which abounds here. In the western portion of the state vegetation suffers from the rigours of the climate, which is more extreme than in any other state, although healthy and pleasant enough for human habitation. State efforts have been exerted to promote afforestation, there being a lack of timber.

North Dakota is essentially an agricultural state; the rural population exceeds the urban more than sixfold. In 1923 nearly 60,000,000 bushels of wheat were produced, flax-seed, maize, oats, and barley also figuring very prominently. Fruit-growing gives promise as an occupation, and stock-raising and dairy-farming are rapidly becoming very important. The Bad Lands, although of little value for crops, afford good grazing. The rainfall is low but generally sufficient; irrigation is practised, especially at Williston, where 80,000 acres come under a U.S. Government irrigation scheme. Manufactures other than those directly connected with agriculture (flour and grist milling, butter-making, &c.) are not important. Lignite coal is mined to a considerable extent, especially near Bismarck, and used for local purposes, while clay for making bricks and pottery is found in the south-west. Railway enterprise has contributed largely to the settlement of the country; the total mileage is over 5300. Both the Missouri and the Red River are navigable to light craft.

The supremacy of the agricultural interest in North Dakota has had some interesting results from a social and economic point of view, especially as regards the introduction of state-owned elevators, flour-mills, and the institution of a state bank. The devices of initiative and referendum were made applicable to all legislation in 1914. Educationally the state is well-equipped, having a state university at Grand Forks, numerous normal and

several agricultural schools, and Indian schools at Wahpeton and Bismarck. There are reform schools at Bismarck and Mandon and asylums at Jamestown and Grafton.

History.—Traders of the Hudson Bay and North-West Fur Companies had outposts in this region before the end of the 18th century, and Lord Selkirk instituted a settlement at Pembina by mistake in 1812. But not until the 'sixties, when the Dakotas became a territory of the United States, did they assume anything like their present form. The boundaries continued to be modified by the formation of adjacent states, and in 1889 it was decided to separate the northern and southern portions of Dakota. These two states were admitted into the Union shortly afterwards. The earlier seat of government was Yankton, but in 1883 it was transferred to Bismarck, the present capital. Population of North Dakota (1890) 190,983; (1910) 577,056; (1920) 646,872. The chief towns are Fargo (21,961); Grand Forks (14,010); Minot (10,476); and Bismarck (7122). Area of state, 70,837 sq. miles.

Northern Territory, a territory of the Commonwealth of Australia (till 1911 of South Australia) between Queensland and Western Australia, north of 26° S. lat. The country is hot and dry, a sandy tableland in the south, pastoral in the north. Agriculture and mining are practicable, but little developed. There is fine scenery. The north coast has good harbours and a number of islands (Melville, Bathurst, Groote Eylandt, &c.). From Darwin, the capital, a railway runs to Pine Creek, to be connected some day with Oodnadatta and Adelaide. Area, 523,620 sq. m.; pop. (1921) 3867, besides some 7000 aborigines.

Northmen, or NORSEMEN, were the sea-rovers who came from the north—Denmark, Norway, Sweden. Bolder navigators than even the Phœnicians of old, they sailed east, west, south, and even north into the Arctic Ocean, to fight for fame, to gain wealth, to plunder, and to slay. We nowadays should call them pirates; they called themselves vikings (a word perhaps of Anglo-Frisian origin, which may mean 'camp-men'), and believed that these expeditions were the noblest and most honourable work they could put their hands to. They held too that the best title, in the legal sense, to property was given by winning it with the sword. This gained them the highest respect and influence, and was the surest guarantee of political power. There were likewise powerful economic and political causes co-operating with these to send forth, from the middle of the 8th century to the 13th, and even later, these thronging swarms of Northmen. The natural resources of the lands they dwelt in were very inadequate in proportion to population. The system of land tenure, based on the indivisibility and absolute ownership of the family estate, frequently imposed galling restraints upon the younger sons, especially the more restless and high-spirited among them. Hence they spent the summer in quest of fame and booty in distant lands; but generally came home again in the autumn, to pass the winter in the enjoyment of the good things they had earned. Still stronger impulses were given to these expeditions when the more powerful chiefs (kings) at home began to subdue their weaker rivals, and the separate kingdoms (Norway, Denmark, Sweden) began to take definite shape, under such strong rulers as Harold Fairhair (Haarfager) and Cnut. Many of the free odal proprietors, rather than become the feudal vassals of the conquerors, preferred to abandon their homes, and go and conquer new lands for themselves elsewhere. These strong rulers, moreover, sternly put down the

intestine conflicts in which the Northmen delighted; consequently to get their fill of fighting they were obliged to go abroad.

A favourite plan of the weaker viking chiefs was to lie in wait up some small creek or river-mouth, or behind the shelter of some island, and thence suddenly dart out upon a passing vessel. The larger fleets boldly invaded a district, plundered the inhabitants, slew them if they offered resistance, or carried them off as slaves if they did not, harried the open country, rifled the churches and monasteries—which always yielded the greatest stores of gold and silver—and not infrequently burned them to the ground, as they did the strong cities they took and sacked. Being heathens, worshippers of Thor and Odin, they had no qualms of conscience as to sacrilege, and stood in no awe of the threatenings of the church. One viking fleet would even challenge another to fight it for fighting's sake only. The vessels they sailed in were comparatively small and light of draught, so that they were able to penetrate a long way up the rivers, sometimes into the heart of a country; and as the Northmen were resistless in arms and unrelenting in their wrath, their mere appearance was often sufficient to paralyse an entire district with panic terror. In many churches a special petition, 'From the fury of the Northmen, O Lord, deliver us,' was recited in the litany. But these sea-rovers were also keen traders: on many occasions they first requested permission to land and trade peacefully with the inhabitants, and only when their trading was done did they begin to plunder. There were several recognised trading-places along the shores of the Baltic, and some on the North Sea, which were visited not only by legitimate merchants from England, Flanders, Italy, the East, but also by vikings who had slaves, and gold and silver, and other less valuable booty to dispose of.

The viking age is divisible into two periods: during the first adventure and plunder were the chief incitements—this lasted until the middle of the 9th century; the second was the period of permanent conquests, in Ireland, France, England, South Italy. The sea-rovers made their first recorded attack upon England in 787, in Wessex, and first began to raid along the shores of Frisia, Flanders, and France towards the end of the century. These bands came from Denmark, but may nevertheless have been Norwegians. During the first half of the next century the depredations of the Northmen were more terrible than ever, especially in Frisia and Flanders, during the periods 834–837 and 845–850. They had also gone farther south: in 820 a band reached Aquitaine; fifteen years later another band plundered the French island of Noirmoutier; in 843–844 a fleet sailed up the Loire and Gironde, visited Galicia (Spain), and steered up the Guadalquivir and fought the Moors. From about the middle of the century bodies of Northmen established themselves in permanent camps at the mouths of the French rivers, and repeatedly ascended them on their errands of plunder and slaughter. Three times they took Paris and stripped it of its wealth (845, 857, 861); but the most famous siege took place in 885–886. In 859 and 860 an exceptionally adventurous fleet entered the Mediterranean, ravaged the coasts of Spain and Mauretania, and Majorca, spent the winter at the mouth of the Rhone, and in the following summer ruthlessly attacked the coast towns of Italy, especially Luna (near Carrara), thinking it was Rome. Yet Flanders and the north of France suffered most during the thirty-six years from 876 to 912. During all this period a large army, or even armies, dominated the coast districts from the Rhine to Brittany, quartering themselves in

entrenched camps, and not only routing time after time the armies of the weak kings of Austrasia and Neustria, and their still weaker vassals, but even making disastrous raids far into the interior—to Coblenz, Soissons, Sens—and extorting from kings, dukes, counts, and towns large sums in gold and silver as the price of abstaining from hostilities. The chiefs of these formidable bands were Björn Ironside, Hasting, Siegfred, Godfred, and Rollo or Rolf. Detachments of the main body crossed over more than once to England, where, however, Alfred was a match for them. Rollo (Rou) is probably the same as Rolf the Ganger; if so, he was the son of a chief of the west coast of Norway, and was outlawed by Harold Fairhair shortly after 872. In 912 Charles the Simple of France, seeing that it was hopeless for him to drive away his dangerous and pertinacious foemen, thought it best to disarm them against himself, and at the same time arm them against new-comers, by allowing them to settle in his kingdom, a plan adopted by other rulers before. Accordingly at Clair-sur-Epte he agreed to cede to Rollo the district bounded by the Channel, the Seine, and the Epte, on condition that he would become his man or vassal, and be baptised a Christian. Rollo accepted the terms, and thus acquired the nucleus of the duchy of Normandy (q.v.). There the name Northmen was softened into Normans, a name celebrated in history not only in virtue of the conquest of England by Duke William, but also because of their exploits in Italy and Sicily, and the East. See GUISCARD and SICILY.

The earliest serious attacks upon England were made in 793 and 794, when Lindisfarne and Jarrow monastery were sacked and Northumberland ravaged. It was about the same time that the sea-kings of Norway began to cross the 'Western Sea' and sail as far as the Syderöer or South Islands—i.e. the Hebrides, the Western Isles of Scotland, and Man (q.v.)—and to Ireland, probably utilising the Faeroe (q.v.) and Shetland (q.v.) Islands as resting-stages. They sacked Iona (Hy) in 802 and again in 806, slaying most of the monks. Their visits to Ireland were particularly numerous after 807, and brought great woes upon the unhappy island. A chief named Torgisl, a Norseman, conquered most of north Ireland shortly after 840. In or a little before 852 a fleet of Danes arrived and disputed fiercely with the Norsemen, or, as the Irish called them, the Eastmen; but in the year quoted Olaf the White of Norway founded the Scandinavian (chiefly Danish) kingdom of Dublin, which lasted three centuries or more, whilst two of his followers created the separate kingdoms of Waterford and Limerick (see IRELAND). The Faeroe, Orkney, and Shetland Islands seem to have been frequently visited by Norsemen after 825, and were permanently colonised during the next quarter of a century. Iceland (q.v.) was discovered and colonised by the same people between the middle and end of the century; and from Iceland they ventured still farther west, and made settlements in Greenland (q.v.), and even visited Vinland (q.v.) in North America. The viking raids on England were incessant after 833, but were checked for a time by the great slaughter inflicted by Ethelwulf at Ockley (Surrey) in 851. Fifteen years later they began again, and this time assumed the character of a serious invasion, the invaders being almost exclusively Danes. They made themselves absolute masters of the northern, and more especially the eastern, portions of the island, notwithstanding the heroic efforts of Alfred and his son Edward. The struggle is sketched under England (q.v.).

By the middle of the 8th century the Norwegians

had discovered the sea-route to the White Sea by rounding the North Cape. On several occasions down to 1222 they sailed up the Northern Dwina and plundered the people of Bjarmeland or Permia. The most important event in viking history on the east side of the Baltic happened in 862. The Slav (perhaps rather Germanic Russi) tribes who dwelt south of Lake Ladoga as far as the Southern Dwina invited three Scandinavian chiefs (probably from Sweden), brothers, of whom Rurik became the most influential, to go and rule over them. They established themselves at Holmgaard (Novgorod) and laid the foundations of the kingdom of Gardariki, out of which grew the subsequent Russia (q.v.), that was ruled over by Rurik's descendants down to 1598. About the same time two other Scandinavian chiefs formed the nucleus of another state at Könugaard (Kiev); and, sailing thence down the Dnieper, they threatened Constantinople, which was only saved by a sudden storm scattering the fleet of the Northmen or Värings (Varangians), as they were called by the Slav Russians and the Greeks. Three times during the first half of the 10th century these adventurers appeared before the capital of the Eastern empire, and on two occasions (907 and 945) went away carrying with them heavy sums, paid by the emperors to save the city from assault. Igor, the son of Rurik, who commanded two of these expeditions, even launched his fleet on the waters of the Caspian, and carried the terror of the Northmen's name among the Mohammedan dwellers on its shores. The expeditions of the Värings gradually ceased after Vladimir introduced Christianity into his dominions in 988. Nevertheless for many years these Scandinavian rulers in Russia surrounded themselves with stout and trusty warriors from the north, their position being precisely analogous to that of the Manchou emperors in China. From the end of the 10th century the emperors of Constantinople had, till the fall of the city in 1453, a picked bodyguard of Varangians. The men of the north esteemed it a high honour to have served in this chosen cohort at Myklegård (i.e. 'the Great City'); and doubtless they carried back to their countrymen at home many elements or traits of the civilised refinement of the Byzantine court. After the Norman Conquest of England large numbers of English Northmen made their way to Constantinople and enlisted in the Varangian guard; these were the only men whose battle-axes cost Robert Guiscard and his Normans trouble at the great battle of Dyrrhachium (1082).

See Steenstrup, *Normannerne* (4 vols. 1876-82); G. Storm, *Kritiske Bidrag til Vikingetidens Historie* (1878); Munch, *Det Norske Folks Historie* (7 vols. 1852-63); Keary, *Vikings in Western Christendom, 789-888* (1891); Du Chailu, *Viking Age* (2 vols. 1890); Barlow, *History of Normans in South Europe* (1886); Count Schaack, *Normannen in Sicilien* (2 vols. 1889); Delarc, *Les Normands en Italie* (1883); also the older books Worsaae, *Danes and Norwegians in England, &c.* (1852); Strinnholm, *Wikingssage* (2 vols. 1839-41); Wheaton, *History of Northmen* (1831); Depping, *Histoire des Expéditions des Normands* (2d ed. 1843); Oman, *History of the Art of War* (1898); Mawer, *The Vikings* (1913); Haskins, *Normans in European History* (1916). See also the books quoted under NORMANDY, and the articles IRELAND, NAMES, SHIPBUILDING. For the language, see ICELAND; and see also SCANDINAVIAN MYTHOLOGY.

North Sea. The North Sea, or German Ocean, is a southern extension of the Arctic Ocean (q.v.). It communicates freely with that part of the Arctic Ocean lying between Iceland and Norway which has received the name of the Norwegian Sea. Its northern boundary would be represented by a line drawn from the Shetland Islands to the opposite coast of Norway, and its southern boundary is the

Strait of Dover; on the west it is bounded by the east coast of Great Britain, and on the east by the coasts of Norway, Denmark, Germany, Holland, and Belgium. With the North Atlantic Ocean it has communication through the Strait of Dover and the English Channel on the south, and on the north by the Pentland Firth and the channel between the Orkney and Shetland Islands; with the Arctic Ocean as already stated; and with the Baltic by the Skagerrack and Kattegat. The North Sea is over 600 miles in length and about 400 miles in greatest width, and its area is estimated at over 160,000 sq. m. By far the greater proportion of this area is less than 100 fathoms in depth, the only part where deeper water is found being off the coast of Norway (the Norwegian Gully or Norwegian Deep, as it has been called), where a depth of 360 fathoms has been recorded; the mean depth of the whole area is estimated at 61 fathoms. The sea is very shallow towards the south and east, and the coasts in this direction are low and flat, being in some places below the level of the sea, whereas to the north and west, where the water is deeper, the seacoast is high, and the deep Norwegian Gully is faced by the high and bold cliffs of Norway. The sea-bottom is very irregular, a number of banks running across from the Yorkshire coast towards the Skagerrack, the most important of which is the Dogger Bank (q.v.), and there are also depressions like the Silver Pit; off the low-lying coasts of Holland, Belgium, and Britain there are numerous shoals and sandbanks formed of the materials brought down by the rivers. The North Sea is surrounded by continental land and receives the waters of numerous rivers, the principal of which are the Thames, Ouse, Humber, Tyne, Tweed, Forth, and Tay, the Scheldt, Rhine, Weser, and Elbe. The deposits forming on the bottom consequently belong to the class called 'terrigenous,' consisting in the shallower water of sands and gravels and in the deeper water of muds and clays, containing stones and fragments of rocks and minerals derived from the land, along with calcareous fragments of shells and other organisms.

The salinity of the water of the North Sea varies between 1·025 and 1·027, the lightest water occurring in the southern part and in the Skagerrack, where fresh water comes from the Baltic, and the densest water at the bottom in the deep water off Norway. The mean temperature of the air over the North Sea in summer is about 60° F., and in winter about 36°, the range throughout the year being about 34°—from 31° to 65° F. Except in the summer months, the temperature of the surface water is higher than that of the air, the mean temperature of the surface water in summer being about 58°, and in winter about 42° F. The winds are variable over the North Sea, the most prevalent being from the south-west, and the currents are chiefly dependent on the direction of the wind; fogs, mists, and rain occur at all seasons. The great tidal wave of the Atlantic advancing from the west is divided into two portions on striking the British Islands: the one entering the North Sea round the Orkneys and through the Pentland Firth, the other coming up the English Channel.

The North Sea has been from the earliest times one of the most important highways of the world, and is surrounded by some of the most prosperous commercial nations, famous for their maritime exploits. The fisheries of the North Sea are among the most important in the world, providing employment for thousands of fishermen from the surrounding countries; all the varieties of food-fishes abound, as well as edible molluscs and crustaceans, such as oysters, mussels, lobsters, crabs, and

shrimps. The value of these fisheries depends to a great extent upon the abundance of the fauna and flora living on the sea-floor, all the various groups of invertebrates being met with in great profusion in the North Sea, while the surface waters swarm with algæ, such as diatoms, &c., which sometimes form extensive floating banks.

North Shields. See SHIELDS.

Northumberland, the most northerly county of England, separated from the Lowlands of Scotland by the Tweed and the Cheviots, and from the county of Durham by the Tyne and Derwent. The German Ocean bounds it on the E., and the county of Cumberland, with a part of Roxburghshire, on the W. Among the English counties it ranks fourth in regard to size, having an area of 1,291,515 acres. Its greatest length is 70 miles and its greatest breadth 47 miles. The surface of the county, except near the coast, is picturesquely broken into rounded and conical-shaped hills and high moorland ridges. The main valleys are fertile and well wooded. The principal heights belong to the Cheviot Hills (q.v.), and are seated in the north-west part of the county. These are Cheviot (2676 feet), Hedgehope (2348 feet), Cushtat Law (2020 feet), Bloody Bush Edge (2001 feet), and Windy Gyle (1963 feet). The Simonside Hills near Rothbury attain a height of 1447 feet. The chief rivers are the Tyne (formed by the confluence of two streams, the North and South Tyne, a little above Hexham), the Wansbeck, the Coquet, the Aln, the Breamish, the Till, and the Tweed. In the south-west of the county are some small sheets of water called the Northumbrian Lakes, the largest of which is Greenley Lough. Off the coast lie a few islands—Lindisfarne or Holy Island, the Farne Islands, and Coquet Isle. The geology of the county is simple in its broad features. The beds as a whole slope to the sea, the direction of the general dip lying between south-east and east; hence the oldest rocks—the Silurian—appear in the north-west, near the head of the Rede and Coquet, and the later formations—the Triassic and Permian beds and the coal-measures—near the coast. The strata have been dislocated and broken by volcanic disturbances, during which were intruded the igneous rocks. The Cheviots, which cover an area of 200 sq. m., owe their origin to the earlier of these upheavals. They consist chiefly of andesites and porphyrites. The Whin Sill, a great sheet of basalt stretching across the county from Kylee near Berwick to Greenhead in Cumberland in a series of columnar crags, was injected among the sedimentary rocks during the later eruptions which took place, it is supposed, at the close of the Carboniferous period. A number of basaltic dykes also cross the county. The coal-measures occupy the south-east part of the county, and the lead-measures (belonging to the Upper Limestone series or Yoredale rocks) the south-west.

The climate is cold, especially from March to the middle of June, when the prevailing winds are from the east and north-east. The winters, however, are often much milder than they are in the south. The average rainfall, too, except in the Cheviot district, is considerably less than in the counties of Devon, Dorset, Hampshire, and Sussex. Northumberland ecclesiastically is in the province of York. For the purposes of civil government the county is divided into nine wards (answering to hundreds or wapentakes), three of which formed part of Durham till 1844. It comprises three parliamentary divisions—Wansbeck, Hexham, and Berwick-upon-Tweed, returning three members. The principal towns are Alnwick, Morpeth, Hexham, and North Shields. Newcastle-upon-Tyne (q.v.) is a city and county of itself. A large portion

of the county is agricultural, especially the fertile tracts along the principal valleys and near the coast. Turnips grow well, the cultivation of them on raised ridges being peculiar to the county, and known as the Northumbrian system. The western portion of the county is pastoral, the slopes of the Cheviots affording sustenance to large flocks of hardy sheep. In Chillingham Park there is preserved a herd of so-called wild cattle. The trade of the county in coal is very great and the chief manufactures are connected with its mining and transit. There is also a large output of iron ore, barium, lead, and fire-clay. The collieries are chiefly in the south-eastern part of the county. In shipbuilding the Tyne is surpassed only by the Clyde. The salmon-fisheries of the Tyne and Tweed have long been famous. The county is traversed by the London and North-Eastern railway. Pop. (1801) 168,078; (1841) 266,020; (1891) 506,030; (1921) 746,138.

Northumberland in the time of the Romans was inhabited by a branch of the Celtic people, the tribe of the Ottadini. In the 6th century it was conquered and colonised by the Angles. It then formed part of the kingdom of Bernicia. Being a border county, it suffered much during the Scottish wars, and from the 11th to the 17th century was frequently the scene of much bloodshed. The battles of Otterburn, Homildon Hill, and Flodden were fought on its soil. Northumberland is very rich in memorials of the past. No county, indeed, has a more interesting collection of military antiquities, from the rude circular camps and entrenchments of the old inhabitants to the great castles and peel-towers of mediæval times. The Romans have left a mighty monument of their power in the great barrier erected across the southern portion of the county, and in the stations and roads connected with it. Other antiquities, also noticed separately, are at Bamburgh, Dunstanburgh, Hexham, Alnwick, Holy Island, Norham, &c. Northumberland is the birthplace of Bishop Ridley, Thomas Bewick, Akenside, Lord Eldon, George and Robert Stephenson, Grace Darling, the second Earl Grey, Birkett Foster, and Lord Armstrong.

Works treating on the history, antiquities, geology, &c. of the county are: the *Histories of Wallis* (1769), *Hutchinson* (1778), *Mackenzie* (1825), and *Hodgson* (1820-40); *Hodgson* *Hinde's General History of Northumberland*, an addition to Hodgson's great work (1858); *Bateson and others, History of Northumberland* (12 vols. 1893 et seq.); *Mawer, Placenames of Northumberland and Durham* (1920); *Hartshorne, Feudal and Military Antiquities of Northumberland* (1858); *Gibson, Northumbrian Castles, Churches, and Antiquities* (1848-54); the *Proceedings of the Newcastle Antiquaries*, and the *Surtees Soc.*

Northumbria, the most northern of the ancient English kingdoms, stretching from the Humber northwards to the Firth of Forth, and separated westwards from Cumbria and Strathclyde by the Pennine range and the Ettrick Forest. Bernicia, the district north of the Tees, had for its first king Ida (547-559), who built Bamburgh as his capital. His grandson, Ethelfrith, mounted the throne in 593, and having married the daughter of Ella, who in 560 had formed the kingdom of Deira out of the district between the Tees and the Humber, set aside the rights of his boy brother-in-law Edwin, and so united both Bernicia and Deira into one kingdom. But the ousted Edwin, returning to defeat and slay the usurper in 617, thereupon himself became king of the Northumbrians as well as Bretwalda. Under him Northumbria was Christianised. In 633 he fell in battle against Penda of Mercia and the Welsh Cadwallon, but a year later St Oswald, son of Ethelfrith, cleared the country of the invaders, and united both divisions

under his rule. His brother and successor, Oswy, was forced to yield Deira to Oswin, son of Osric, his cousin, but in 654, by a great victory in which Penda perished, was able anew to unite his kingdom, and reigned till 670 the most powerful of all Northumbrian kings. Under later kings—Egfrid (670–685), Aldfrid (685–705), a great patron of learning, and as many as fourteen obscure successors, most of whom came to a violent end—Northumbrian influence gave way before the rise of Mercia, internal tumults, and Danish ravages, until 806, when the chroniclers cease to give a regular succession of kings, and 827, when Northumbria became tributary to Egbert. See the *Histories of Green, Skene, Freeman, and Hodgkin*.

North-west Frontier Province, a new province of India to the north-west of the Punjab, constituted in 1901 under a chief commissioner, and comprising the districts of Hazara, Peshawar, Kohat, and parts of Bannu and Dera Ismail Khan, heretofore in the Punjab. Attached are five political agencies—viz. the Khyber, Kurram, Tochi, and Wana agencies removed from the Punjab and the Malakand agency. The deputy commissioners of the five districts are also responsible for the political relations of certain trans-border tribes. Area districts, 13,418 sq. m.; agencies and tribal areas, 25,500 sq. m.; population (1921), districts 2,251,000; agencies, &c., 2,825,000.

See Wyllie, *From the Black Mountain to Waziristan*.

North-west Passage, a route for ships from the Atlantic to the Pacific by the north of America. The *North-east Passage* is that by the north of Asia. See *POLAR EXPLORATION, ARCTIC OCEAN, FRANKLIN (SIR JOHN)*.

North-west Territories of Canada. The area originally known as the North-west Territories has been altered by the separation therefrom of the provinces of Saskatchewan and Alberta, parts of Manitoba, Ontario, and Quebec, and the addition of territories and islands previously known by other names. In 1905 acts were passed by the parliament of Canada establishing the provinces of Saskatchewan and Alberta, and declaring that 'the North-west Territories shall hereafter comprise the territories formerly known as Rupert's Land and North-western Territory, except such portions thereof as form the provinces of Manitoba, Saskatchewan, and Alberta, the district of Keewatin and the Yukon Territory, together with all British territories and possessions in North America, and all islands adjacent to any such territories or possessions except the colony of Newfoundland and its dependencies.' In the same year Keewatin was brought under the provisions of the North-west Territories Act. The extent of the North-west Territories after the expansion in 1912 of Manitoba, Ontario, and Quebec was reduced practically to the district 'between Hudson Bay and the Yukon, and is estimated at 1,242,000 sq. m. The Territories are divided into three provisional districts, Franklin, Keewatin, and Mackenzie, and are administered by a commissioner and a council of four appointed members, who are invested with authority to make ordinances and appointments within specific limitations, under instructions from time to time given by the governor in council or the Minister of the Interior.

The resources of the Territories are game, great numbers of musk-ox, fish, timber, water-power, minerals, the oilfields covering large areas; explorers, prospectors, and representatives of capitalists are giving much attention to various sections, and it is not unlikely that within the next generation the new North-west of Canada will supply the world with surprises quite equal to the

wheat production of the old North-west. The native population of the North-west Territories is composed of Indians and Eskimo—all of whom have given unmistakable evidence of a desire to meet the white man in the most friendly spirit, and adapt themselves to the laws and methods of civilisation. Pop. 8000.

Northwich, a market-town of Cheshire, on the river Weaver and the old Watling Street, 18 miles NE. of Chester. Known to the Romans as *Salinæ*, it has long been the centre of the salt-industry, both rock and white salt being largely exported. The town possesses brine-baths having considerable curative properties. The parish church of St Helen has a finely carved 16th-century roof, while there is also a well-equipped library and museum. The town was the scene of much heavy fighting during the Civil War. Pop. 18,000.

Norton, ANDREWS, born at Hingham, Massachusetts, 31st December 1786, graduated at Harvard and became professor there of biblical criticism and interpretation. One of the most distinguished exponents of Unitarianism, he also keenly opposed Theodore Parker and the naturalistic theology. His chief writings are *Reasons for not believing the Doctrines of Trinitarians* (1833), and two works on *The Genuineness of the Gospels*. He died at Newport, Rhode Island, 18th September 1853, leaving also a translation of the gospels, which was edited (1855) by Dr Ezra Abbot and his son, CHARLES ELIOT NORTON, who was born at Cambridge, Massachusetts, 16th November 1827, and graduated at Harvard in 1846. He travelled in India and Europe, was joint editor with Lowell of the *North American Review*, wrote on Italy, and edited Carlyle's letters and Ruskin's letters to himself (1904). He died on the 21st October 1908.

Norton, THE HON. MRS. Caroline Sheridan, poet and novelist, was born in 1808, the second of the three beautiful granddaughters of Richard Brinsley Sheridan. One of her sisters became Lady Dufferin, the other Duchess of Somerset; and she herself in 1827 married the Hon. George Chapple Norton (1800–75). She bore him three sons, of whom Thomas Brinsley (1831–77), the second, succeeded to the title of fourth Lord Grantley; but the marriage proved a most unhappy one, and her friendship with Lord Melbourne (q.v.), whom she first met in 1831, led her husband to institute five years afterwards a groundless and unsuccessful action of divorce, the damages laid at £10,000. Already she had made by her pen £1400 in one year, and after the separation from her husband she continued her literary activity. Her poems include *The Sorrows of Rosalie* (1829), *The Undying One* (the Wandering Jew, 1830), *The Child of the Islands* (1845), and *The Lady of La Garaye* (1862); her novels, *Stuart of Dunleath* (1847), *Lost and Saved* (1863), and *Old Sir Douglas* (1868). In March 1877 she married Sir William Stirling-Maxwell (see MAXWELL, SIR W. STIRLING-), but died on the 15th June following. An exploded story about her supplied the subject for George Meredith's *Diana of the Crossways*. See *Life by Miss Perkins* (1909).

Norwalk, (1) a city of Connecticut, at the mouth of a river of the same name, on Long Island Sound, 41 miles by rail NE. of New York. It has a good harbour, extensive oyster-fisheries, large manufactories of straw-hats, felt-hats, and cloth, woollens, shirts, shoes, tires, locks, and door-knobs, besides foundries and ironworks. Several of these establishments are in South Norwalk, which was formerly a separate city. Pop. of Norwalk 28,000.—(2) Capital of Huron county, Ohio, 55 miles by rail WSW. of Cleveland. It is a pleasant little town, with streets shaded with

maples; manufactures organs, shoes, ploughs, sewing-machines, tobacco. It has steel and iron-works, and ships small fruits. Pop. 7400.

Norway (Norweg. *Norge*), the western division of the Scandinavian peninsula, extends (without reckoning Spitsbergen) from lat. 57° 59' N. (Lindesnæs) in the south-west to 71° 11' in the north-east, overlapping Sweden and Finland on the N. and screening them from the Arctic Ocean. Although 1160 miles in length (coast-line 3000 miles), it varies in width from 20 to 100 miles north of 63° N. lat.; below that line it swells out to a club-shaped mass 260 miles in width. It is separated from Sweden by the Kjölen (i.e. Keel) Mountains (3000 to 6000 feet), the backbone of the peninsula, which run parallel to the Norwegian coast from the plateau of Finmark in the north to 63° in the south, and then bifurcate. The main range proceeds southwards, still marking the boundary between the sister kingdoms, though it decreases greatly in height. The other division continues parallel to the coast, in a south-westerly and then southerly direction, to the extremity of the country. But the mountains in this division no longer form a narrow ridge or 'keel'; they widen out into a broad plateau, undulating between 2000 and 4000 feet and embossed with mountain-knots—Dovre, Jotun, Lang, Fille, Hardanger Fjelde (*fells*)—the separate peaks of which shoot up to 6000 feet and higher (e.g. Galdhöppigen, 8399 feet; Glittertind, 8379; Snehetten, 7566; Lodalskaupen, 6790 feet). The leveller portions of this plateau region consist of dreary moors, covered in winter with snow and in summer with coarse grass and heather, and studded with numerous tarns and belts of forest (conifers, birches, willows). The grass affords pasturage to the sheep and cattle of the dalesmen; the *sætre* or huts of the herd-girls and the wood-cutters are the only habitations in these mountain solitudes. But the bear, lynx, wild reindeer, and lemming make their home there; owls, kestrels, and buzzards prey on the smaller animals and birds; snipe, teal, and loom frequent the lakes; and vast numbers of lapwing and plover breed in the tarns. Moreover, in winter the ptarmigan is plentiful on the snows. Besides these creatures, the fox, eagle, sparrow-hawk, raven, crow, and woodcock are common, not only here, but throughout the kingdom. Numerous wild berries—cloudberry, raspberries, bilberries, cranberries, &c.—ripen on these loftier regions in summer.

Norway presents a bold front to the Atlantic. The west side of the peninsular rampart—the 'Westland,' which is nowhere more than 70 miles wide—sinks down abruptly to the ocean, in some cases by steep terraces, in others sheer to the water's edge. On the inner or eastern side—the 'Eastland'—the slope is more gradual; the general versant faces south-east. The greater part of the country lies between the same degrees of latitude as Greenland, and would in all probability be covered with a similar ice-cap to Greenland—as indeed it was in the end of the Tertiary period—were its shores, on west and north, not washed by the Gulf Stream. It is mainly owing to this warm oceanic artery that Norway is habitable; its influence, together with the direction of the parallel mountain rampart, the distribution of the atmospheric pressure, and the presence of deep-sea banks off the coast, determines the predominant climatological features of the country. The isotherms do not run from west to east, but parallel to the coast. Hammerfest, for instance, on the north coast, in 70° 40' N. lat., has a winter mean of 22·6° F., 3° higher than Oslo, which has virtually an inland site, in 59° 55' N. lat. In winter the west coast districts are the warmest, and the cold increases in intensity

according to the distance inland; whereas in summer the reverse is the case, though altitude is then a more potent influencing factor than in winter. The places that have the lowest winter mean (11·8°) are all inland, as Elverum and Røros (Røraas), near the Swedish frontier, Kautokeino (in southern Finmark), and Nyborg (at the head of Varanger Fjord); at all these places the mercury has been known to freeze (−40° F.). The places which have the highest summer temperature are Oslo, the south-west extremity of the country, the heads of the western fjords, and the interior of Finmark. The prevalent south-west winds bring considerable rainfall, 40 to 70 inches in the year, to the west coast of southern Norway. In the interior only 12 to 16 inches fall during the year.

The population has much more than doubled since 1820, when it stood at 977,500. In 1885 there were only nine towns with populations exceeding 10,000; in 1920 there were eighteen—Oslo (Kristiania), the capital (258,483), Bergen (91,443), Trondhjem (55,030), Stavanger, Drammen, Hauge-sund, Ålesund, Kristiansand, Skien, Fredrikstad, Kristiansund, Tønsberg, Larvik, Fredrikshald, Sarpsborg, Horten, Arendal, and Tromsø—all seaport towns. The density of the population over the entire surface is 21·2 per square mile, much the lowest of any country in Europe except Iceland; but then fully 70 per cent. of the total area is wholly uncultivable, being barren mountain and waste (2 per cent. under glaciers); in addition about a fifth is forest. In 1891 the population was 1,999,176; in 1920 2,649,775. Details as to area and population are given below.

COUNTIES (<i>Fylker</i>).	Area, English sq. m.	Census Population, 1st Dec. 1920.
Oslo (town).....	6·3	258,483
Akershus.....	2,068·9	179,962
Østfold.....	1,614·1	160,128
Hedmark.....	10,635·7	149,619
Opland.....	9,751·9	129,149
Buskerud.....	5,717·7	187,249
Vestfold.....	901·8	124,060
Telemark.....	5,863·8	125,245
Aust-Agder.....	3,608·2	74,700
Vest-Agder.....	2,804·7	82,807
Rogaland.....	3,526·9	166,423
Hordaland.....	5,991·5	156,218
Bergen (town).....	13·5	91,443
Sogn og Fjordane.....	7,132·3	90,114
Møre.....	5,811·5	159,391
Sør-Trøndelag.....	7,211·6	166,787
Nord-Trøndelag.....	8,652·9	89,221
Nordland.....	14,700·3	173,826
Troms.....	10,420·8	90,750
Finmark.....	18,539·9	44,190
Total.....	124,964·3	2,649,775

To these must be added Svalbard (Spitsbergen and Bear Island), now an integral part of Norway: area, 25,000 sq. m.; pop. about 1500 in summer, 1000 in winter. Jan Mayen (150 sq. m.; uninhabited) has been annexed. For map, see SWEDEN.

The vast majority of the Norwegians are of Nordic race, Scandinavian in tongue. There were besides in 1920 (apart from foreigners) 7309 Finns (called Kvæns by the Norwegians), 19,329 settled and 2814 nomad Lapps (called Finns).

Finmark, which is inhabited in great part by Lapps, is a monotonous undulating plateau (1000 to 2000 feet). The coast is deeply indented with large fjords (Varanger, Tana, Laxe, Porsanger, Alten), and east of the North Cape (q.v.) is low, bare, and bleak, though the banks of Pasvig, the frontier river with Finnish Lapland, are green with patches of fir, pines, and birches. Vegetables, barley, and peas ripen on the shores of the fjords, thanks to the Gulf Stream and the eight weeks' uninterrupted sunlight that prevails in summer. At that

season too gnats are a terrible plague to man and beast. The cliffs and islands swarm with wild-fowl, and the sea-waters with fish. The wolf and glutton are common, the former being a dangerous enemy to the Lapps' reindeer herds. West of 22° E. long. the coast breaks rocky, wild, and precipitous, its outline being irregular in the extreme; and these characteristics it preserves right down to below 59° N. lat., to the point nearest Scotland (280 miles distant). From this point up to the North Cape the entire coast is protected from the Atlantic waves by a belt of rocky islands, called the Skjærgaard or 'Skerry Fence,' between which and the coast there are connected navigable roads, sheltered and safe at nearly all seasons. The outermost islands of this belt are the Lofoten and Vesteraalen chains; in both groups the mountains (2000 to 3000 feet) rise in extremely fantastic pinnacles and turrets, with razor-backed saddles and gabled roofs. But wherever, on these and all the other islands of the Skjærgaard, there are level patches and ledges of soil touched by the modifying climatic influences grass grows abundantly. The climate of the Lofoten is indeed so mild that rye and barley easily ripen, and large flocks of sheep are left out all winter, whilst many thousands of fishermen congregate here in the winter to prosecute the herring and cod fisheries. All the islands of the Skjærgaard are frequented by enormous quantities of sea-birds, chiefly of the duck and gull varieties; they are 'fowled' for the sake of their down (from the eider duck), feathers, flesh, and oil. On some of the islands the red deer still lingers. On the mainland the mountains in the north have the same bare, angular outlines as in the Lofoten, but support in many parts large forests of fir and pine; in southern Norway they have rounded, dome-shaped summits, and are, next the sea, only sparsely covered with fir (no pine) and other trees. The peninsular rampart is crowned with several gigantic glaciers—e.g. the shores (6000 feet) of Lyngen Fjord in the north are lined with them; from Jökul Fjeld, on an arm of Kvenang Fjord, large masses of ice drop off the glaciers into the sea and float away as icebergs; just north of 67° N. lat. is the enormous snowfield of Sulitjelma (6168 feet), and just south of the same parallel Svartisen (3600 feet), the second largest glacier in Norway, measuring 44 miles by 12 to 25, and sending down glacier curtains to within a few hundred feet of the sea; south Norway possesses the second largest glacier in Europe (Vatnajökull in Iceland being the largest), the roof-shaped Justedal (4600 to 5400 feet), which has an area of 580 sq. m. (87 miles long by 6 to 22 miles wide), and reaches down its icy polypous arms to within 150 feet of the sea; to the south of it lies the snowfield of Folgefond, 40 miles long and 7 to 15 wide (108 sq. m.), and 3000 to 5000 feet in altitude. Throughout Norway the limit of perpetual snow ranges from 2300 feet on Justedal to 5150 on the Dovre Fjeld.

The lofty west coast region is everywhere cleft by gigantic fissures, very narrow and winding, into which the sea-water flows—the fjords. In some cases they are of great depth, much deeper than the sea outside (200 fathoms): Sogne Fjord, for instance, is 2820 feet deeper; Hardanger Fjord, 930 feet; and Vest and Nord Fjords, 840 feet. Some of them penetrate great distances inland and send off numerous branching arms. Sogne Fjord cuts its way to the foot of the Jotun Fjeld, 106 miles from the ocean, and Hardanger Fjord, which encircles the Folgefond, is 68 miles long. Nord and Sogne Fjords clasp the Justedal between them. These three fjords offer some of the grandest and most accessible scenery in Norway. Their landward continuations either rise rapidly to the plateau region

above or form narrow valleys at a slightly higher elevation, and in that case generally contain a deep lake separated from the fjord by a moraine or barrier of glacial deposits. The finest of these valleys is Romsdal, where the rounded, pure gneiss mountains tower up to 6000 feet with almost perpendicular walls. The steep sides and extremities (2000 to 4000 feet) of these fjords and valleys are braided with waterfalls, varying in character from trickling ribbons and veils of white foam to full-volumed streams like Skjæggedal (530 feet), Vöring (475 feet), and Vetti (900 feet). The inner reaches of the fjords have as a rule warm summers and mild winters; all the ordinary cereals and hardy fruits ripen easily, and such trees as fir, birch, hazel, elm, mountain ash, aspen, bird-cherry, oak, ash, lime, and alder grow according to the elevation. The only considerable break in the lofty coast-wall is the basin of Trondhjem, a little north of 63° N. lat. This district was the centre of the ancient national life of the country, and in the cathedral of Trondhjem city (called Nidaros to the middle of the 16th century) the kings of Norway are still crowned. The southern coast-lands, bordering the Skagerrack and the wide Christiania Fjord, are comparatively low and tame.

On the eastern side of the peninsular rampart the valleys trend south and south-east, and converge upon Christiania Fjord. At their upper extremities they are generally narrow and deep; and many are filled with chains of lakes, and make fine waterfalls (Rjukan, 800 feet, in Telemark) as they drop from level to level; their lower reaches get wider and shallower as they proceed south. Most of these valleys are traversed by mountain torrents and streams, the longest being the Glommen (350 miles), Drammen (163), with its tributary the Hallingdal (113), Nummedal Laagen (143), and Otteren (140). Some of these streams in their lower courses expand into long narrow lakes of considerable size: Lake Mjösen is 60 miles long, and its bottom is 1080 feet below the level of the sea; others are Randsfjord (43 miles long), Tyrifjord (19 miles), and Fæmund (35 miles long and 2300 feet above sea-level). The slopes of these valleys, especially in the southern and eastern parts of the country, are planted for miles upon miles with forests, chiefly fir. In these forest regions the elk is still found, and the blackcock, capercaillie, and hazel-grouse abound. The trees are felled principally in winter, and floated down the streams in early spring to the sawmills at their mouths.

Geology.—The great mass of the Norwegian plateau consists almost entirely of Archaean rocks, chiefly granite and gneiss, with quartz and hornblende schists in a subordinate degree, in very many cases clearly stratified. In central and western Norway (the fjeld region) the primary rocks are covered with layers of metamorphosed clay-slate and quartzite, whilst large masses of eruptive rocks of later date, such as granite, syenite, gabbro (especially in the Jotun Fjeld), porphyry, greenstone, labradorite, serpentine, have pierced through both formations and overspread them in broad sheets or coverlets. The prevailing formation in eastern Norway is called Sparagmite, a loose accretion of conglomerates and breccias, sandstone and quartz. Bands of Silurian rocks extend across the southern part of the country from south-west to north-east, the two most clearly-defined belts stretching from Hardanger Fjord to Trondhjem and from Skien Fjord (on the south coast) to Lake Mjösen. Most of the rocks of the plateau have been greatly crumpled, folded, twisted, crushed, and dislocated. The prevailing formation throughout northern Norway is granite. Nearly all parts of the country bear conspicuous traces of the scratch-

ing, grinding, and polishing to which the structural rocks were subjected during the Glacial age and the period of its departure. Incised and striated lines, and polished surfaces, occur at all altitudes up to 5000 feet, and generally follow directions radiating outwards from the highest mountain-knots of the peninsular rampart. Boulders litter the surface of the country nearly everywhere; moraines are numerous, and transverse ridges of glacial detritus block the mouths of many of the valleys; 'giant kettles,' the basins that received the glacial cataracts, occur in numerous districts near the sea. Moreover, the lines of ancient beaches, whether of the ocean or of glacial lakes, are distinctly traceable at many points along the coast from Bergen to the North Cape; sometimes there are two, or even more, one above another. The coast of northern Norway is estimated by some authorities to have risen between 400 and 600 feet. See UPHEAVAL.

Industries and Occupations.—Norway's economic wealth lies in her fisheries, in her forests, in her water-power and resultant manufactures, and in her shipping; her mines and her agriculture are unable to meet the home demands.

By far the most important of the fisheries are the cod and herring. Cod are taken on the west coast from January to April. They are cured chiefly in two ways, being either dried on wooden frames (hence called *tørfisk*, 'dry fish') or slightly salted, carried to the mainland, split open, and dried on the rocks (hence called *klippfisk*, 'split fish'). The former are exported to Italy, the latter to Spain. Cod-liver oil and salted roe rank high among the country's exports, and heads and offals, powdered for manure, are also exported. Herrings are taken all the year round. Mackerel and oysters are taken off the south coast, and salmon and sea-trout and lobsters off the west coast and elsewhere. Off the north coast of Finmark cod, saithe, flounders, smelt, &c., are taken in summer. The fishery in the Polar seas for whales, walrus, seals, dog-fish, sharks, &c., is prosecuted from Tromsø, Hammerfest, and Vardø. The inland lakes and rivers contain an abundance of salmon, trout, and red charr, and some of the southern lakes have also grayling, bream, perch, and pike.

The forests cover about 22 per cent. of the entire surface, though the area was formerly very much greater. Trees are, however, being systematically planted in several parts. The sawmills give employment to thousands of men, whilst many are engaged in the preparation of wood-pulp and cellulose.

Agriculture is carried on chiefly near Oslo, at the lower ends of the eastland valleys, in the level district of Jæderen in the extreme south-west, and around Trondhjem. The farms are mostly small (under 2 hectares). The rearing of cattle, sheep, and goats—in the north reindeer—is important. The area under cultivation is only about 3·4 per cent. of the entire surface of the country.

Copper and iron pyrites, silver, aluminium, and zinc are produced. Lack of coal and abundance of water-power and of timber determine the manufactures: electro-chemical and electro-metallurgical products, wooden goods, wood-pulp, paper, matches, &c. Shipbuilding is carried on, chiefly in the south.

The Norwegians rank amongst the busiest sea-carriers of the world. The largest items of import are textiles, articles of food (cereals, groceries, and fruits), metals (unwrought and manufactured), machinery and ships, coal, yarn and rope, tallow and oils, hides and skins. Timber and manufactures of timber, fishery and other animal products, form two-thirds of the entire exports. Much

of the timber is exported as deals and boards, the remainder being manufactured, and of this wood-pulp forms a large proportion. The animal products are principally fish and fish produce, but include also cattle, butter, and preserved milk. The other principal exports are paper and paper manufactures, skins and tallow, metals and metal-ware. Great Britain and Ireland and Germany have about half of the Norwegian trade between them. The chief exports to Britain are wood and wood-pulp, fish, and matches; the chief imports from Britain are coal, iron and steel, cotton, and ships. The principal ports are Oslo, Bergen, Trondhjem, Frederikstad, and Drammen.

People.—The Norwegians are among the most democratic peoples in Europe. They are proud of their freedom and independence, are simple, honest, and straightforward, frugal, and in general unaffectedly pious, though in some districts liable to violent outbursts of passion. Otherwise they are slow of action and take life leisurely. Formerly intemperance was a vice, but from 1871 the reform of the licensing system was undertaken (see LIQUOR LAWS). The rural population are decidedly more democratic than the urban. All titles of nobility were abolished in 1821, and none but townfolk use the equivalent of our 'Mr.' Owing to the insufficiency of the natural resources of the country to support the people considerable number emigrate, almost all going to the United States. Those who remain behind are fairly prosperous on the whole. Their difficult country has compelled the Norwegians to perform some feats of engineering skill of no mean order. As road-makers they vie with the Swiss. But the principal means of communication are steamboats, which ply all along the coast, on the fjords, and the inland lakes. There are, however, some 20,000 miles of well-kept national and communal roads, and some 2200 miles of railway (all but 270 miles managed by the state). Electrification of the railways is in progress. The lines radiate chiefly from Oslo. Two connect Trondhjem with the capital, and since 1891 four separate railways connect Norway with Sweden. Norway is now visited every summer by great numbers of tourists, especially from Britain, the rest chiefly Swedes, Danes, and Germans.

The people are on the whole well educated and intelligent. Attendance at school is free, and compulsory upon all children between seven (six and a half in towns) and fourteen. The country is well equipped with primary schools, and for the higher branches there are over 100 secondary schools (public, communal, and private), and the university of Oslo, with 1400 students. Trondhjem has a technical high school; Aas an agricultural high school. The state contributes about one-fourth of the total cost of the public education. The state religion is the Evangelical Lutheran. The dissenters (Methodists, Baptists, Roman Catholics, &c.) number only 71,000. For purposes of ecclesiastical government the country is divided into seven dioceses (*stifts*), each administered by a bishop—viz. Oslo, Hamar, Kristiansand, Bergen, Trondhjem, Tromsø, and Stavanger.

Constitution.—Even during the union with Sweden (1814-1905) Norway was not merely a free state and nation, but in many respects was essentially a republic; and the union of democratic—almost republican—Norway with aristocratic Sweden never worked smoothly. The nationalist movement became pronounced in 1890. An agitation for an even larger measure of home rule, and diplomatic representation distinct from that of Sweden, ended in the refusal by Sweden to grant the concessions asked and in the formal proposal by Norway, in 1905, to withdraw from the union with Sweden. After some negotiations

and the meetings of Swedish and Norwegian parliaments a separation was amicably agreed to, and in October the union was cancelled, and Norway was again an entirely distinct and independent state. Prince Carl, second son of the Crown-prince of Denmark, was chosen king, as Haakon VII. The supreme executive rests with the king; but the responsibility for his acts is borne by a council of state. The Storting or parliament consists of 150 members, 100 for country districts and 50 for towns. All Norwegians (male and female) above twenty-three years of age who reside and have resided in the country for five years are qualified as electors. The members, elected every three years, must be at least thirty years of age, have resided in Norway for ten years, and (except former ministers) be voters in the districts they represent. As soon as the Storting meets (in January every year in Oslo) one-fourth of the assembled members are chosen to form an upper house (*Lagting*); the remainder constitute the lower house (*Ödelsting*), in which all legislative measures are proposed either by a member of the house or by a member of the government. The upper house may pass or reject a bill; in case of disagreement the houses vote together as one, though in that case a majority of two-thirds is necessary. If a bill is passed by three successive parliaments (not sessions), it becomes law in spite of the king's veto. Nearly all offices were thrown open to women in 1912, the cabinet in 1916. Both the counties and the communes enjoy a liberal degree of self-government. The monetary unit is the *krona* (=1s. 1½d.), divided into 100 *öre*. The metric system of weights and measures prevails. The national defences embrace an army and navy. Service in the army is compulsory and universal—12 years with the *Linje*, 12 with the *Landvärn* (Landwehr); men of the ages of 18 to 20 and 44 to 55 belong to the *Landstorm*. The navy consists of a permanent establishment reinforced by a quota of conscripts chosen annually from an active navy roll of all seafaring men between the ages of 20 and 44.

See Kier, *Norges Land og Folk* (1886); Kirchhoff, *Länderkunde* (pt. ii. 1890). In English, Du Chaillu, *Land of the Midnight Sun* (2 vols. 1881); F. Vincent, *Norsk, Lapp, and Finn* (1881); Mary Godwin, *Letters from Norway* (1796); J. D. Forbes, *Norway and its Glaciers* (1853); Daniels, *Home Life in Norway* (1911); Burchardt, *Norwegian Life and Literature* (1920); Gathorne Hardy, *Norway* (1925); *The Norway Year Book* (ed. Hammer). The best guide-books to the country are those by Yngvar Nielsen, Baedeker, Tönsberg, Bennett, Jørgensen, and Willson.

History.—It is not until the 9th century that the story of Norway begins to emerge from the obscurities of myth and legend. When the tribes of Gothic descent crossed the Baltic and settled in the southern parts of the Scandinavian peninsula they found a race, perhaps Finnish, in possession. These people they drove north towards the Arctic Ocean. When this immigration took place cannot be determined exactly. Indeed, if, according to one theory, the original home of the Aryans was in Scandinavia, it probably never took place at all. At the dawn of the historical period Norway was parcelled out among the free men of the race (Norreni, Norsemen, Norwegians), whose slaves—prisoners taken in war—tilled the soil, whilst they and their free dependents spent their time in fighting, viking raids, and similar pursuits. The ties that united these free men were personal rather than political or territorial, though for judicial purposes all who dwelt in a well-defined district (*fylki*) met at stated intervals and at fixed places to adjudicate in common, on terms of strict

equality. Several of these districts were associated together in a higher unity—the *thing*. Of such *things* or meetings there came to be eventually three, the Frosta for the north, the Gula for the west and south, and the Eidsfja for the east; at a later date the Borgar *thing* for the south-east was separated from the Eidsfja. Each of these *things* had its own independent code of purely customary laws. The chief men, calling themselves kings, later jarls (earls), had no official authority; their power was due solely to their personal influence—their character, wealth, warlike renown, and long descent (compare NORTHMEN).

The cradle of the future kingdom of Norway was the district of Vestfold, on the western side of Vik (now Christiania Fjord). There a royal race from Sweden established themselves, seemingly in the 7th century. A descendant of these kings, Black Halfdan (died 860), reduced the petty kings to the north of him, as far as Lake Mjösen. His greater son, Harold Haarfager or Fairhair (king 863–930), extended his sway as far north as Trondhjem, in which district, as being his first conquest in lands that owed no allegiance to the chief king in Sweden, he established the seat of his power, just as the elector of Brandenburg called himself Frederick I. king of Prussia. After that in three great sea-fights, the last near Stavanger in 883, he conquered the kings of the west and south-west, and proclaimed himself chief king in Norway. But many of the defeated chiefs (kings) refused to submit to Harold, especially when he asserted the right of conquest, seized their odal lands, and introduced a form of feudalism. They sailed across the Western (North) Sea, and colonised the Faroe, Shetland, and Orkney Islands, the Hebrides, Man, Ireland. But they so harassed the men (jarls) to whom Harold had given their lands in Norway that the king, pursuing them, slew many of them and reduced the islands to his sway, and appointed earls over them (Orkneys, Hebrides). Those who were still disaffected escaped his rule by sailing on farther to Iceland. In Harold's reign the skalds or improvisatore court-poets began to compose, and were held in great honour. Harold's son, Erik Blood-axe, was driven from Norway by a younger brother Haakon in 935, and for many years the country was distracted by Erik's sons trying to recover their father's power. After Haakon died (961) their principal opponent was Earl Haakon of Trondhjem, who ruled Norway west of the mountain plateau until he was killed in a revolt (995). Olaf Trygvesson, a descendant of Harold Haarfager, a man who had won great fame as a viking in England (991–994) and elsewhere, stepped into the gap. Like his great-uncle Haakon he was a Christian, and like him he attempted to make his people Christian, and he did make them Christian, at least nominally and superficially. The beau-ideal of a sea-king, and the pride and admiration of his people, Olaf died a hero's death, fighting against a host off the north coast of Prussia (1000). After an interval of fifteen years another Olaf, likewise a descendant of Harold Haarfager, landed and won the kingdom from the sons of Earl Haakon. This Olaf—St Olaf—made his people's Christianity more real, first thoroughly welded the kingdom into a united state, made all the western islands tributary, and ruled sternly but well. Ever since the days of Harold Haarfager the king of the Danes had claimed supremacy over at least southern Norway; in 1028 the great Cnut came with a large fleet to make good his claim. Olaf fled to Russia, and in attempting to win back his crown perished in battle at Stikklestad near Trondhjem (1030). Five years later the chiefs of the land made Olaf's son Magnus king, and he became king of the Danes also in 1042. But this office he found

so difficult that in 1046 he associated with himself as king his uncle Harold Haardraada, who had served in the Væring guard at Constantinople and had fought against the Saracens in Sicily. War between the Danes and Norsemen was almost chronic all through the reigns of Magnus and Harold, who became sole king in 1047. Harold's love of adventure led him to his death at Stamford Bridge in England in 1066. During the peaceful reign of Harold's son, Olaf Kyrre (1067-93), commerce thrived, industrial guilds were formed, and the land prospered greatly. The next king, Olaf's son, Magnus Barefoot, waged war in the Orkneys, Hebrides, and Ireland, till he fell in this last island in 1103. Two sons of Magnus, Eystein (died 1122) and Sigurd (died 1130), then reigned in concert, Eystein being a quiet stay-at-home prince, whilst Sigurd, who had inherited all the adventurous enterprise of his ancestors, sailed to the Levant, and visited Jerusalem and Constantinople (1107-11). After his return he greatly fostered the church. At this period the towns began to be prosperous.

From 1130 to 1240 the country was torn by internal feuds, three predominant parties contesting for power—an oligarchical party amongst the chief men; the bishops' party, who claimed the right to elect the king; and after 1174 the nationalist Birkebeiner (i.e. 'Birch-legs'), who generally had the first two parties allied against them, but who in the long-run got the victory. After defeating the earls and bishops, and slaying their nominee or puppet, King Magnus, in Nord Fjord (1184), they made their leader Sverre (died 1202, a Faeroe islander, and a clever man, king. Nevertheless, the civil strife went on until the twenty-third year (1240) of the reign of Sverre's grandson Haakon. This king reigned twenty-three years longer, and during that time the land recovered from her distractions. In 1262, Iceland acknowledged the supremacy of the king. Haakon died at Kirkwall (1263), shortly after being defeated at Largs in an attack upon Scotland. It was during the first half of the 13th century that the Old Norse literature began to be written down. The laws were put in writing during the reign of Haskon's son, Magnus the Law-betterer (1263-80), who, in 1266, gave up the Hebrides to Scotland. The pretensions of the bishops' party were finally crushed by Erik (died 1299), son of Magnus, and father of the little Margaret, Maid of Norway. Erik's successor, his brother Haakon, dying (1319) without a son, the throne passed through a daughter to the Swedish royal house, and again through marriage to the Danish (1380). The great Queen Margaret of Denmark united all three kingdoms by the Union of Kalmar (1397). And now evil days fell upon the land. The extraordinary exertions of Norway's youth seem to have worn her out early; her high spirit and enterprise were gone; her literature died out, and her intelligence burned down to a dull glimmer; her commerce passed into the tyrannical hands of the Hanseatic merchants of Bergen; her old colonies, Orkney and Shetland, were pledged to Scotland for ever in 1468; Denmark, which at first respected her national rights, treated her from 1536 as a conquered province, and forced the Reformation upon her, yet the Norwegians never seriously resented the harsh and oppressive treatment of their rulers. In 1612 some 300 men from Scotland, whilst making their way to join the army of Gustavus Adolphus in Sweden, were cut to pieces by the Norwegian peasantry in the pass of Kringelen in Gudbrandsdal.

The national spirit began to stir again in the awakening of the peoples occasioned by the French Revolution; and the transference of Norway to Sweden in 1814 gave back to the Norwegians their national rights, a liberal constitu-

tion, and their sense of national unity. At first they resisted the transference. Prince Christian of Denmark headed the movement for independence, and summoned a national assembly, which at Eidsvold (17th May) drew up a liberal constitution. But Sweden marched her forces into the country, and on 10th October Christian abdicated. Charles XIII. of Sweden, having recognised the constitution, was elected king on 4th November. In 1821 the Norwegians abolished all titles of nobility. The spirit of independence and of nationality has grown stronger as the years have passed, industry has thrived, commerce has prospered and brought wealth, and, intellectually, Norway stands in the van of progress. The unanimous assertion of 'home-rule' aspirations in Norway, and the unwillingness of Sweden to make the concessions demanded, led to strained relations between the kingdoms, and the peaceful revolution in 1905, when Norway resumed complete independence. Jan Mayen was annexed in 1920. In the same year Norway signed, and in 1924 ratified, a treaty placing Spitsbergen (with Bear Island) under Norwegian sovereignty. Spitsbergen became part of the kingdom of Norway in August 1925.

See Munch, *Det Norske Folks Historie* (7 vols. 1852-63); E. Sars, *Udsigt over Norges Historie* (1873-77); Keyser, *Norges Stats- og Retsforfatning* (1867); in English, *Heimskringla*, trans. by W. Morris and Magnusson (vols. iii.-vi. of Saga Library, 1891) or by Laing (3 vols. 1844; new ed. 1890); histories by Boyesen (new ed. 1900), Bain (1905), Knut Gjerset (1915), Hardy (1925); T. Michell, *History of the Scottish Expedition to Norway in 1612* (1886); and Powell and Vigfusson, *Corpus Poeticum Boreale* (1883). Carlyle's *Early Kings of Norway* (1878) is adapted from Laing's *Heimskringla*.

Literature.—Like Germany, Norway has an ancient and a modern period of literary history—the interval between being mostly blank. The ancient period of Norwegian literature is that of the Sagas (q.v.), and see also ICELAND, SNORRO, EDDA. What writers Norway gave birth to between the 13th and the 19th century, except Peder Dass (1647-1708) and Dorothea Engelbretsdatter (1634-1716), are counted amongst the Danes, in whose language they wrote. These men, Holberg, Tullin, Wessel, Fasting, Brun, Frimann, and others—some of them the brightest ornaments of Danish literature—have been already mentioned under Denmark (q.v.).

The modern period begins with the re-awakening of the national life; it received its first impulses from the Norwegian Society, a band of patriotic men living in Copenhagen in 1772, from the founding of a native university at Christiania in 1811, and from the recovery of national independence in 1814. The earliest writers of the new era, the poets Bjerregaard, (1792-1842), M. C. Hansen (1794-1842), and Schwach (1793-1860), though the ring of patriotism is in their work, possessed little originality. The creator of the modern national literature was Wergeland (1808-45), the Schiller of his country, who believed that in the free peasant proprietor lay the hope of Norway's future, and who laboured earnestly to make him worthy of that high calling. The nebulous thought and disregard of æsthetic law and taste shown in his earlier works provoked the satirical attacks of Welhaven (1807-73), a master of poetic form, and the representative of the intellectual aristocracy of the country, the mercantile and official classes. This gave rise to a keen literary feud. But, apart from Andreas Munch (1811-84), the ladies' poet, who stands by himself, and the poets J. Moe (1813-82), Jensen (1812-67), and Th. Kjerulf (1825-88), who were more or less influenced by Welhaven, nearly all subsequent writers have worked in the spirit of Wergeland, and for the same ends. Monsen (1815-

52) wrote lyrics which sometimes approach the best of Wergeland's later work in quality. Aasen (1813-96), Vinje (1818-70), K. Janson (1841), Sivle (1857), and Garborg (1851), the *Maalstrøever*, have tried to create a literary language by collating and fusing together the various peasant dialects, the first named more especially in philological works, the others in tales and novels, and even in poetry. Garborg is a writer of striking individuality. Asbjørnsen (1812-85) and Moe, the poet, and Faye collected the folk-tales; Landstad (1802-81), the hymn-writer, and Bugge (1833-1907) collected the popular songs. Daa (1809-77) popularised the history of his country, and Vig (1824-57) laboured in the same direction in various works for the people. Schultze (1823-73), Friis (1821), Østgaard (1812-73), Magdalena Thoresen (1819-1903), and others have described well and lovingly their native land and its people. Bjørnson (1832-1910), M. Thoresen, and Lie (1833-1908) wrote good tales from the life of the provinces; the peasant tales of Bjørnson are of great merit. Eilert Sundt (1817-75) strove to educate the country-people through his treatises on their social and economic circumstances. The chief writers of the latest phase of Norwegian literature are Ibsen, Bjørnson, Lie, Kjelland (1849-1906), Garborg, Camilla Collett (1813-95), Elster (1841-81), M. Thoresen, Jæger (1854), Flood (1837), Gloersen (1838), Amalie Skram (1847-1905), Kristofersen (1851), Krogh, Gunnar Heiberg (1857), Hamsun (1859), Bojer (1873). Speaking generally, these authors (novelists except Ibsen and Heiberg) show a strenuous desire for truth, great earnestness, a strongly realistic way of looking at things, keen delight in intellectual and moral strife, remarkable directness, vigour, and freshness of style, a decided leaning to satire, and frequently, too, a charming naïveté and striking originality. The socio-satirical plays of Ibsen (q.v.) have attracted notice in all countries, made him a conspicuous personality, roused not a little keen controversy, and affected the history of dramatic literature. Best known abroad by his tales, Bjørnson (q.v.), like Kjelland and Lie, also did dramatic work, and produced some admirable poetry. Kjelland satirised the classes of whom Welhaven was the representative; he had strong cosmopolitan, especially French, tendencies. Poulsen, 'Marie,' and Marie Colban (1814-84) must be mentioned as voluminous and popular authors of works of a light character.

The best Norwegian painters have been Tide-mand (1814-76), C. F. S. Hansen (1841), Gude (1825-1903), M. Müller (1828), S. Jacobsen (1833), Munthe (1841-96), and Sinding (1842); the best sculptor, Middelthun (1820-86); the best musicians, Ole Bull (1810-80), H. Kjerulf (1815-68), Grieg (1843-1907), and Svendsen (1840-1911).

See Schweitzer, *Geschichte der Skandinavischen Literatur* (3 vols. 1836-90); Gosse, *Northern Studies* (2d ed. 1882); Halvorsen, *Norsk Forfatter-Lexikon, 1814-80* (1881 et seq.); Jæger, *Norske Forfattere* (1883); and Botten-Hansen's excellent bibliography, *La Norvège Littéraire, 1824-66* (1869); Gröndahl and Raknes, *Chapters in Norwegian Literature* (1923).

Norway Haddock. See BERGYLT.

Norwich, a cathedral city, the capital of Norfolk, and a parliamentary, county, and municipal borough, with two members of parliament and a Lord Mayor (1910), stands on the Wensum, immediately above its confluence with the Yare, 18 miles W. of Yarmouth and 114 NNE. of London. Pop. (1801) 34,975; (1881) 87,842; (1901) 111,728; (1921) 120,661. Built on the summit and slopes of a hill which gradually rises from the river, the city, with its hamlets, covers an area of 7898 acres, whereas the total circuit of the ancient defences (1294-1342) was four miles. Its narrow, winding

streets are rich in examples of early architecture—as Pull's Ferry and the Bishop's Bridge (1295), both on the river-banks; St Giles' Hospital (founded 1249); the Guildhall and the Strangers' Hall (now a folk museum), dating from the 15th century; the Music House (partly Norman, and once a residence of Sir Edward Coke); the Bridewell (Decorated and Perpendicular, *circa* 1400), now a Museum of Local Industries; the Lazar House (a Norman relic), now a branch public library; Suckling House (14th century); and the Dolphin Inn (1587). The cathedral, almost wholly Norman in style, but the growth of more than four centuries, occupies a site close to the river, and was founded in 1096 by Bishop Herbert de Losinga: its dimensions are 407 feet in length by 72 in breadth (or 178 across the transepts), and it is surmounted by a noble (Norman) tower and (Decorated) spire of 315 feet—the highest in England next to Salisbury: special features are the relics, consisting of two glorious arches, of its Early English Lady Chapel (demolished 1573-89); its cloisters, 175 feet square (1297-1430); the Decorated Beauchamp Chapel (in which is preserved the Bible used at the coronation of Queen Victoria); and the vaulted roof of the nave and transept, rich in mediæval sculptured bosses. Fine gateways to the cathedral are St Ethelbert's gate (*circa* 1272) and the Erpingham gate (*circa* 1420). Close by is the grammar-school, founded (as a Mortuary Chapel) in 1316, and famous as the place of education of Sir Edward Coke, Raja Brooke, and other celebrities; also St Andrew's Hall (Perpendicular; formerly the church of the Black Friars), in which are held the triennial musical festivals, first established at Norwich in 1824. Of the ancient castle, standing on a partly artificial mound, its massive quadrangular Norman keep (erected *circa* 1135-1154 by Hugh Bigod), is the only original portion now standing; it was used as a prison till 1887. In 1894 the castle was opened as a museum; it contains a good collection of local natural productions, and is famous for its collection of raptorial birds. On the cattle-market beneath the castle is held on Saturdays the largest cattle-market in the eastern counties. A large Roman Catholic church, St John the Baptist, was built by the Duke of Norfolk in 1894. The thirty-six old churches are for the most part built of flint, and in the Perpendicular style: those of St Peter Mancroft, St Andrew, St Giles, St Lawrence, St Michael Coslany, and St Stephen are the finest examples. Modern public buildings include the hospital (founded 1771 and rebuilt 1879-83); the Public Library (1857), which contains the old City Library, founded in 1608, and a large collection of books on Norfolk; an Agricultural Hall (1882); a Volunteer Drill-hall (1866); the Technical Institute (1899) Borrow House, presented to the city in 1913 for the purpose of a Borrow Museum; and Stuart Hall (1925) adjoining Suckling House. Formerly one of the largest seats in England of the worsted-weaving trade, the city is still noted for its textile fabrics—especially its crapes; but now the principal manufactures are those of boots and shoes, mustard, starch, ornamental ironware, whilst extensive breweries and large nursery-gardens on the outskirts of the town give employment to many hands.

Of times pillaged by the Danes, and in 878 Guthrum's headquarters, Norwich in 1004 was burned by Sweyn, and thirteen years later was held by his son Cnut. Subsequent to the Norman Conquest the principal incidents in its history have been the translation of the bishopric hither from Thetford (1094); the granting of its first charter of self-government (1194); its sacking by Louis the French Dauphin (1216); the riotous attack by the citizens on the cathedral monastery (1272); its

first representation in parliament (1298); settlements of Flemish weavers (1336) and of Dutch and Walloon refugees (from 1565); a hurricane (15th January 1361), which blew down the spire of the cathedral; John Litester's rebellion (1381); disastrous fires (1463 and 1509), on the last occasion the roof of the cathedral being destroyed; the encampment of Kett's rebels on Mousehold Heath (1549); many royal visits and outbreaks of the plague, the worst being the Black Death in 1349, when half the population is supposed to have perished, in 1602, when 3076 persons died, and in 1665, when 2251 succumbed; and the great inundation through a prodigious rainfall on 25th-26th August 1912. Among the bishops of Norwich (since 1094) have been Pandulph (the pope's legate), Salmon (the builder of the grammar-school), Bate-man (the founder of Trinity Hall at Cambridge), De Spenser ('the fighting Bishop of Norwich'), Corbet (the poet), Harsnett and Manners-Sutton (afterwards Archbishops of York and Canterbury), Wren (father of the celebrated architect), Joseph Hall, and Reynolds (the composer of the General Thanksgiving in the Prayer-book). Of citizens the best known are Sir Thomas Erpingham (builder of the gate which bears his name, and chamberlain to Henry IV.); Thomas Bilney; Archbishop Parker; Dr Caius; Greene (the poet and dramatist); Bishops Cosin and Tanner; Sir Thomas Browne; 'Old' Crome, his son, Cotman, Stark, and Vincent (the 'Norwich school' of painters); Mrs Opie; Crotch (the musical composer); Wilkins (architect and R.A.); William Taylor (q.v.) and Professor Brewer; Sir W. J. Hooker; Gurney (the philanthropist) and his sister, Elizabeth Fry; Lindley (the botanist); and Harriet Martineau and her brother James.

See works by Stacy (1819), Bayne (1858), Goulburn (1876), Jessopp (1884); the *Official Guide*; the *Records*, edited by Hudson and Tingey (1906-7); *The Norwich School of Painting*, by W. F. Dicks (1906); Hawkins's *Norwich, a Social Study* (1910); Clayton's *Robert Kett and the Norfolk Rising* (1912); Stephen's *Guide to the Study of Norwich: a Select Bibliography* (1919); Hannah's *Heart of East Anglia* (1914); Henderson's *Story of Norwich* (1917); and works cited at Norfolk.

Norwich, capital of New London county, Connecticut, is at the head of the Thames River, 13 miles N. of New London; the chief part of it on an eminence between the Yantic and Shetucket rivers, which join to form the Thames. There are numerous and varied manufactures. Abundant water-power is supplied by the branches of the Thames. The land on which the city stands was granted by Uncas the Mohican to an English ensign who in 1656 reached him by night with a canoe-load of provisions, when he was besieged in his stronghold by the hostile Indians, and nearly forced by hunger to surrender: a granite obelisk bearing the name of Uncas was erected in 1825. Pop. 30,000.

Norwood, a district in the boroughs of Camberwell, Lambeth, and Croydon, hilly, healthy, and pretty, long the seat (until 1797) of a Gypsy settlement.

Nose, the organ of smell, and also part of the apparatus of respiration and voice. Considered anatomically, it may be divided into an external part—the projecting portion, to which the term *nose* is popularly restricted—and an internal part, consisting of two chief cavities, or *nasal fossæ*, separated from each other by a vertical septum, and subdivided by spongy or turbinated bones projecting from the outer wall into three passages or *meatuses*, with which various cells or *sinuses* in the ethmoid, sphenoid, frontal, and superior maxillary bones communicate by narrow apertures.

The external portion of this organ may be described as a triangular pyramid which projects from

the centre of the face, immediately above the upper lip. Its summit or root is connected with the forehead by means of a narrow bridge, formed on either side by the nasal bone and the nasal process of the superior maxillary bone. Its lower part presents two horizontal elliptical openings, the *nostrils*, which overhang the mouth, and are separated from one another by a vertical septum. The margins of the nostrils are usually provided with a number of stiff hairs (*vibrissæ*), which project across the openings, and serve to arrest the passage of foreign substances, such as dust, small insects, &c., which might otherwise be drawn up with the current of air intended for respiration. The skeleton or framework of the nose is partly composed of the bones forming the top and sides of the bridge and partly of cartilages, there being on either side an upper lateral and a lower lateral cartilage, to the latter of which are attached three or four small cartilaginous plates, termed *sesamoid cartilages*; there is also the cartilage of the septum which separates the nostrils, and in association posteriorly



Fig. 1.—Longitudinal Section of the Nasal Fossæ of the Left Side, the Central Septum being removed:

1, frontal bone; 2, nasal bone; 3, part of ethmoid bone; 4, sphenoidal sinus. *a*, superior turbinate bone; *b*, superior meatus; *c*, middle turbinate bone; *dd*, middle meatus; *e*, inferior turbinate bone; *ff*, inferior meatus; *gg*, a probe passed into the nasal duct.

with the perpendicular plate of the ethmoid, and with the vomer, forms a complete partition between the right and left nasal fossæ. It is the lower lateral, termed by some writers the alar cartilage, which by its flexibility and curved shape forms the dilatable chamber just within the nostril. The nasal cartilages are capable of being slightly moved, and the nostrils of being dilated or contracted by various small muscles.

The *nasal fossæ*, which constitute the internal part of the nose, are lofty and of considerable depth. They open in front by the nostrils, and behind they terminate by a vertical slit on either side in the upper part of the pharynx, above the soft palate, and near the orifices of the Eustachian tubes, leading to the tympanic cavity of the ear.

The mucous membrane lining the nose and its cavities is called *pituitary* (Lat. *pituita*, 'rheum'), from the nature of its secretion; or *Schneiderian*, from Schneider, the first anatomist who showed that the secretion proceeded from the mucous membrane, and not, as was previously imagined, from the brain; it is continuous with the skin of the face at the nostrils, with the mucous covering of the eye through the lachrymal duct (see EYE), and with that of the pharynx and middle ear posteriorly. This membrane varies in its structure in different parts of the organ. On the septum and spongy bones bounding the direct passage from the nostrils to the throat the lining membrane contains ample and capacious submucous plexuses

of both arteries and veins, of which the latter are by far the more large and tortuous. These plexuses, lying as they do in a region exposed more than any other to external cooling influences, appear to be designed to promote the warmth of the part, and to elevate the temperature of the air on its passage to the lungs. They also serve to explain the tendency to hemorrhage from the nose in cases of general or local plethora. In this, the respiratory part of the nose, the mucous membrane

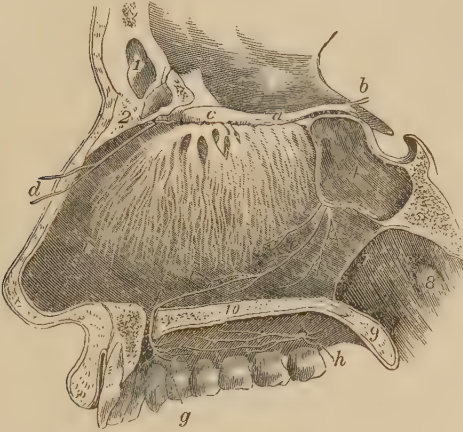


Fig. 2.—Distribution of the Olfactory Nerve on the Septum of the Nose:

1, frontal sinus; 2, nasal bone; 4, sphenoidal sinus of left side; 7, posterior opening of the left nostril; 8, opening of Eustachian tube; 9, section of soft palate; 10, section of hard palate. *a*, olfactory nerve; *b*, its three roots; *c*, its bulb; *d*, nasal branch from the ophthalmic division of the fifth nerve; *e*, naso-palatine nerve; *g*, *h*, its branches; *i*, the septum of the nose.

is lined by ciliated epithelium. In the upper third of the nose—which, as the proper seat of the sense of smell, may be termed the *olfactory region*—the mucous membrane is very thick and coloured by a brown pigment. The olfactory nerve, or nerve of smell, terminates in the olfactory mucous membrane. It passes into the nasal cavity in several small branches; these ramify in the soft mucous membrane (fig. 2), and end in tiny varicose fibres which terminate in elongated epithelial cells projecting into the free surface of the nose. These cells—the olfactory cells—which in some animals are provided with little hairs, are affected by odorous particles, and the excitement thus set up travels to the brain by the branches of the olfactory nerve. In order to smell a substance it must be in the form of vapour or dissolved in fluid. Adequate stimuli for smell are chemical in their nature, and the odoriferous substances must come into direct contact with the olfactory surface before the olfactory end-organs can be excited. So sensitive is the nose, however, that odorous particles of inconceivable smallness are capable of producing powerful sensations. When we remember that a grain of musk will scent the air in its neighbourhood for years, and that this can only be by the continual loss of particles of its substance, these particles must be infinitely minute. Still more wonderful is the development of the sense of smell in many of the lower animals. A hare passes rapidly over the ground and the scent will under favourable circumstances remain for hours, and be sufficiently strong to enable the well-trained harrier to follow it with unerring accuracy. In savage tribes the sense of smell is vastly more acute than among civilised nations; nevertheless by practice

it is possible for any one to cultivate this sense to a very considerable extent. Well-authenticated cases are recorded of persons obliged by the loss of the other senses to train this, the only one left for their use, to such a degree of acuteness that they have been able to recognise both objects and persons by the sense of smell alone.

Most persons imagine that we are largely beholden to 'taste' for our gustatory pleasures. In reality our sense of taste only enables us to distinguish sweet from sour or bitter, and all the flavour of the food or wine is smelt. Close the nose and shut the eyes, and one cannot distinguish port from sherry, a raw potato from an apple, or beef from mutton.

There is as yet no true scientific classification and scale of odours. We are not even able to distinguish the different qualities of odours by different names, and to express them we employ the names of the vegetable or animal substances from which they emanate. Neither can we differentiate odours into elementary and compound. When two equally strong odours act separately on the nasal fossæ, such as camphor and cedar oil, it is possible to perceive the one or the other alternately; the existence of a true mixed odour is possible but rare, as it readily breaks up into its components. The usual effect of mixing two odours is neutralisation if weak, conflict if strong. Smell is easily fatigued—e.g. bad drains are soon not smelt by those living near them. In daily life bad smells are often corrected by other more pleasant odours, such as that of carbolic acid in gangrene. Olfactory sensations are useful to the individual and the species, as they excite reflex acts in the motor system and the glands. Repugnant smells from putrefying food and various poisonous substances lead to their rejection or removal. Close relations exist between the olfactory sensations and the sphere of emotion, and especially can they alter that affective state of the mind we call mood; a bad smell causes irritation and impatience, a pleasant smell engenders cheerfulness. Another characteristic of olfactory sensations is their capacity to call up by imagination the memory images of distant places. We know little of the relation between the physico-chemical constitution of a body and the quality and intensity of the odours it is capable of arousing, although Haycraft and others have pointed out that the elements which form odoriferous compounds belong almost exclusively to the fifth, sixth, and seventh groups in the periodic system of Mendeléeff.

DISEASES OF THE NOSE.—Acute inflammation of the nasal mucous membrane has been already described under the title of Catarrh (q.v.).

Chronic Inflammation, Chronic Rhinitis, or Chronic Catarrh is a very common condition of the nose and may exist for years without attracting much attention; it appears to be especially frequent and troublesome in America. It usually follows upon repeated colds in the head, but may be due also to constant inhalation of dust or irritating vapours. There seems, too, to be a tendency for this type of inflammation to run in families, probably owing to some peculiarity in the formation of the nose. The mucous membrane covering the turbinated bones swells up; and, by blocking the passage to some extent as well as by producing irritating discharges, forms a source of still further irritation. Any malformation, such as deviation of the septum to one side, or the presence on it of a 'spur,' has a similar effect. The most marked symptom is increased secretion causing constant running at the nose, a feeling of 'stuffiness,' and hawking in the back of the throat. In some persons, wasting of the mucous membrane takes place after a time, the secretion lessens, and un-

pleasantly smelling crusts form in the nose (see OZENA). Dryness of the throat resulting from mouth-breathing, enlargement and redness of the outer nose, loss of smell, impairment of hearing, and constant headache across the bridge of the nose may be further unpleasant consequences. Occasionally soft polypi develop from the swollen mucous membrane and produce still greater blockage (see POLYPUS).

In treatment, much relief is gained from the use morning and evening of a nose-wash such as the following: sodium bicarbonate, 30 grains; sodium chloride, 30 grains; borax, 30 grains; white sugar, 60 grains; rose water, 8 ounces; a small quantity to be mixed with an equal quantity of hot water before use. It may be applied by means of a nasal douche or syringe, or simply snuffed up from the palm of the hand and allowed to trickle into the throat by inclining the head backwards. Much benefit is also obtained from sprays containing ichthyol, adrenalin, &c., or by the use of astringent snuff or powder. When the mucous membrane is permanently thickened, much relief is got by cauterising with the galvano-cautery, or by operations designed for straightening the septum, removal of spurs, &c. Sometimes there is a chronic catarrhal or suppurative condition in the air-spaces of the bones about the nose which communicate with its cavity, and these must be opened up, drained, and carefully washed out. The last-named condition is specially apt to affect the antrum or maxillary sinus lying in the upper jaw-bone, which is often infected from decayed upper teeth.

Bleeding from the nose, or *Epistaxis*, may be produced by direct injury, as from a blow on the nose or a scratch inside the nostrils, or it may occur in plethoric people or those with high blood-pressure and a tendency to apoplexy. In the latter type of case its occurrence may be very salutary. If the bleeding proves excessive, it may often be stopped by placing the patient in a sitting position with the head slightly inclined backwards near an open window, by the application of cold to the back of the neck and of cold cloths to the head, and gentle pinching of the nostrils to prevent the passage of air back and forth. If this is not sufficient, pledgets of lint soaked in tincture of perchloride of iron, alum solution, hazeline, or other styptic, may be pushed up each nostril. If this is still insufficient, the back of the nose may be plugged by means of similar pledgets of lint introduced through the mouth.

Foreign bodies such as pieces of pencil, buttons, peas, or small stones are sometimes introduced by children into the nostril and slip readily beyond reach. For a time the foreign body may remain firmly impacted in the nose and cause no trouble. But in course of time a troublesome inflammation with discharge from one nostril takes place. To remove the stone, pea, &c., it is often sufficient to close the opposite nostril, and by tickling with a feather the nostril concerned, or by giving a pinch of snuff, a vigorous sneeze is produced which dislodges the body. If this fails, removal by a medical man with the help of a speculum and a bright light is a comparatively easy matter.

Nosology (Gr. *nosos*, 'disease') is that branch of medicine which treats of the distribution and arrangement of diseases into classes. See DISEASE.

Nossi-Bé, or NÔSIBÉ, a volcanic mountainous island on the north-west coast of Madagascar (q.v.) belonging to the French; area, 130 sq. m.; pop. 35,000.

Nostalgia (Gr. *nostos*, 'the return home'; *algos*, 'pain'), a technical term for home-sickness which, when, as sometimes, it takes the form of acute

melancholia, becomes ruinous to health, and even fatal. It is said that inhabitants of mountainous countries suffer more keenly than others; but it seems to have less to do with affection for the physical features of home than with inability to break with old habits and modes of life. In armies it has been found necessary to adopt measures to prevent desertion on this ground. In Canada the playing of *Lochaber no Mcre* by the pipers of Highland regiments had to be interdicted; and so in France it was forbidden under pain of death to sing or play the *Ranz des Vaches* in the hearing of Swiss mercenaries.

Nostoc, a genus of Algae belonging to the Cyanophyceæ, found upon moist ground, rocks near streams, &c., and consisting of a somewhat gelatinous hollow tumid frond, filled with simple filaments resembling strings of beads. *N. commune* is frequent in Britain, springing up suddenly on gravel-walks and pasture-grounds after rain. It is a trembling, gelatinous mass, often called Star Jelly, and vulgarly regarded, owing to the suddenness with which it makes its appearance, as having fallen from the skies (cf. Dryden, 'The shooting-stars end all in purple jellies'), and as possessed of important medicinal virtues. *N. edule* is employed in China as an article of food. Some species live in symbiosis with fungi as Lichens (q.v.); some within Liverworts (*Anthoceros*, &c.), Cycad roots, and elsewhere.

Nostradamus, the assumed name of Michel de Notredame, an astrologer of Jewish descent, who was born at St Remi in Provence, 14th December 1503. He studied at Avignon, and next medicine at Montpellier, took the degree of doctor of medicine in 1529, and practised the profession at Agen, afterwards at Salon near Aix. Next year when the plague was raging at Lyons he was conspicuous for his skill and devotion. He first felt upon his prophetic vein about the year 1547, but in what light he himself regarded his pretensions it is now impossible to say. The first collection of famous *Centuries* appeared at Lyons in 1555. These were predictions in rhymed quatrains, divided into centuries, of which there were seven; the second edition, published in 1558, contained ten. Astrology was then the fashion, and these quatrains, expressed generally in obscure and enigmatical terms, brought their author a great reputation. Catharine de' Medici invited him to visit her at Blois; the Duke and Duchess of Savoy went to Salon expressly to see him; Charles IX. on his accession appointed him his physician-in-ordinary. Nostradamus died at Salon, 2d July 1566. His predictions have given rise to a vast illustrative or controversial literature. The *Centuries* were formally condemned by the papal court in 1781.

See Jaubert's *Vie de M. Nostradamus* (Amst. 1656); Haitze's *Vie de Nostradamus* (Aix, 1712); Astruc's *Mémoires pour servir à l'Histoire de Montpellier* (1767); *Apologie pour les Grands Hommes Soupçonnés de Magie* (Paris, 1825); E. Bareste's *Nostradamus* (1842); and Charles A. Ward's *Oracles of Nostradamus* (1891).

Notables, the name formerly given in France to persons of distinction and political importance. As the States-general were inconvenient to the despotism of the monarchy, the kings of the House of Valois adopted the expedient of calling in their stead *Assemblies of the Notables*, the time of calling them and the composition of them being entirely dependent on the pleasure of the crown. For more than a century and a half even this poor acknowledgment of any other mind or will in the nation than that of the sovereign ceased to be made; but when the state of the finances brought the monarchy into difficulties and perils Louis XVI., at the instigation of the minister Calonne, had re-

course again to an Assembly of Notables, which met 22d February 1787, and was dissolved 25th May. It consisted of 137 members, among whom were seven princes of the blood, nine dukes and peers, eight marshals, eleven archbishops, twenty-two nobles, eight councillors of state, four masters of requests, thirty-seven judges, twelve deputies of the Pays d'États, the civil lieutenant, and twenty-five persons belonging to the magistracy of different cities. See LOUIS XVI., NECKER, FRANCE.

Notary public is an officer of the law or professional person whose chief function is to act as a witness of any solemn or formal act, and to give a certificate of the same; which certificate, if duly authenticated, is accepted as good evidence of the act done in his presence, and attested by him. Under the Law Agents Amendment Act, 1896, no person can now be admitted as a notary-public in Scotland until he shall have been admitted and enrolled as a law agent. The English courts take notice of the seal of a notary, but his certificate is not generally received as proof of the facts certified. A notary is employed in the noting and protest of foreign bills of exchange in case of non-acceptance or non-payment. In the United States the powers of notaries are defined by the state laws.

Notation. For Chemical Notation, see CHEMISTRY; for Musical, MUSIC, SOLFEGGIO; for Mathematical, NUMERALS, ALGEBRA, CALCULUS, GEOMETRY, QUATERNIONS, SCALES OF NOTATION.

Noto. an ancient episcopal town of Sicily, 16 miles SW. of Syracuse by rail; pop. 32,000.

Notochord. See EMBRYOLOGY, AMPHIOXUS.

Notodden, a town of Norway, in Telemark, at the north of Lake Hiterdal, 60 miles SW. of Oslo, near the great Tinfoss cascades, which provide ample power for generating electricity largely used in the production of nitrates, &c.; pop. 6500.

Notornis, a genus of the Rail family, with wings so much reduced as to be incapable of flight, has within historical times become partially or completely extinct. Notornis inhabited New Zealand, and within the 19th century four specimens were taken, one of them in 1898, so that possibly there are still a few survivors in out-of-the-way districts. *N. alba* was soon exterminated in Lord Howe Island.

Notoryctes, MARSUPIAL MOLE or URQUAMATA, a blind central Australian marsupial, discovered in 1882, is a pale yellow silky-haired animal, with great digging claws on its third and fourth fingers, that feeds on insects under the sand. The eyes are covered with skin and muscle. The dentition is peculiar. The pouch opens backwards. The single species (*N. typhlops*) forms a family by itself.

Nototherium, a genus of gigantic fossil kangaroo-like marsupials, found in Australia (q.v.).

Not Proven. See CRIMINAL LAW.

Notre Dame (Old Fr., 'Our Lady'), the name of many churches dedicated to the Virgin Mary in France, particularly the cathedral of Paris.

Nottingham, a city of England, the capital of Nottinghamshire, and a parliamentary, municipal, and county borough (the first returning four members), is seated on the Trent, 126 miles NNW. of London, 15 E. of Derby, and 38 S. by E. of Sheffield. Formerly surrounded by ancient walls (910-1265), of which all traces have now disappeared, the town covers an area of about 16 sq. m., and its appearance of late years has been much improved by the widening of its streets; by the erection of a new town-hall, University College,

and other public buildings; by the opening and laying out of an arboretum of 17 acres, of a public park and recreation grounds of over 150 acres, and of a tract of open land, called 'Bulwell Forest' (135 acres); as also by the spanning of the Trent—which is here about 200 yards wide—with a broad granite and iron bridge in the place of a former narrow structure of seventeen arches. Crowning a precipitous rock, which rises 133 feet above the river, stands the castle, built (1674-83) on the site of an ancient Norman fortress, dismantled during the Parliamentary wars, and itself much damaged by fire during the Reform Bill riots of 1831. It was restored in 1878, and transformed into an art museum. Near to it are the county hall (1770); St Mary's Church (restored 1867-85), a cruciform building in the Perpendicular style, 216 feet in length; and a spacious market-place, 5½ acres in extent, having at its eastern end the exchange, with a richly-decorated façade (rebuilt 1814). In another group not far off are the guildhall and other municipal offices (1888), in the French Renaissance style of architecture; two theatres (1865-84); and University College (1879-81), with well-equipped technical schools and a natural history museum; it received a charter of incorporation in 1903. Other edifices worthy of mention comprise a hospital (1781, with additions 1829-79); a Roman Catholic cathedral (1844), cruciform and Early English; and the high school, founded as a grammar or free school in 1513; it is largely endowed, and annually offers for competition eight exhibitions of a value of £435, besides scholarships. There is also a municipal school of art. Nottingham aspires to a university and a port; and improvement of the Trent waterway has been undertaken. In 1870-84 Nottingham was the seat of a suffragan bishop under Lincoln. On the outskirts race-meetings were held annually in March and October for a hundred years until 1890; the Trent Bridge cricket-ground is the scene of the county's home matches; whilst mention must not be omitted of the annual goose fair held at Michaelmas. Of the various manufactures carried on in the town the most important are those of lace and hosiery; baskets, bicycles, cigars, and needles are also made, whilst several iron-foundries are in operation, and malting and brewing are extensively carried on. One of the most successful sewage farms in the country has been laid out 5 miles from the town, the whole of whose sewage is here dealt with. Pop. (1801) 28,801; (1831) 50,220; (1891) 213,984; (1921) 262,658. In the history of Nottingham, which was one of the Five Boroughs, the principal incidents have been its occupation by the Danes, and their withdrawal on the conclusion of a treaty for peace (868); its destruction by fire (1140 and 1153); the granting of its first charter (1155); the convening of three parliaments (1330-37); the appointment of its first suffragan bishop (1534); the raising by Charles I. of his standard at the commencement of the Parliamentary war (1642); and riots (1795-1816), partly on account of a bread famine and partly owing to the Luddites (q.v.). See the borough *Records* (1882-1900), works by Dickinson (1816), Wylie (1853-65), Hine (1876), W. H. Stevenson (4 vols. 1890), and Guilford (1920), besides those cited under the county.

Nottinghamshire, or NOTTS, an inland county of England, bounded on the N. by Yorkshire, E. by Lincolnshire, S. by Leicestershire, and W. by Derbyshire. Its greatest length is 50 miles; average breadth, 20 miles; and area, 844 sq. m., or 540,123 acres. Pop. (1801) 140,350; (1831) 225,400; (1891) 445,823; (1921) 641,134. Apart from the valley of the Trent, which is very flat, the general aspect of the county is undulating and well wooded, the highest ground—600 feet above the sea-level—being in the

west, in the vicinity of Sherwood Forest (q.v.). In the south are the Wolds, consisting of upland moors and pasture-lands broken up by many fertile hollows, whilst the northern boundary for upwards of 15 miles is skirted by the Car, a tract of low-lying land, formerly a swampy bog, but since 1796 drained and brought into cultivation. The Trent, with its tributaries, the Erewash, Soar, and Idle, is the principal river, and the Fosse Dyke and Notts and Grantham canals, and London, Midland, and Scottish, and London and North-eastern railways also traverse the county. The climate, especially in the east, is remarkably dry and the soil varies, sand and gravel, clay, limestone, and coal-land prevailing in different districts. In productiveness it is not above mediocrity, except in the Vale of Belvoir to the east of Nottingham. The cultivation of hops has been discontinued. The principal mineral products are coal, gypsum, iron ore, and limestone. The manufactures are noticed under the chief towns—viz. Nottingham, Newark, Mansfield, Retford, and Worksop, the two former also being the scene of most of the historical events connected with the county. Notts returns nine members to parliament, one for each of its five divisions (Bassetlaw, Newark, Mansfield, Broxtowe, and Rushcliffe), and four for Nottingham (its capital and assize town). Of its natives the best known are Archbishops Cranmer, Secker, Sterne, and Manners-Sutton; Garnet (the Jesuit); Denzil Lord Holles; General Ireton, and his contemporary Colonel Hutchinson; Lady Mary Wortley Montagu; Bishop Warburton; Dodsley, Kippis, and Wakefield (the authors); Admiral Earl Howe; Sandby and Bonington (the artists); Dr Erasmus Darwin; Edmund Cartwright; Fynes Clinton; Kirke White, Byron, 'Festus' Bailey; Speaker Denison; 'General' Booth; Samuel Butler (the author of *Erewhon*); D. H. Lawrence.

See county histories by Thoroton (1797), Bailey (1852-55), Briscoe (1881), White (1885), C. Brown (1891), and the 'Victoria History' (1906 *et seq.*).

Nouméa, capital of New Caledonia (q.v.); pop. 9000.

Noun. See GRAMMAR.

Novalis, the pen-name of Friedrich von Hardenberg, German writer, who was born at Wiedersdorf, near Mansfeld, in Prussian Saxony, 2d May 1772. Whilst being educated at Jena, Leipzig, and Wittenberg he came under the influence of Schiller, and became acquainted with Fichte, Fr. Schlegel, and Tieck, studied deeply the works of Boehme, and imbibed himself with the spirit of Romanticism to such an extent that he was afterwards designated the 'Prophet of Romanticism.' He made his start in life as a mining official. At Weissenfels (1795) he fell in love with a beautiful young girl, whose early death left a lasting impression upon him. Ere many years were past he himself, delicate from his boyhood up, was seized with consumption, and died 25th March 1801. The principal tenets of his two philosophical romances, both left incomplete, *Heinrich von Ofterdingen* and *Die Lehrlinge zu Saïs*, were that life ought to be poetry realised in practical conduct, and that there are in the universe many verities and realities the truth of which cannot be grasped by the cold, critical intellect; they can only be known by the sympathetic intuition of feeling. His *Hymnen an die Nacht* are a glorification of his sorrow at the loss of his mistress. These, together with his *Poems* and *Sacred Songs*, are the only finished productions he has left. Novalis penned many thoughtful and suggestive sentences, often in very graceful language; but on the whole his writings lack precision of thought and robust common sense; their prevailing atmosphere is

a mystic twilight, where is much obscurity, but also much beauty and much deep feeling. His *Sämmtliche Werke* (2 thin vols.) were published by Tieck and Fr. Schlegel in 1802. To these a third volume, containing a supplement to the *Life* printed in vol. i., together with poems and philosophic fragments by Novalis, was added in 1846. See Carlyle, *Miscellaneous Essays* (vol. ii.), the German *Life* published at Gotha (2d ed. 1883), E. Heilbronn, *Novalis der Romantiker* (1901), and Novalis's correspondence with the Schlegels (Mainz, 1880).

Novara, capital of a North Italian province, 60 miles N. of Turin by rail, with a colossal cathedral (rebuilt 1831), several fine churches, a trade in silk, grain, and wine, and manufactures of silk, cotton, and linen. Here the Sardinians were utterly defeated by the Austrians under Radetzky on 23d March 1849. Pop. 56,000.

Nova Scotia, a province of the Dominion of Canada, lying between 43° 25' and 47° N. lat. and 59° 40' and 60° 25' W., long., consists of a long, narrow peninsula, and the island of Cape Breton, which is separated from the mainland by the Strait of Canso. It is bounded on the N. by Northumberland Strait, which separates it from Prince Edward Island, and by the Gulf of St Lawrence; NE., S., and SE. by the Atlantic Ocean; W. by the Bay of Fundy; and NW. by New Brunswick, with which it is connected by an isthmus only 15 miles wide, separating Chignecto Bay, the north-western branch of the Bay of Fundy, from Northumberland Strait.

The greatest length of the province is 386 miles, the greatest breadth about 100 miles, and the area, including the Bras d'Or Lakes (360 sq. m.) in Cape Breton Island, 21,428 sq. m.—one-third less than that of Scotland. Pop. (1806) 67,515; (1851) 276,117; (1871) 387,800; (1891) 450,523; (1901) 459,574; (1911) 492,338; (1921) 523,837. The principal cities and towns are Halifax, the capital (58,000), Sydney (22,500), Glace Bay (17,000), Amherst, New Glasgow, Sydney Mines, Dartmouth, Truro, Yarmouth.

The coast-line is about 2000 miles in length, and the shores abound with excellent harbours. There are numerous rivers, but few of them are more than 50 miles long. The most important are the Avon, Annapolis, Shubenacadie, Lahave, and Margaree. Among the lakes the chief is Great Bras d'Or Lake, really a landlocked arm of the sea, about 50 miles long, with an area of about 230 sq. m., and a depth of water varying from 12 to 60 fathoms. The next largest lakes are Lake Rossignol, 20 miles in length; Ship Harbour, 15 miles long; Lake Ainslie; and Grand Lake. The most remarkable body of water in the province is Minas Basin, the east arm of the Bay of Fundy (q.v. for its tides), penetrating 60 miles inland, and terminating in Cobequid Bay. The country is beautifully variegated by ranges of hills and broad valleys, both of which run longitudinally through the province. The Cobequid mountains, as they are called, run through the interior of the province. On each side of them are rich arable lands. The Annapolis valley is especially favourably situated. The southern part of Cape Breton is very much the same in appearance as the northern part of the mainland, but the northern part of the island is bold and steep, the land at Cape North being 1800 feet above the sea-level. The distance from Cape North to Cape Ray on the Newfoundland coast is 60 miles.

The climate of Nova Scotia is remarkably temperate considering its northern latitude. The extreme of cold is 20° below zero, and the extreme of heat 94° in the shade. The western counties

average from 6 to 8 degrees warmer than the eastern, and in Annapolis county the mercury rarely falls below zero. Vegetation is very rapid, and the autumn forms a delightful season. Spring is rather tedious, and the winter variable. Fogs are prevalent along the coasts, but do not penetrate inland to any extent.

Agriculture and horticulture are among the principal industries in the province. Oats and buckwheat, Indian corn, tomatoes, potatoes, turnips, and all root-crops grow in abundance. Wheat is grown to some extent. Apples, pears, plums, cherries, and other garden fruits attain the utmost perfection. The apple-orchards in Annapolis and Kings counties are famous. They extend along the roadside in an almost unbroken line for 100 miles, and in the autumn form a sight not soon forgotten. More attention than formerly is now being devoted to dairying and to the raising of live-stock. The manufactures of the province are yet limited, but are being developed. Cottons and woollens are manufactured in various parts of the country. There are iron-works at Londonderry, steel-works at Sydney and New Glasgow, and stove and hardware works at Amherst; and there are also several sugar-refineries, paper-mills, boot and shoe and other manufactures of leather, manufactories of agricultural and other machinery, of furniture and wooden ware, and many sawmills. The shipbuilding industry was formerly a most important one, but has suffered from the substitution of iron for wooden vessels. Mining is extensively carried on. The production of gold has fallen off. Coal and iron are abundantly distributed and extensively worked. Notwithstanding that the export of coal to the United States fell off considerably when the reciprocity treaty with that country came to an end in 1866, the output of coal did not decrease, the falling off in the United States trade being more than counterbalanced by the great increase in the consumption in the Dominion. Now Nova Scotia furnishes about a third of the Dominion's yield. Other minerals are also abundant, including silver, manganese, gypsum, antimony, copper, slates, granites, sandstones, and several varieties of precious stones. The fisheries of Nova Scotia are regarded as among the finest in the world. A large number of men and boats are engaged in the industry. The waters abound with mackerel, cod, herring, shad, salmon, halibut, haddock, lobsters, &c. The chief exports of Nova Scotia are fish-products, minerals, lumber, agricultural products, and general manufactures.

There are 1450 miles of railway in the province, which is connected with both the Canadian and United States railway-systems. There are two canals in the province, one from Halifax to Cobequid (not now in use), and the other connecting St Peter's Bay and Bras d'Or Lake. The maritime situation is very favourable for sea-borne trade, the coast-line has many deep indentations, and the harbours on the Atlantic and Bay of Fundy coasts are accessible to shipping all the year round.

The religious denominations according to the census in 1921 were as follows: Roman Catholics, 161,000; Presbyterians, 110,000; Baptists, 87,000; Anglicans, 86,000; Methodists, 59,000. Education is free, and there are numerous public schools and academies, besides a normal school, technical schools, several convents, Dalhousie University, Halifax; Acadia University (Baptist), Wolfville; St Francis University (Roman Catholic), Antigonish; and King's College University, Windsor. The last, belonging to the Church of England, was founded in 1787. Its buildings were burned down in 1920.

The public affairs of the province are administered by a lieutenant-governor, and legislative council of

twenty-one members, and a house of assembly of forty-three members elected by the people for four years. The province is represented in the Dominion parliament by ten senators and fourteen members of the House of Commons.

Unlike some of the provinces, Nova Scotia has but little land available for agricultural purposes that may be given by a grant from the crown. Throughout the province, however, many farms with buildings already erected are available at moderate prices to make comfortable homes. Excellent shooting and fishing are to be found all over the province, especially in the less accessible parts, where big game is still fairly abundant.

History.—Nova Scotia was first visited by Cabot in 1497, and the first colonisation recorded is that in 1604 of the French under De Monts, who attempted for some years to form settlements at Port Royal—now Annapolis—St Croix, &c. The settlers were finally expelled by the English colonists of Virginia, who claimed the country by right of the discovery of Cabot. Other attempts were made at colonisation, but with small success. The country was ceded to France by the treaty of Breda in 1667; its possession, however, remained a source of contention between England and France, until it was finally ceded to England by the treaty of Utrecht in 1713. A memorable event in the history of the province was the expulsion of the Acadians (see ACADIA) in 1755. Cape Breton was the scene of many struggles between the French and British, especially in the neighbourhood of Louisburg (q.v.). In 1763 it was annexed to Nova Scotia. It was subsequently made a separate province, but again united to Nova Scotia in 1819. Many attempts were made to develop Nova Scotia, but the foundations of its present position date from the immigration in 1784 of the loyalists who preferred to take up their homes in British territory rather than remain under the sovereignty of the United States. The province of New Brunswick was created in 1784 out of Nova Scotian territory.

See Haliburton's *Nova Scotia* (1829), Murdoch's *History of Nova Scotia* (1867), Hannay's *Nova Scotia* (1879), Kingsford's *History of Canada* (1889), and Bourinot's *Builders of Nova Scotia* (1900).

Novatian, a priest of the Roman Church in the 3d century, and the leader of a sect called after his name. The place and time of his birth are not known with certainty. Novatian is said to have been a stoic philosopher, but after his arrival in Rome was converted to Christianity, and, being seized with sudden illness while still a catechumen, received what was called *clinical baptism*—i.e. baptism administered on a sick-bed and without the solemn ceremonial. Such baptism was in ordinary circumstances an impediment to holy orders. Notwithstanding this irregular baptism, Novatian was promoted to orders by Fabian the Roman bishop, and soon acquired great reputation by his learning and eloquence. Soon after the Decian persecution a great controversy arose about the manner of dealing with the lapsed—i.e. those who fell away during persecution. Novatian at first inclined to the milder side, but on the election of Cornelius to the Roman bishopric (March 251), and on Cornelius taking the indulgent course towards the lapsed, Novatian, together with Novatus and some other discontented priests of Carthage, opposed his authority, and eventually Novatian was chosen by a small party and actually ordained bishop in opposition to Cornelius. The party who espoused his cause was called by his name. They were confined mainly, in the first instance, to Rome and to Carthage, where a similar conflict had arisen. They held that in the grievous sin of idolatry through fear of persecution the church had no power to absolve

the penitent; and therefore, although it does not appear that they excluded such sinners from all hope of heaven, yet they denied the lawfulness of readmitting them to the communion of the church. This doctrine they extended at a later period to all grievous sins of whatever character. In this view the church was merely a community of saints whose very existence is endangered by the presence of one sinner. Cyprian (q.v.), at first rigorous against the lapsed, gradually abated his severity.

Novatian may thus be regarded as the first antipope. The churches throughout Italy, Africa, and the East adhered to Cornelius; but the Novatian party set up bishops and established churches not only at Carthage, but at Constantinople, Alexandria, Nicomedia, in Phrygia, Gaul, Spain, and elsewhere. They claimed for themselves a character of especial purity, and assumed the appellation of Cathari (Puritans). The time and manner of the death of Novatian is uncertain. According to Socrates he died a martyr in the persecution of Valerian, but this is improbable. His sect survived long after his death. An unsuccessful effort was made in the Council of Nice to reunite them to the church; and traces of them are still discoverable in the East down to the end of the 6th century. See the *Letters* of Cyprian, Eusebius; also Walch's *Ketzerhistorie* (vol. ii.).

Novaya Zembiya, an Arctic land belonging to Russia, lying between the Kara Sea and Barents Sea, and separated at its southern extremity from the island of Vaigatch by Kara Strait, 30 miles wide. Long and narrow, it measures 600 miles from north to south and 60 in average width, and is cut in two nearly midway up by a narrow winding sea-passage, the Matchkin Shar. The western side is broken by several bays, often studded with islands. The interior is mountainous throughout, the mountains, covered with snow and ice, rising to 4000 feet or more. The rocks are Cambrian, Devonian, and Permo-Carboniferous. The continuation of the Gulf Stream reaches the western shores and prevents them from being always icebound. Almost without permanent inhabitants, it is visited by Russian and Norwegian seamen and hunters for the capture of the numerous sea-fowl, whales, walrus, seals, and dolphins which frequent its coasts. It was known to the hunters of Novgorod in the 11th century, but was rediscovered by Sir Hugh Willoughby in 1553. A Norwegian scientific expedition under Professor Høltedahl visited it in 1921.

Novellæ. See JUSTINIAN.

Novello, VINCENT, musical composer and publisher, was born in London, of an Italian father and English mother, on 6th September 1781. He officiated as organist in various chapels in London, and was one of the founders of the Philharmonic and similar musical societies. His musical compositions, chiefly sacred, are considered to have contributed much to the improvement of cathedral music. But it is as a painstaking editor of unpublished works of eminent musicians that he deserves chiefly to be remembered. He died at Nice, 9th August 1861.—His daughter, CLARA ANASTASIA, a distinguished vocalist, was born in London in 1818; won great triumphs in many great cities; married Count Gigliucci in 1843; quitted the stage in 1860; and died at Rome 12th March 1908. See her *Reminiscences* (1910).

Novels. 'Novel,' as the name of a thing, came to us with the thing itself from Italy early in the reign of Elizabeth. Boccaccio, from whom Painter took the 'excellent novelles' in his *Palace of Pleasure*, applies 'novella' somewhat indiscriminately, and in his preface speaks of 'novels or fables

or parables or stories' as if they meant pretty much the same thing; but in Provençal, and according to the *Cento Novelle Antiche*, 'noella' or 'novella' seems to have meant originally some new drollery, jest, or bon-mot—something, as Borghini explains, that pleased by its freshness, and the 'noellaire' or 'novellatore' to have been a kind of jester who collected and retailed such things. Most of the *Cento Novelle* and a large number of Boccaccio's, notably those of the sixth, seventh, and eighth days, are of this sort, and in the collections of Sacchetti and Ser Giovanni the proportion is still greater. In fact the primitive novella was something much more akin to the *facetiae* of Poggio, the *Cent Nouvelles nouvelles*, the stories of the *Heptameron*, the *Hundred Merry Tales*, and even their humble relatives, the jests attributed to Joe Miller, than to the long, grave, and often tragic narratives that appeared under the title when it had grown elastic in the 16th century. But if 'novel' has departed from its original signification, 'romance' has wandered still farther. The word originally had nothing whatever to do with any form or species of composition. It was simply the name given in the middle ages to the spoken language of the commonalty, particularly in France and Spain, in contradistinction to the Latin or Letra, the language of the learned classes and the language used in documents and writings of all kinds. In time, however, it came to mean not only the vehicle but also the thing conveyed; anything in Romance was called romance, and naturally the term was extensively applied to the great source of popular recreation, the songs of the minstrels and *trouvères*, by which it was in the end almost monopolised. Hence the two meanings of 'romance' in Spanish—(1) the vernacular ('en buen Romance' is the precise equivalent of our phrase 'in plain English'); (2) a piece of popular narrative poetry such as we mean by the word 'ballad.' In France the place of the ballad was supplied by much longer and more elaborate compositions, like the *chansons de geste*, and to these the title of 'romans' was very generally given. But it is noteworthy that, 'romance' or 'romans,' it was applied, in Spain exclusively and in France all but exclusively, to compositions in verse, and that the prose-works which we now call the romances *par excellence* were not so styled in their own time. The romances of chivalry were called by their authors or editors chronicles, histories, or books; but, except in one edition of *Lancelot*, never romances; and the still more typical romances, the heroic romances of the 17th century, *Polexandre*, *Cassandre*, *Pharamond*, *Ibrahim*, and the like, seem to have been indebted to Scarron, but certainly not to their authors, for the name. Neither 'novel' nor 'romance,' in short, has any historical or etymological claim to stand for the latest development of prose fiction; nor is there any warrant for a distinction between the novel and the romance founded on a predominance of the real or the ideal, the ordinary or the extraordinary, the comic or the tragic, a distinction which, in practice, it would be impossible to draw. The names are purely conventional. What we call a novel the French call a *roman*; if they shared our somewhat contemptuous feeling for the romantic perhaps they would have followed our example, as we perhaps might have followed theirs if, instead of bad news, we talked of hearing bad novels.

For the origin of the thing so called there is no need to search very far. To ask where fiction came from, or what particular race or people were the inventors of it, is very much like asking who invented singing. If we must find a source for it, or fix it upon someone, a child in a corner telling a

story to itself, with its playthings for *dramatis personæ*, or Maggie Tulliver unfolding the tale of the earwig's domestic troubles to her cousin Lucy, will be as near the fountain-head of fiction as we need go. The demand for fiction seems to follow very closely upon the demand for food. 'Tell me a story' is among the earliest expressions of our wants in life, and so far as we can see it has been, one from time immemorial, and everywhere and always story-tellers of one sort or another are to be found striving as best they can to comply with the call. It is true that we cannot see very far back, and that our only available sources of information convey a very imperfect idea of story-tellers and story-telling in the remote past. The fragments and specimens that have come to us through tradition and literature can no more give a complete view of the fiction of the age they belong to than the fossils in a cabinet of the fauna and flora of the globe when they were living things. They have been preserved by accident, or by the possession of some property or feature conducing to preservation, while types and species less favoured have left no trace behind them of their existence. To take an example, every one at all acquainted with it must have noticed how strongly the didactic element asserts itself in early eastern fiction. By far the greater number of the specimens that have come down to us through the *Panchatantra*, *Hitopadesa*, *Bidpai*, *Lokman*, *Æsop*—for in strictness he must be counted among the Orientals—and other channels are fables with a moral attached. Now it is obvious that these cannot be the earliest type of fiction. Children call for stories, but not (in real life at least) for instruction or improvement until some years have passed over their heads; and what is true of children is true of humanity. But the very earliest productions of the fable family are entirely destitute of this appendage, and are mere stories told for their own sake. Properly they belong to a still earlier type than the fable, the story where animals and inanimate things speak and act like human beings, the immediate descendant, no doubt, of the story the child tells to itself about such objects as take its fancy (see *BEAST-FABLES*). It is easy to see how the moral came to be added, and how, once added, it became protective. The story furnished with a moral was preserved by and for the sake of its moral when those told for the story's sake alone dropped out of circulation; and in virtue of its moral it found its way into literature as soon as there was a literature to receive it. It is simply an instance of survival of the fittest; not necessarily of the best, but of the best fitted to survive in the struggle for existence.

The case of *Æsop* above referred to is an illustration of the connection between oriental and European fiction. Some critics maintain that he was an Oriental himself, and identify him with *Lokman*; but without going so far it may be safely said that the fables bearing his name are mainly of oriental origin, and from some source in common with the *Panchatantra*. But this is not the only instance. It is significant that, with scarcely an exception, Greek prose fiction came from Asia Minor, or from islands off the coast, and in most instances the Asiatic influence is distinctly perceptible. Of the Milesian tales we know little, but from that little it seems likely that they were compositions somewhat in the nature of the French *fabliaux*, and like them largely indebted to the eastern story-tellers. *Iamblichus*, the author of the *Babylonica*, and *Heliodorus*, the author of the more famous *Theagenes and Chariclea*, were both Syrians, and clearly drew their inspiration from the same quarter. *Achilles Tatius*, the follower of *Heliodorus*, was of Alexandria. *Xenophon*, who wrote the tale of

Abrocomas and Anthia, was of Ephesus. *Josaphat and Barlaam* was by John of Damascus. *Lucian* was another Syrian, but he cannot be properly included among those who wrote stories for the story's sake, nor indeed among those distinctly influenced by eastern fiction, any more than the author of the graceful pastoral of *Daphnis and Chloe*, whoever he may have been, for 'Longus' is probably a mere clerical error. As M. Chassang says, in his *Histoire du Roman*: 'The taste for the romance passed from the East to Greece;' but it was to the artistic instinct of the Greeks that the novel or romance owed the remarkable development we see in *Daphnis and Chloe* and *Theagenes and Chariclea*. The taste passed into Italy also about the same time, but more probably through the medium of the Milesian and Sybarite tales than directly from the East; and it bore fruit in the *Satyricon* of *Petronius Arbiter* and the *Metamorphosis*, or *Golden Ass*, of *Apuleius*, in each of which the best-known episode is derived from an eastern story. The *Cupid and Psyche* of *Apuleius* and *Petronius' Widow of Ephesus* are found in divers forms, and of the latter there is even a Chinese variant.

The collection of fables, partly from the *Panchatantra* and *Hitopadesa*, called *Kabila wa Dimna* had a great share in the spread of oriental stories in the middle ages throughout western Europe, but chiefly in Spain, where, introduced probably by the Arabs, it helped to furnish material for the *Disciplina Clericalis* of *Pedro Alfonso* and the *Conde Lucanor* of *Don Juan Manuel*. But even more influential was a work that still circulates as a chap-book in most European countries, *The Seven Wise Masters of Rome*, which, under a variety of titles, *Erastus*, *Dolopathos*, *Syntipas*, *Sindebad Nameh*, *Sandabar*, *The Seven Vizirs*, and through Latin, Greek, Hebrew, Arabic, and Persian, may be traced back to Sanskrit. Such collections of fables, apologies, and tales, each in a setting more or less ingenious of its own, and borrowing freely from its predecessors—story-books of a class that has been made familiar by *The Thousand and One Nights*—were very numerous at the time, and served as a mine of oriental fiction to mediæval Europe. The *Gesta Romanorum*, which is in fact a European story-book on the oriental model, was largely indebted to this source, but not nearly so much as the *fabliaux* (properly 'fableaux,' diminutive of 'fables') of the *trouvères*, who found in the inventions of the eastern story-tellers precisely the sort of tale which their easy verse and *esprit gaulois* could readily adapt to the taste of their audiences. It was from the *fabliaux* that the Italian *novellieri*, from *Boccaccio* to *Bandello*, and not only they, but also the compilers of the *Cent Nouvelles nouvelles* and of the *Heptameron*, and the gay novel-writers of the 16th century in general, chiefly took their lightest, liveliest, most satirical, and sometimes most licentious tales; and in this way the fiction of the East came in numberless instances to be incorporated in the literature of Europe.

But the *trouvères* were at the same time laying the foundations of another very different species of novel. There were audiences for whom the *fabliaux* were too light and trivial, and who demanded a lay of a more serious and earnest character and of deeper interest, and for these they had the *chanson de geste*, a sort of minor epic, dealing for the most part with the deeds or adventures of some real or legendary hero, and standing in much the same relation to the *fabliaux* as tragedy, or at least serious drama, to light comedy and farce; and from these *chansons de geste* in process of time, as reading became a more common accomplishment, and books began to take the place of the lays of the minstrels, came the prose romance

of chivalry. Not, of course, that every romance of chivalry had its origin in the verse of a *trouvère*; there is no evidence, for instance, that the story of Lancelot was ever the subject of a *chanson de geste*, though there can be little doubt that it furnished a theme for Welsh and Armorican ballads long before Walter Map took it in hand. But unquestionably the early romances of chivalry were as a rule made from earlier metrical romances, as these again, no doubt, from shorter and ruder pieces of verse; the process being, presumably, first legend or tradition, then ballads of some sort embodying incidents of the legend, then the isolated ballads connected, unified, and polished into a *chanson de geste* by a bard of a higher order, and finally the prose romance, sometimes curtailing, but oftener expanding the *chanson*. The process is well seen in the romances of the Charlemagne cycle: the connecting-link between the legend and the *chanson* has, of course, disappeared, but it has left its traces plainly visible in the *Chanson de Roland*, the germ of the whole; and we find the legends of Gascony and the Ardennes and of Charlemagne's troubles with his foes and vassals first furnishing a subject for the *trouvère*, and then passing into prose romances like *Huon de Bordeaux*, *Les Quatre fils Aymon*, *Fierabras*, and *Ogier le Danois*. Nor is it confined to the romances of chivalry proper, of Arthur and the Round Table and Charlemagne and the Peers; for the romances of the borderland between chivalry and faerie, *Parthenope of Blois*, *The Knight of the Swan*, *Melusina* (q.v.), and the like, were all apparently sung by the *trouvères* before they sought readers in prose. See ROMANCES.

The Spanish family of romances of chivalry came into the world long after the age of the *trouvères*, though it is very likely that Amadis of Gaul, the founder of it, may have made his first appearance in verse. He is mediæval, but all his progeny, which includes not merely the Amadis series, but also the Palmerins and isolated romances, are of modern birth, and a connecting-link between the novel of the middle ages and the novel of our own day. They were the products of a variety of causes—the taste created by the Amadis, the recent invention of printing, which made such reading a comparatively cheap luxury, and, above all, the condition of Spain at the time. M. Chassang, in the book already quoted, has a remark not wholly complimentary to novelists and novel-readers, to the effect that story-telling flourishes most where the people are most idle. The peoples of the East were, and still are, the most prolific of story-tellers, because, living under paternal governments, they have always had a surplus of time upon their hands. The Greeks and Romans did without stories so long as their republics lasted, for his share in the affairs of the state gave each man employment enough for his spare time and thought, and it was not till Greece became subject to Rome and Rome to the emperors that the Greek and Latin romances came into existence. This theory, if we accept it, will account for the passion for romances that raged in Spain in the 16th century, until cured by the drastic remedy of Cervantes. The end of the great national struggle with the Moors, the establishment of the Inquisition, the absorption of all political power and authority by the sovereign, and the general stagnation in public life left the upper and middle classes to a great extent without occupation. Only a few could follow Cortes and Pizarro, and the majority had to resign themselves to inaction, made all the more irksome by the memories of a stirring past, and warm their blood as best they could with the imaginary adventures and sound and fury of the chivalry romances. The chief charge brought by

every assailant of these productions, from Pedro Mexia to Cervantes, is that they infected their readers with their own extravagance, and made them think in their style and fancy themselves acting the scenes they read of. But this was the great attraction; they were indulged in, like bhang or opium, for the sake of the pleasant insanity that attended indulgence. Don Quixote's madness, if an extreme, was not a solitary case; and astute romancers, like Feliciano de Silva and Marcos Martinez, knew well that the stronger they made the dose the better they pleased their readers, and on principle kept them well plied with rant, bombast, and absurdity, and fooled them to the top of their bent.

But if Cervantes purged his country of sham chivalry, from the bonfire of Don Quixote's books—to borrow the witty image of M. Demogeot—'an unlucky phoenix rose up for the ennui of the 17th century,' the heroic romance, *Polexandre*, *Cléopâtre*, *Cassandre*, *Ibrahim*, *Clélie*, and the rest. Another variety of romance, however, the pastoral, had some share in the genesis of the heroic romance. The Spanish pastorals, supposed by some to have been the descendants of *Daphnis and Chloe*, were in reality, through the *Arcadia* of Sannazaro, the offspring of the Renaissance worship of Virgil, of which were born all the pining shepherds and obdurate shepherdesses that haunt the poetry of the 16th century. For a time they disputed in a feeble way the ascendancy of the chivalry romances, and were threatened with the same fate by Cervantes; but they were left to live out their innocent lives in peace and die at last of their own insipidity. To them, or rather to Montemayor's *Diana*, the first and best of them, we owe one of the patriarchs of the English novel, Sidney's *Arcadia*, and the French owe Honoré d'Urfé's *Astrée*, the precursor of the heroic romances. These were based partly on chivalry, partly on pastoral romance; their strength lay in their combination of sentiment and swagger, the latter borrowed from the chivalry romances, the former from the pastorals; and their one merit, perhaps, was that they provoked some excellent satires, such as Boileau's 'Héros de Roman,' Furetière's *Roman Bourgeois*, Sorel's *Berger Extravagant*, Scarron's *Roman Comique*, and Mrs Lennox's *Female Quixote*.

But a far more important variety of fiction came into existence in Spain in the time, and partly through the influence, of the chivalry romances. These were every day growing wilder and wilder and more and more regardless of all common sense and observance of decent probability, when a little book, called *The Life of Lazarillo de Tormes*, made its appearance. It did not pretend to be a satire or even a protest against the romances in fashion; it merely suggested that a story just as interesting and amusing might be got out of real, everyday life, without magicians, giants, flying dragons, or enchanted palaces, seeing that tastes varied, and that, as Jean Sautrain of Lyons put it in the French translation of 1560, it was not everybody that took delight in reading of heroic deeds. And in fact the *Lazarillo* is studiously unheroic, and the exact opposite of a romance of chivalry. The hero is a beggar boy, or rather a beggar-man's boy; hunger and thrashings are the dragons and giants he has to encounter; his adventures and achievements are cheating and outwitting his masters; the empire of Trebizond that crowns his career is the office of town-crier of Toledo, and the princess that bestows her hand upon him, the doubtful house-keeper of a sly old priest. It was the first genuine attempt at realism in literature, and for the first time in the history of fiction readers found themselves taking pleasure in the creations of the story-teller, not because they were remote from ordinary

experience, but because they were familiar. Finding favour, as a matter of course it had successors. It was followed by the *gusto picaresco* novels, the tales of Spanish rogue and vagabond life, of which *Guzman de Alfarache*, *Marcos de Obregon*, and Quevedo's *Vida del Buscon* are the best-known examples. They took up with this phase of life partly in deference to the precedent of *Lazarillo*, partly because it was a life rich in adventures and incidents, but chiefly because it was a phase of life familiar and real to all readers in Spain in the 17th century. And not in Spain alone, apparently, for the truth of the picaresque novels seems to have been recognised wherever there were readers in Europe; the best of them were translated almost immediately into French, and very soon into English, Italian, German, and Dutch, and, as repeated editions show, took their place everywhere among the acknowledged purveyors of amusement. In Germany, indeed, they may be said to have laid the foundation of the novel in Grimmelshausen's *Simplicissimus*, and in England we need only turn to Defoe for proof of their influence. *Colonel Jack* and *Moll Flanders* are picaresque novels pure and simple, with their parentage stamped upon their features, and there are marks about *Captain Singleton* and *Roxana* that show them to be of the family.

But it was through Le Sage that the picaresque novel came to be influential in shaping modern fiction. Like a keen-eyed horticulturist who detects in some wild plant useful properties that may be indefinitely developed by cultivation, or germs that only need the gardener's skill to expand into endless varieties of form and colour, Le Sage saw the capabilities of this rough growth of Spanish humour, and how its asperities might be removed without impairing its virtues. It may be said it was no great discovery to perceive that disreputable life is not the only one that affords material available for a story of real life, that rascality and roguery are not the only qualities from which amusement may be extracted, and that whatever may be the artistic advantages of a scoundrel, there is on the whole more to be made of a hero who will be accepted by the reader as a man and a brother. But this is only what is said of every discovery as soon as men have come to look upon its consequences as matters of course. Great or small, however, this was Le Sage's discovery, and whether it was of importance or not the modern novel of real life and character will show. It would be difficult, perhaps, to define with precision the extent of Le Sage's share in the formation of this great necessary of present-day existence, but of its reality there can be no question. To take only one illustration out of many—in *David Copperfield* and elsewhere Dickens has left it on record that the favourite stories of his boyhood were *Roderick Random* and *Peregrine Pickle*, a training which shows its fruits in *Pickwick* and all his early works; but if *Gil Blas* was not in the same way Smollett's primer in fiction we have his own word for it that it was the model he set before him when he undertook to 'point out the follies of ordinary life.' This much, at least, cannot be disputed, that he was one of the great masters of the art of story-telling, the first to show an artist's knowledge of the value of details and the right use of realism, and the first to make clear the distinction between the novel and prose fiction in general. *Pantagruel* and *Gulliver's Travels* are not novels, not because the ordinary characteristics of the novel are wanting, but because Rabelais and Swift have merely assumed the disguise of a storyteller for the sake of gaining access to quarters otherwise inaccessible, precisely as Burton put on a pilgrim's dress in order to get into Mecca. In

Don Quixote and *Robinson Crusoe* there may be just as little of the conventional features of the novel, but there is no disguise; they take their places among the novels unchallenged, while the title of *Tristram Shandy* must remain at least questionable, for though it may be called 'The Life and Opinions of Tristram Shandy,' it is in reality 'the freaks and grimaces of the Rev. Laurence Sterne.' Le Sage's theory, so far as we may infer one from his practice, seems to have been that to tell a story is the novelist's business, and to keep to it with singleness of purpose his duty as an artist.

In the foregoing necessarily brief outline of the history of the novel it will be seen that in its growth there has been at work a process very much like that which regulates other growths. One form springs from another, supplants it through being better adapted to surrounding circumstances, and lasts just so long as the adaptation lasts. In the novel, too, as in other cases, forms that have been in this way pushed aside have a tendency to reappear if circumstances favour them. The long-winded sentimental novels of the 18th century were only a reversion of the *romances de longue haleine* of the 17th in a soil that happened to suit them; and in the novels of Horace Walpole, Clara Reeve, and Mrs Radcliffe the spirit of the later romances of chivalry asserted itself, just as the spirit of the older and truer chivalry romance found expression in Scott. *Quentin Durward* is a genuine romance of chivalry, modified only by genius and modern influences. In its extraordinary powers of multiplication and variation also the latter-day novel seems to be subject to natural law. The varieties of wild animals and plants are few, and seldom strongly marked; but no sooner does man for his pleasure or comfort appropriate any living thing, dog or pig, rose or cabbage, than it acquires a variability and fertility apparently limitless. Thus it has fared with the novel ever since Le Sage undertook the domestication of an adaptable species. Having become not merely a source of amusement, but a necessary adjunct of modern life, it now rivals the rabbit in fecundity, and runs into varieties more widely different than greyhound, bulldog, and toy-terrier. This luxuriance of growth, however, cannot be regarded with unmixed satisfaction. It would be no small evil if the novel from an honoured branch of literature were to degenerate into a manufacture.

See Dunlop's *History of Prose Fiction* (1814; ed. H. Wilson, 1888); O. L. B. Wolff's *Allgemeine Geschichte des Romans* (Jena, 1850); Alexis Chassang's *Histoire du Roman, et de ses Rapports avec l'Histoire* (Paris, 1862); Landau's *Beiträge zur Geschichte der Italienischen Novelle* (Wien, 1875); Professor Erwin Rohde, *Der Griechische Roman und seine Vorläufer* (Leip. 1876); F. Bobertag's *Geschichte des Romans in Deutschland* (Breslau, 1876-79); B. Tuckerman, *History of Prose Fiction* (1882); S. Lanier, *The English Novel and Principles of its Development* (New York, 1883); Vte. E. M. De Vogüé, *Le Roman Russe* (2d ed. 1886); André Le Breton, *Le Roman au Dix-septième Siècle* (Paris, 1890); Huet, *Traité de l'Origine des Romans*; Lenglet du Fresnoy, *De l'Usage des Romans*, and *Bibliothèque des Romans*; and Bougeant's amusing satire on them, the *Voyage du Prince Fan-Férédin dans la Romancie*; Jusserand, *The English Novel in the Time of Elizabeth*; Raleigh, *The English Novel* (1894); Saintsbury, *The English Novel* (1913); Cross, *The Development of the English Novel* (1899); W. L. Phelps, *The Advance of the English Novel* (1919).

November (Lat. *novem*, 'nine') was among the Romans the ninth month of the year, and contained 30 days. It subsequently was made to contain only 29, but Julius Caesar gave it 31; and in the reign of Augustus the number was restored to 30, which number it has since retained. Its

festivals are All Saints (1), St Hubert (3), St Martin (11), St Catharine (25), and St Andrew (30).

Novgorod ('new town'), a famous city of Russia, on the Volkhof, near where it issues from Lake Ilmen, 110 miles SSE. of St Petersburg by rail. It is the cradle of Russian history. In 864, according to tradition, Rurik was invited hither by the neighbouring tribes, and from him begins the history of the country and the line of its sovereigns. As early as the 12th century it had important connection with the Hanse cities, and it became the market of north-east Europe. During the time of its prosperity the town was called Novgorod the Great, and had 400,000 inhabitants, and extended its sway to the White Sea and the river Petchora. Its government was a sort of republic. The greatness of Novgorod provoked the jealousy of the princes of Moscow, and in 1471 the tsar Ivan III. nearly destroyed the town, bereft it of its liberties, and exiled the most influential citizens; and when Archangel was opened for English trading-vessels, but especially after the foundation of St Petersburg, its trade fell away, and the town rapidly declined, till now it is but the shadow of its former self. Of the existing ancient buildings the most remarkable are the church of St Sophia, founded in the 11th century, and built on the model of St Sophia at Constantinople, possessing some remarkable paintings and tombs; several others of more than thirty churches; and wall surrounding the Kreml. Pop. 26,000.

Novi, a town of Italy, 30 miles NW. of Genoa by rail; pop. 20,000. Here in 1799 the French were defeated (15th August) and victorious (6th November).

Novipazar, a town of Yugoslavia, on the Raska, an affluent of the Morava, 120 miles SE. of Sarajevo; pop. 11,000. The sanjak of Novipazar, mountainous and barren, but strategically important, was occupied by Austria-Hungary in 1879-1908, but the civil administration reserved to the Porte. After the war of 1912-13 it was divided between Serbia and Montenegro.

Novi Sad, Serbian name of Neusatz (q.v.).

Novorossisk, a fortified port on the Black Sea, to the SE. of Anapa in Russian Caucasia, with trade in corn, cement, and petroleum; pop. 50,000.

Novotcherkask, a town of southern Russia, on the Aksai, a tributary of the Don, 40 miles from the Sea of Azov, was capital of the Don Cossacks country; pop. 60,000, who carry on agriculture, cattle-breeding, fishing, wine-growing, and the making of candles and bricks.

Nowogeorgiewsk, a Polish fortress on the Vistula, 20 miles NW. of Warsaw.

Nowy Sącz. See SANDEC (NEU).

Noyades. See CARRIER (JEAN).

Noyau. See LIQUEUR.

Noyes, ALFRED (b. 1880), a fluent poet of wide appeal, published *The Loom of Years* in 1902, *The Flower of Old Japan* (a dainty verse allegory, 1903), *Drake* (blank-verse epic in 12 books, 1908), and other verse, largely heroic (*Collected Poems*, 3 vols. 1910-20), besides plays, short stories, essays, and *William Morris* in the 'Men of Letters' series. *The Torchbearers* (1922 *et seq.*) is an epic trilogy on the progress of science.

Noyes, J. HUMPHREY. See PERFECTIONISTS.

Noyon, a town in the French department of Oise, 67 miles NNE. of Paris by rail. It has a fine cathedral in the Transition style of the 12th century, an hôtel-de-ville (1485-1523), and a former episcopal palace. Pop. 7000. The *Noviodunum* of Caesar, Noyon was a residence of Charlemagne and Hugo Capet, and the birthplace of Calvin.

Town and cathedral suffered severely in the Great War (q.v.).

Nubia is a comparatively modern name for a large region of Africa, under the Pharaohs called Kush, later a portion of Ethiopia (q.v.), and now mostly included in Anglo-Egyptian Sudan. It extends on both sides of the Nile from Egypt to Abyssinia, touching the Red Sea on the east and the desert on the west. The pre-dynastic culture may have come to Egypt through Nubia. Later the tide of civilisation ran the other way, though under the twelfth dynasty we see signs of Nubian influence in Egypt (see GALLAS). For later history see ETHIOPIA, EGYPT, SUDAN; also MEROE. At present the country is occupied by races belonging to several different stocks, much mixed. The chief elements are Arab, more or less mixed with Nilotic and Negro blood, mainly in Upper Nubia; Ababdeh and Bisharin between the Nile and the Red Sea; and Nubas and Barabira in Lower Nubia, on and near the Nile between Assuan and Dongola. The Semitic Arabs are comparatively recent intruders to this region. They entered Nubia after occupying Egypt in the 7th century, but were resisted by the Christian Dongolawi kings till the 14th century, when the Arabs, assisted by a large contingent of Bosnians, became masters of the land. Both in its lower and upper sections Nubia is for the most part an expanse of steppes or rocky desert, with patches where grass sometimes grows, and ravines in which moisture enough is found to keep alive a few mimosas or palms, and to raise pasture for gazelles and camels. There are also wells and small oases here and there, as on the chief caravan routes. The great 'Nubian Desert' lies east of the Nile, opposite the great western bend of the river. Below Khartum rain is almost unknown; the climate is accordingly excessively hot and dry, and, except in the river-ports after the fall of the Nile, is very healthy. The only exception to the general aridity is the narrow strip of country on both sides of the Nile, which nowhere exceeds four miles in breadth, and in many places is only a quarter of a mile wide. The most fertile part is near Dongola. A mountain barrier bounds the valley on both sides of the Nile, and consists of granite and sandstone.

Nuble, an inland province of Chile. Capital, Chillán (q.v.).

Nucellus. See OVULE.

Nucleus. See CELL.

Nudibranchiata. See GASTEROPODA.

Nuevo León, a northern state of Mexico, of which Monterrey (q.v.) is the capital.

Nuggets. See GOLD.

Nukha, a town of the republic of Azerbaijan; it is on the southern slope of Caucasus, and 120 miles E. of Tiflis; pop. 50,000.

Nullification, in the history of the United States, refers especially to the action of the legislature of South Carolina in 1832, declaring certain acts of congress unconstitutional and therefore null and void. In 1828 congress passed what became known as the 'tariff of abominations,' which discriminated unfairly against the people of the southern states. There cotton was the staple product, and any step tending to impose restrictions on the commercial intercourse with Europe, where its principal markets lay, was bitterly opposed; whereas in the north, with its manufacturing interests, a protectionist policy had steadily grown in favour. In 1832 congress readjusted the tariff, modifying some of the objectionable features, but still leaving the southerners unjustly treated. In November a state convention in South Carolina passed an ordinance nullifying the tariff of 1828 and 1832, and declaring their right and intention,

in the event of any attempt at coercion, to withdraw from the Union and organise a separate government. In December President Jackson (q.v.) issued a vigorous proclamation against the ordinance, and the governor of South Carolina replied with a counter-proclamation, and volunteers, in addition to the state militia, were organised to resist the national government. But in February 1833 Clay, the 'great pacificator,' introduced a Compromise Bill, providing for the gradual reduction by the year 1842 of all higher duties to 20 per cent.; congress passed this on March 2, and on March 15 the South Carolina convention repealed the ordinance of nullification and secession. See CALHOUN; and for the whole question out of which this movement grew, see STATES' RIGHTS.

Numantia, the chief town of the Celtiberian people called Arevaci, in Hispania Tarraconensis, was situated on a steep hill on the Durus (Douro), in the neighbourhood of the present Soria in Old Castile. The site is probably marked by the present Puente de Guaray. Numantia is celebrated for the heroic resistance which it made to the Romans. After a siege of fifteen months, in the course of which famine and the sword had left alive very few of its 8000 brave defenders, it was taken and destroyed by Scipio the younger, 134 B.C. Scipio's army numbered no fewer than 60,000 men.

Numa Pompilius, in the legendary history of Rome, its second king, the successor of Romulus. He was a native of Cures in the Sabine country, and was universally revered for his wisdom and piety. Unanimously elected king by the Roman people, he soon justified by his conduct the wisdom of their choice. After dividing the lands which Romulus had conquered, he proceeded, with the assistance of the nymph Egeria, who gave him interviews in a grove near the city, to draw up religious institutions for his subjects, and thus stands out in the primitive legend as the author of the Roman ceremonial law. His reign lasted for thirty-nine years, and was a golden age of peace and happiness.

Numbers. See PENTATEUCH, BIBLE, APOCALYPTIC NUMBER.

Numbers, THEORY OF, the most subtle and intricate, and at the same time one of the most extensive branches of mathematical analysis. It treats primarily of the forms of numbers, and of the properties at once deducible from these forms; but its principal field is the theory of equations, in as far as equations are soluble in whole numbers or rational fractions, and more particularly that branch known as Indeterminate Equations. Closely allied to this branch are those problems which are usually grouped under the Diophantine Analysis (see DIOPHANTUS), a class of problems alike interesting and difficult, of which the following are examples: (1) *Find two numbers the sum of whose squares shall be a square number*; a condition satisfied by 5 and 12, 8 and 15, 9 and 40, &c. (2) *Find three square numbers in arithmetical progression*: Answer, 1, 25, and 49; 4, 100, 196, &c.

Forms of Numbers are certain algebraic formulas, which, by assigning to the letters successive numerical values from 0 upwards, are capable of producing all numbers without exception—e.g. by giving to m the successive values 0, 1, 2, 3, &c., in any of the following groups of formulas, $2m$, $2m+1$; $3m$, $3m+1$, $3m+2$; $4m$, $4m+1$, $4m+2$, $4m+3$, we can produce the natural series of numbers. These formulas are based on the self-evident principle that the remainder after division is less than the divisor, and that consequently every number can be represented in the form of the product of two factors + a number less than the smaller factor.

By means of these formulas many properties of numbers can be demonstrated without difficulty. To give a few examples. (1) *The product of two consecutive numbers is divisible by 2*: Let $2m$ be one number, then the other is either $2m+1$ or $2m-1$, and the product $2m(2m \pm 1)$ contains 2 as a factor, and is thus divisible by 2. (2) *The product of three consecutive numbers is divisible by 6*: Let $3m$ be one of the numbers (as in every triad of consecutive numbers one must be a multiple of 3), then the others are either $3m-2$, $3m-1$; $3m-1$, $3m+1$; or $3m+1$, $3m+2$. In the first and third cases the proposition is manifest, as $(3m-2)(3m-1)$ and $(3m+1)(3m+2)$ are each divisible by 2, and therefore their product into $3m$ is divisible by 6 (= 1.2.3). In the second case the product is $3m(3m-1)(3m+1)$, or $3m(9m^2-1)$, where 3 is a factor, and it is necessary to show that $m(9m^2-1)$ is divisible by 2: if m be even, the thing is proved; but if odd, then m^2 is odd, $9m^2$ is odd, and $9m^2-1$ is even; hence in this case also the proposition is true. It can similarly be proved that the product of four consecutive numbers is divisible by 24 (= 1.2.3.4), of five consecutive numbers by 120 (= 1.2.3.4.5), and so on generally. These propositions form the basis for proof of many properties of numbers, such as that the difference of the squares of any two odd numbers is divisible by 8. The difference between a number and its cube is the product of three consecutive numbers, and is consequently (see above) always divisible by 6. Any prime number which, when divided by 4, leaves a remainder unity, is the sum of two square numbers: thus, $41 = 25 + 16 = 5^2 + 4^2$, $233 = 169 + 64 = 13^2 + 8^2$, &c.

Besides these there are a great many interesting properties of numbers which defy classification; such as that the sum of the odd numbers beginning with unity is a square number (the square of the number of terms added)—i.e. $1 + 3 + 5 = 9 = 3^2$, $1 + 3 + 5 + 7 + 9 = 25 = 5^2$, &c.; and the sum of the cubes of the natural numbers is the square of the sum of the numbers—i.e. $1^3 + 2^3 + 3^3 = 1 + 8 + 27 = 36 = (1 + 2 + 3)^2$, $1^3 + 2^3 + 3^3 + 4^3 = 100 = (1 + 2 + 3 + 4)^2$, &c.

Numbers are divided into *prime* and *composite*—prime numbers being those which contain no factor greater than unity, composite numbers those which are the product of two (not reckoning unity) or more factors. The number of primes is unlimited, and so consequently are the others. The product of any number of consecutive numbers is even, as also are the squares of all even numbers; while the product of two odd numbers, or the squares of odd numbers, are odd. Every composite number can be put under the form of a product of powers of numbers; thus, $144 = 2^4 \times 3^2$, or generally, $n = a^p \cdot b^q \cdot c^r$, where a , b , and c are prime numbers, and the number of the divisors of such a composite number is equal to the product $(p+1)(q+1)(r+1)$, unity and the number itself being included. In the case of 144 the number of divisors would be $(4+1)(2+1)$, or 5×3 , or 15, which we find by trial to be the case. *Perfect numbers* are those which are equal to the sum of their divisors (the number itself being of course excepted); thus, $6 = 1 + 2 + 3$, $28 = 1 + 2 + 4 + 7 + 14$, and 496 are perfect numbers. *Amicable numbers* are pairs of numbers, either one of the pair being equal to the sum of the divisors of the other; thus, 220 ($= 1 + 2 + 4 + 5 + 10 + 11 + 20 + 22 + 44 + 55 + 110 = 284$) and 284 ($= 1 + 2 + 4 + 71 + 142 = 220$) are amicable numbers. For other series of numbers, see FIGURATE NUMBERS.

The most ancient writer on the theory of numbers was Diophantus, who flourished in the 3d century, and the subject received no further development till the time of Vieta and Fermat (q.v.), who

greatly extended it. Euler next added his quota, and was followed by Lagrange, Legendre, and Gauss, who in turn successfully applied themselves to the study of numbers, and brought the theory to its present state. Cauchy, Libri, and Gill (in America) have also devoted themselves to it with success.

See Barlow's *Theory of Numbers* (1811); Legendre's *Essai sur la Théorie des Nombres* (3d ed. Paris, 1830); and Gauss's *Disquisitiones Arithmeticae* (1801; new ed. 1860; Fr. trans. 1807); H. J. S. Smith, in *Brit. Ass. Reports* (1859-65); Cayley, in *Brit. Ass. Reports* (1875); L. E. Dickson, *History of the Theory of Numbers* (1923).

Numerals. The denary system of notation is due to the fact that we have ten fingers. The rude method of finger-counting has been developed into a highly-complicated system of reckoning, still in use in eastern Europe by pedlars; various positions and arrangements of the ten digits allowing of reckoning as high as 10,000. For permanent purposes a system of single strokes is the most obvious method; and series of strokes as high as four or five are found in various countries in old inscriptions. But strokes, when numerous, are inconvenient and confusing; hence additional symbols are found to make their appearance for 5, 10, 100, and 1000. For the Babylonian system see SCALES OF NOTATION. The Egyptian scheme is illustrated at HIEROGLYPHICS; and from these hieroglyphs were derived the Phœnician, Palmyrene, and Syriac numerals.

After alphabetic writing was in use, the alphabetic signs obviously lent themselves to employment as numerals—either following the order of the letters, each having a successively greater value than its predecessor; or the initial letter of the word for the several numbers might be used. Thus, according to the latter method, the Greek inscriptions used I for 1, II (ἑντε) for 5, Δ (τέκα) for 10, H (the old sign for the rough breathing in ἑκατον) for 100, X (ἑκατοί) for 1000, and M (ἑκατοί) for 10,000. Then a II with a Δ inscribed in it stood for 50 (5 × 10), and with H inscribed (5 × 100) for 500. In this connection the capitals or uncials were used of course. (For the derivation of letters from numerals see OGAM.) Otherwise, following simply the order of the letters, the twenty-four letters of the Ionic alphabet were used for the numbers 1 to 24; the books of the *Iliad*, for example, are often thus numbered. But a more ingenious method was soon adopted by the Greeks, as also by the Hebrews. The alphabet (cursive) was divided into three groups, of which the first did duty for the units, the second for the tens, the next for hundreds. The Hebrew square character had twenty-two distinct letters, and double forms for five of them, so that three groups, each of nine characters, were available. The Greek alphabet, as ultimately arranged, had twenty-four letters; the three additional signs required to make up three nines were obtained by keeping two old letters for ς (see DIGAMMA) for 6, and 5 or 4 (koph) for 90, and adding the superfluous sibilant ϑ (sampi) for 900. Then α to θ were 1 to 9; from ι to κoph were 10 to 90; ρ to sampi were 100 to 900. The thousands were made by subscribing an ι beneath the units; thus α was 1000. Sometimes a sort of algebraic method was employed for larger numbers; βM = (2 × 10,000) 20,000.

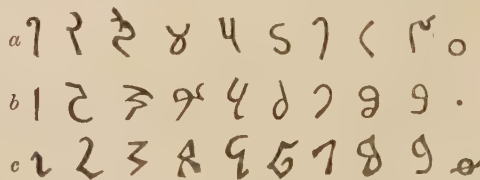
The cumbersome Roman method of using the capitals is familiar enough to ourselves yet. The C has been understood to be the initial of *centum*, and M of *mille*. But some (as Taylor) have contended that the Latins, when they dropped the Greek *phi*, *chi*, and *theta* as phonetic signs, retained them as numerals, with arbitrary values. In this case the C would be originally Θ, assimilated to C, because C was the initial of *centum*. The old ⊕, used for

1000, came to be written CIO, afterwards confounded with ∩ or ∪, the initial of *mille*. The L would be a derivative from an old Chalcidian form of *chi*, inscribed for lapidary purposes ⊥, and then simplified. Those who do not accept the theory of the dropped Greek letters suppose that M is from a circle with a vertical stroke, the C a circle with a horizontal stroke or a cross, ⊕. The X, V, and L might all come from this letter. In any case, X is twice V (whether or not the latter originated in the hand held with the thumb to one side and the other fingers together); and D (for 500) or IO is half CIO.

It is doubtful how far the Abacus (q.v.) has to do with the development of the system of numerals, in which the value of the cipher depends on its position. There were abacus boards so arranged that the first column meant units, the second tens, the third hundreds, the fourth thousands. A method of writing numbers derived from this was actually used in Europe in the middle ages; we show the columnar arrangement simplifying the reading in the several cases, 654, 650, 604, 54.

C	X	I
VI	V	IV
VI	V	IV
VI	V	IV

In the decimal scheme of figures as now used by us, the nine numerals with the zero, which enables the value of the position to be secured without abacus or columnar arrangement, are known as the Arabic numerals, but are unquestionably of Indian origin. From India they were apparently brought to Bagdad after the middle of the 8th century, and their value and use was set forth early next century by the Arab mathematician Abu Ja'far Mohammed Ben Musa, or Al-Kharizmi ('native of Kharizm'—Khiva); whence the system came to be known in Europe, where it became familiar in the 12th century as *Algorism* (erroneously *Algorithm*). The earliest European forms of these characters are found in MSS. of the 12th century; by the 14th they were practically of the same shape as now. The 12th century numerals are evidently forms of the Gobar or western Arabic numerals used in



a, Indian, 10th century; b, Gobar, 10th century; c, European, 12th century.

Persia in the 10th century. These can be traced to the contemporary Indian Devanagari numerals, which again are as certainly based on an old series of characters used in cave-inscriptions in the 1st and 2d centuries. These Canon Taylor contended are (mainly, at least) degraded forms of the Indo-Bactrian alphabet. On the other hand, comparison of archaic Indian and Chinese numerals suggests derivation from a stroke system. In early Indian cave inscriptions one, two, and three resemble the Roman numerals, but the strokes are horizontal instead of vertical. Four and five may be different views of the hand (five showing the thumb). The others are explained as combinations. The modern arithmetic was not practised in England till about the middle of the 16th century, and for a long time after its introduction was taught only in the universities.

See Canon Taylor, *The Alphabet* (1899); Woepke, *Mémoire sur la Propagation des Chiffres Indiens* (1863); Burnell, *South Indian Palaeography* (1874); Trentlein,

Geschichte unsrer Zahlzeichen (1875); G. F. Hill, *The Development of Arabic Numerals in Europe* (1915). See also DECIMAL SYSTEM, SCALES of NOTATION, SHEEP-SCORING NUMERALS.

Numidia (Gr. *Nomadia*, 'land of Nomads'), the name given by the Romans to a part of the north coast of Africa, corresponding to some extent with the modern Algiers, and lying between Mauritania and the Roman province of Africa; on the south it reached to the chains of Mount Atlas. The inhabitants of Numidia, as of Mauritania, belonged to the race from which the modern Berbers are descended. They were a warlike race, and excelled as horsemen, but were proverbially faithless and unscrupulous. Of their tribes the *Massyli* in the east and the *Massesyli* in the west were the most powerful. In the grand struggle between the Carthaginians and the Romans they at first fought on the side of the former, but subsequently the king of the Eastern Numidians, Massinissa, joined the Romans, and rendered them effectual service in the war with Hannibal. Favoured by the conquerors, he united all Numidia under his sway. Of his successors in this kingdom Jugurtha and Juba are the most famous. After the victory of Cæsar over Juba I. in the African war Numidia became a Roman province (46 B.C.); but Augustus afterwards gave the western part, with Mauritania, to Juba II., and the name Numidia became limited to the eastern part. Among important places were Hippo Regius, Zama, and Cirta (the residence of the Numidian kings), afterwards called Constantina, a name still preserved in Constantine. For the modern history of Numidia, see ALGIERS.

Numismatics (Gr. *nomisma*, from *nomos*, 'law,' 'a legally current coin') is the science which embraces the study of the current coins of all nations. In the wider, though less accurate, acceptance of the term it includes also that of medals, both artistic and historical. The various branches of numismatics are (1) Greek, Phœnician, &c.; (2) Roman and Byzantine; (3) Mediæval and Modern; and (4) Oriental. The chief value of numismatics consists in the light which coins throw upon history. The secondary importance of the science is purely artistic. The study of coins is also of great use in elucidating the mythology of the ancients, in fixing the chronology of the different systems of alphabetical writing (Palæography), and in indicating the origin and gradual extension over the civilised world of the principal systems of weighing the precious metals (Metrology). Historically, coins are of the utmost importance as being contemporary and authentic documents furnishing us with in many cases the only means of ascertaining the names of obscure cities and peoples, together with the chronological succession of their kings, tyrants, or chief-magistrates. Artistically, they faithfully record the successive phases of art from its earliest beginnings to its culminating point, and through all the stages of its decline, subsequent temporary revival, and second decadence, to the present day.

I. *Greek Coins*.—The use of the precious metals as mediums of exchange may be traced back to the remotest ages of which we possess any historical accounts. Thus, for instance, we read that Abraham was 'very rich in cattle, in silver, and in gold' (Gen. xiii. 2; xxiv. 35), and in the account of his purchase of the cave of Machpelah (Gen. xxiii. 16) it is stated that 'Abraham weighed to Ephron four hundred shekels of silver current with the merchant.' This use of gold and silver as uncoined money, weighed in the balance, must, however, be carefully distinguished from its use as 'coin,' a word which implies that the ingot or piece

of metal is impressed with an official device, mark, or 'type,' serving the purpose of a guarantee of just weight and value. 'So far as we have any knowledge,' says Herodotus (i. 94), 'the Lydians were the first nation to introduce the use of gold and silver coin.' The best authenticated Greek tradition (Herodotus, i. 94) attributed the invention of coinage to the Lydians; but although the metal of which the earliest coins were made doubtless came from Lydia, it is probable that the invention was due to some of the Greek cities on the Ionian coast, such as Miletus. The most primitive specimens of the art, which may go back to about 700 B.C., if not earlier, are bean-shaped lumps of the native Lydian gold ore, which contained a large admixture of silver, and went by the name of *electrum* or pale gold. The face or *obverse* of the coin bears normally some kind of design (though on the very earliest pieces it is undecorated), and the *reverse* consists merely of the impress of the rude unengraved punch or nail-head which served to keep the ingot in its place while it was being struck. The ingot was placed on an anvil, into which had been let a die engraved in intaglio with the design which it was desired to impress on the obverse; the punch was placed on the top of the ingot, and was held in position by tongs, while the moneyer struck it with successive blows of a heavy sledge-hammer until the impressions of the engraved die on the obverse and of the square nail-head on the reverse were brought into sufficient relief and intaglio respectively. The design or type was the *signet* of the issuing authority (personal ruler or city-state); owing to the intense penetration of Greek life by religion, these signets are more often than not of a sacred character, representing objects or animals consecrated to deities, or the deities themselves.

These one-sided coins with an intaglio or 'incuse' square on the reverse are characteristic of the early stages of the art of coining not only in Asia Minor but in all the Greek cities, for the use of coined money rapidly spread from Ionia over all the coasts and islands of the Ægean Sea. In Greece proper the earliest coins were of silver, and were struck in Ægina in the 7th century B.C. They bear the symbol of a tortoise.

Before the introduction of coinage proper there had been current in Peloponnesus bars or spits (*ὀβελίσκοι*) of iron or bronze, the regulation of which primitive currency, as of the weights and measures of his time, was due to Pheidon, king of Argos, probably about the middle of the 8th century. Such spits have been found in the temple of Hera at Argos, where they were probably dedicated when superseded. From about 700 B.C. onwards the coinage of Greece and of the East may be classified historically in the following eight periods:

(i.) 700–480 B.C.—Period of archaic art, ending with the Persian wars.—The art work on the coins of these two centuries is characterised at first by a rude strength of style, and afterwards by a gradual development into clearly-defined forms, which, however, are always distinguishable by their angularity and stiffness from the freer work of later times. Thus, for instance, the eye of the human face is always drawn, even when in profile, as if seen from the front, both corners being visible, while the mouth wears a fixed and formal smile, due to an attempt to give liveliness of expression. Towards the end of the archaic period a type in relief begins to appear within the incuse square of the reverses. The coins which circulated most widely were, in silver, those of Ægina with the tortoise above referred to; the Corinthian coins with the Pegasus; the tetradrachms of Athens, first introduced by Peisistratus about 550 B.C., obverse, head of Athena, reverse, owl, the sacred bird of that goddess; and, in gold, the famous

Darics, on which the Persian king is represented as a kneeling archer. In the west the chief coins were those of the Greek colonies in southern Italy, Sybaris, Croton, Tarentum, &c., which differ from those of Greece proper in having the figures on the reverse in intaglio instead of in relief.

(ii.) 480-415 B.C.—Period of transitional and early fine art, to the end of the Athenian supremacy.—The coins of this period are characterised by a great advance in the technical skill with which the dies were engraved. The name of the city or of the chief-magistrate now occurs frequently on the reverse, usually in an abbreviated form.

In Asia Minor the chief coinage of this period is the electrum currency of the flourishing commercial city of Cyzicus on the Propontis, so often alluded to under the name of 'Cyzicene staters' by Xenophon and other historians. In Greece proper the Athenian money was still the chief, though by no means the only medium of exchange, and in the West the Corinthian staters, with the figure of Pegasus on the obverse, had a wide circulation. In Sicily Syracuse affords a larger variety of types than any other Greek city, though the finest specimens of the Syracusan monetary art fall into the next period.

(iii.) 415-336 B.C.—Period of finest art, age of the Spartan and Theban supremacies, and of Philip of Macedon.—The art of die-engraving attained in this period a higher point of excellence than it has ever since reached. The coin-types are remarkable for sculptural reserve, intensity of action, or rich and varied ornamentation, according to the requirements of the subject represented. These



Medallion of Syracuse.

are most frequently ideal heads of divinities on the obverses, and mythological figures on the reverses, or agonistic types referring to the local games and religious festivals, such as the victorious quadrigæ on the famous Syracusan medallions (first issued after the failure of the Athenian expedition against Syracuse), which are generally recognised as the finest coins that have ever been struck. In this age the practice of coining money had become universal; the number of mints throughout the civilised world was enormous, every little town striking its own 'autonomous' silver or bronze, and, in some cases, gold currency. In European Greece the gold staters of Philip of Macedon obtained a wide circulation, and his conquests in Greece gradually put an end to the independent issues in that country. Philip's gold was imitated, with ever-increasing debasement of style, by the Celtic tribes of Central Europe and Gaul, and from these imitations were ultimately derived the first primitive gold coins of the Britons.

(iv.) 336-280 B.C.—Period of later fine art; age of Alexander the Great and the Diadochi, characterised by the introduction of the portrait of the reigning monarch in place of the head of the divinity on the obverse.—Before Alexander's time no tyrant, however despotic, had ever ventured to

place his own head upon the coinage of the state. The regal money of Alexander and his successors now gradually superseded the autonomous coinage of the smaller Greek states, except in the west, which was beyond the sphere of Alexander's conquests, and where the cities of Italy and Sicily continued to strike gold and silver until they were in turn brought under subjection by the growing power of Rome (see below).

(v.-vii.) 280 B.C. to the Christian era.—Periods of early and later decline; age of the Epigoni, the Attalids, and of Mithradates the Great.—The silver and gold coinage during these three centuries is almost exclusively regal, and presents us with a remarkable series of lifelike portraits of the long succession of the Seleucid kings of Syria, of the Ptolemies of Egypt, of the kings of Macedon, of Pontus and Bithynia, of the Attalids of Pergamum, and of the successors of Alexander in northern India, many of whom are known to us only from their coins. The chief characteristic of the art of numismatic portraiture, which attained its highest perfection about 250 B.C., is its realism, which is carried in some cases almost to the verge of brutality, as, for instance, on the tetradrachms of some of the kings of Pontus, the ancestors of Mithradates the Great. Among the latest portraits on Greek coins is that of the famous Cleopatra on a coin of Ascalon. She is represented with little of the seductive beauty which we should expect to find on the coins of this fascinating princess. Among the non-regal coins of the 2d century B.C. the large tetradrachms of some of the Greek cities of the western coast of Asia Minor, which re-

gained their freedom after the defeat of Antiochus the Great by the Romans, 190 B.C., are worthy of note; those of Cyme, Myrina, Smyrna, and Magnesia being especially remarkable. Local imitations of the silver coinage of Alexander the Great are also very plentiful. Throughout the greater part of this period Athens continued to coin very plentifully her tetradrachms with the helmeted head of the chryselephantine statue of Athena Parthenos by Phidias on the obverse. These coins formed the chief currency for the trade between Europe and the East.

(viii.) From the Christian era to the reign of the Emperor Gallienus.—During this period of nearly three centuries the Romans per-

mitted the Greek cities in the eastern half of the empire to strike bronze money for local use. It is known to collectors as the 'Greek imperial' coinage. Artistically it is quite without interest, but archæologically it is perhaps more important than the matchless silver and gold currency of the free and independent cities of more ancient times. The Greek imperial coins illustrate the local festivals, religious rites, and municipal institutions which prevailed in the out-lying provinces of the Roman empire, and are also of value as recording the names of the successive chief-magistrates and high officials of the various cities, who appear to have been responsible for the coinage in each locality.

II. *Roman and Byzantine Coins.*—The Romans for the first four centuries of their history had no regular coinage, the chief medium of exchange being bronze, circulating by weight, *aes rude*, in lumps of irregular form. It was late in the 4th century B.C. that the pound-weight of bronze (12 oz.) was first cast into large unwieldy pieces of circular shape, *aes grave*, having on the obverse a head of Janus, and on the reverse the prow of a galley. This was the Libral As; and its divisions were the Semis (6 oz.), the Triens (4 oz.), the Quadrans (3 oz.), the Sextans (2 oz.), and the Uncia (1 oz.), each of which bore a dis-

linet type and mark of value. Somewhat later (perhaps during the Pyrrhic War) silver Roman coins were issued in Campania. As time went on the As was gradually reduced in weight until (circa 269 B.C.) it stood at no more than 2 oz. This reduction is explained by the fact that bronze, originally in Italy the standard metal, was gradually superseded in that respect by the silver money struck at the Capuan mint, so that it was no longer important to maintain the full weight of the bronze money. In 268 B.C. the Roman mint issued for the first time a silver coin, the Denarius, equivalent to ten asses. The fractions of the silver piece were the Quinarius (five asses) and the Sestertius (two and a half asses). In 217 B.C. the weight of the as was further legally reduced to 1 oz. (uncial reduction), and again in 89 B.C. to half an ounce (semuncial reduction). The types of the silver coins, at first constant and uniform, were subsequently varied according to the pleasure of the *triumviri monetales*, as the officers were called who were entrusted with the supervision of the coinage. The long series of the Republican silver money, which extends from 268 B.C. to Imperial times, is sometimes incorrectly known as the Consular or Family series, because the types usually allude to events connected with the family history of the *triumviri monetales*. The Imperial series commenced in the reign of Augustus, who reserved for himself all rights connected with the coinage of gold and silver, though leaving to the senate the privilege of striking bronze at the Roman mint, whose issues were accordingly henceforth distinguished by the letters S.C. (*Senatus Consulto*). Under Augustus, from 15 B.C., and Tiberius gold and silver were issued not from Rome but from Lyons. Supplementary mints were established at Alexandria and elsewhere. All coins now bore the portrait of the reigning emperor, or of some member of the imperial family, and on the reverse, for the most part, allegorical personifications, representations of historical events, architectural monuments, or public buildings. Their inscriptions often furnish us with the exact date of issue. The chief denominations were, in gold, the aureus; in silver, the denarius; and in brass or copper, the sestertius, tarified at four asses; the dupondius, two asses; and the as and semis, sometimes also the quadrans. The large brass coins from Augustus to Commodus supply us with a magnificent series of imperial portraits, but from Septimius Severus onwards there is a rapid deterioration both in art and workmanship. From the reign of Caracalla to that of Diocletian the utmost disorder prevailed in the coinage, each successive emperor debasing it more and more, until the so-called silver denarius became merely a copper coin washed with tin. In 296 A.D. Diocletian entirely reformed the currency, which was again modified by Constantine, who reduced the weight of the aureus from sixty to seventy-two to the pound. The new gold piece was henceforth known as the Solidus, and it maintained its full weight and purity of metal as long as the empire lasted. This coin received in western Europe the name of Bezant or Byzant, from Byzantium or Constantinople, the capital of the eastern empire. The types of the coins of the Christian emperors retained for a time their pagan character, though little by little Christian symbolism crept in, until at length all pagan influence disappeared, and figures of Christ and the Virgin took the place of the allegorical representations of pagan times. The Latin language in the inscriptions on Byzantine coins continued to be used until the middle of the 11th century, when it was finally displaced by the Greek.

III. *Medieval and Modern Coins*.—The coinage of western Europe, down to the time of Charle-

magne, consisted mostly of imitations of the Byzantine coins. That emperor (circa 768 A.D.) introduced a new silver coin called the *new denier*, which soon came into general use.

English.—The *denier* was introduced into England, under the name of the *penny*, by Offa, king of Mercia (757–796), previous to whose time the currency of the Anglo-Saxons had consisted of small gold and silver coins (*sceattas*) and copper coins (*styccas*), which were mainly rude copies of Roman or of Merovingian money. Under the Anglo-Saxon and early Norman kings local mints were established at all the considerable towns in England, and the penny frequently bore on its reverse both the name of the town and of the moneyer by whom it was struck. An attempt to introduce a regular gold currency was made by Henry III., but gold money did not come into general use until the reign of Edward III., who introduced first the florin (6s.), which was at once withdrawn, and then (in 1344) the *noble* (6s. 8d.), with its divisions. This king also was the first to strike in any quantity multiples of the penny, *groats* (4d.) and *half-groats*. Edward IV. added new denominations called the *rose noble* and the *angel*, so called from its type, St Michael slaying the dragon. With the accession of the Tudor dynasty authentic portraits of the reigning sovereign make their first appearance on the coins of the realm, and many new denominations, such as *sovereigns* in gold and *shillings* in silver were added. In the time of Charles I. we note a remarkable improvement in the art of die-engraving, of which the celebrated *Oxford crown* is a good example; on the obverse of which is the king on horseback, with a view of the city of Oxford in the distance. In 1562 the mill and screw were introduced from France for striking coins, in place of the old-fashioned hammer and anvil, but did not come into general use until 1662. On the coins of the Commonwealth the inscriptions are in English instead of Latin, and some of Cromwell's portraits by the famous engraver, Thomas Simon, are worthy of the highest praise. To the series of Charles II. belongs the beautiful *Petition crown*, also by Simon. This coin takes its name from Simon's petition to be reinstated as engraver to the mint, inscribed on the edge: 'Thomas Simon most humbly prays your majesty to compare this, his tryal-piece, with the Dutch, and if more truly drawn and embossed, more gracefully ordered, and more accurately engraved, to relieve him.' The petition was not granted. In Charles II.'s reign the first *guineas* were struck from gold brought from the Guinea Coast, and copper coins, consisting of *halfpennies* and *farthings*, were first regularly established. From this time onwards the English coinage declines very greatly in artistic interest, George IV.'s crown by Pistrucci being perhaps the only modern piece worth noticing. The supposed extreme rarity of Queen Anne's farthings is a myth.

Scottish.—The coinage of Scotland down to the reign of Robert III. followed closely the English types. From this time original designs became more frequent. It reached its highest point of artistic excellence in the reigns of James V. and Mary; the best-known coins of this period are the *bonnet-piece* of the former, representing the king wearing a bonnet, and the *ryal* of the latter, bearing the queen's portrait in profile.

Irish.—The earliest Irish coins were struck by the Danish ruler Sihtric III. (989–1029). They were copied from the pennies of Ethelred II. After this we have no Irish coinage until the partial conquest of the country by Henry II., in whose reign mints were established at Dublin and Waterford, where his son John issued coins as Lord of Ireland. After this the coinage continues, with many gaps,

down to the reign of George IV. Among the more modern Irish coins the gun-metal money of James II. is historically interesting. This was 'money of necessity,' struck after his flight from England. It was decreed in the reign of William and Mary, and redeemed only at metal value.

Western Europe.—The mediæval and modern coinage of the various European states, from the time of the issue of the *denier* by Pépin le Bref (in 757) and of the *new denier* by Charlemagne down to the middle of the 17th century, is of extraordinary historical interest. The Italian coins are artistically superior to the rest, especially in portraiture, where the influence of the Renaissance of art may be clearly traced. An important landmark in the numismatic history of western Europe is the reintroduction of gold money, dating from the first issue of the *florino d'oro* in Florence, 1252. An equally important gold coin, the Venetian *sequin* or *ducat*, was introduced in 1284. The silver *gros* was introduced by St Louis (1226–70). In France the coins of Francis I. and Henry II., and in Germany those of the Emperor Maximilian I., are especially noteworthy. Many of the German *bracteates* (thin pieces struck on one side only) of the 12th–13th century have great interest, and the *thalers*, from the early 16th century onwards, are also of historical value, as their types record the chief events in the history of the cities by which they were struck.

IV. *Oriental Coins.*—Oriental coins fall into three principal divisions: (i.) The coins of India beginning with those of the successors of Alexander the Great in the 3d century B.C. in Bactria and the Punjab, and extending down to recent times. The gold and silver coins of the Pathan kings and of the Mogul emperors may be here particularised, more especially the gold *mohurs* and silver *rupees* of Jehangir with the signs of the zodiac.

(ii.) The coins of the numerous Arab dynasties in Asia, Africa, and Spain consist of *dinars* in gold and *dirhems* in silver. The interest of these Mohammedan issues is purely historical, as they bear no representations of living beings, all such images being forbidden to true believers. Many of these coins possess, however, a beauty of their own as specimens of oriental caligraphy. The inscriptions consist of formulæ of the faith from the Koran, together with the name of Khalif, the place of mintage, and the date of issue. The Kufic coins are the subject of a special article.

(iii.) The coins of China, Japan, and the Far East.—Those of China date from the 7th century B.C., the earliest being in the form of tools, such as spades, knives, &c. In the 1st century B.C. these pieces are replaced by circular discs of brass called *cash*, with a square hole in the centre, a form of coin which has survived until quite recent years. The coins of Japan begin about the 5th century A.D., and are modelled on the later Chinese pattern. Among the more modern Japanese issues are oblong pieces of gold and silver, and large oval plates, called *o-ban* and *ko-ban*, some of which are more than 6 inches in length. Like China, Japan has now adopted a currency modelled on the European pattern.

See Eckhel's *Doctrina Numorum* (1792–98); B. V. Head, *Gold and Silver Coins of the Ancients* (3d ed. 1889) and *Historia Numorum* (2d ed. 1911); G. Macdonald, *Coin Types* (1905), *Evolution of Coinage* (1916), and his *Greek Coins in the Hunterian Museum* (3 vols. 1899–1905); G. F. Hill, *Handbook of Greek and Roman Coins* (1899); Babelon, *Traité des Monnaies grecques et romaines* (1901 et seq.); and the *Catalogues of Greek Coins in the British Museum* (1873 et seq.). On Roman coins the chief works are Mommsen, *Histoire de la Monnaie romaine* (trans. by Blacas, Paris, 1865–75); the *Catalogues of the Roman Republican and Imperial Coins* and of the *Byzantine Coins in the British Museum* (1908

et seq.); Mattingly and Sydenham, *Roman Imperial Coinage* (1923 et seq.). On mediæval, modern, and oriental coins: J. A. Blanchet, *Numismatique du Moyen Âge et Moderne* (1890); A. Engel and R. Serrure, *Traité de Numismatique du Moyen Âge* (1891 et seq.), and *Traité de Numismatique Moderne* (1897–99); Ruding, *Annals of the Coinage of Great Britain* (1840); Hawkins, *Silver Coins of England* (1887); Kenyon, *Gold Coins of England* (1884); the *British Museum Catalogues of Anglo-Saxon Coins and Norman Coins* (1887 et seq.) and *Handbook of Coins of Great Britain, &c.* (1899); E. Burns, *Coinage of Scotland* (1876); the *British Museum Catalogues of Oriental Coins* (1875–90) and of *Indian Coins* (1908 et seq.); O. Codrington, *Manual of Musulman Numismatics*; E. J. Rapson, *Indian Coins*; the *Catalogue of Coins in the India Museum, Calcutta* (1906 et seq.); and *Catalogue of Coins in the Panjab Museum* (1914).

Nummulites, or NUMMULINA ('money-fossils'), a genus of fossil foraminifera, the shells of which form immense masses of rock of Eocene age. They are circular bodies of a lenticular shape, varying in magnitude from the merest point to the size of a florin or larger. The shell is composed of a series of small chambers arranged in a concentric manner. The growth of the shell does not take place only around the circumference, but each whorl invests all the preceding whorls, so as to form a new layer over the entire surface of the disc, thus adding to the thickness as well as the breadth, and giving the fossil its lenticular



Nummulites.

form. A thin intervening space separates each layer from the one which it covers, and this space at the margin swells out to form the chamber. All the internal cavities, however, seem to have

been occupied with the living sarcodæ, and an intimate connection was maintained between them by means of innumerable parallel tubuli, which everywhere pass from one surface to another, and which permitted the passage of the sarcodæ as freely as do the minute pores or foramina of the living foraminifera. The name is given to them from their resemblance to coins. The genus appears first in the Carboniferous system, where it is represented by one small form. Several species are also met with in Jurassic and Cretaceous rocks, but the genus reached its maximum in Eocene times. It is represented at present by only a few small forms.

NUMMULITE LIMESTONE, an important member of the Eocene system of southern Europe, &c., consists of a limestone composed of nummulites held together by a matrix formed of the comminuted particles of their shells, and of smaller foraminifera. It attains a thickness of several thousand feet, and has been traced over a vast area. It occurs on both sides of the Mediterranean basin, in Spain and in Morocco. It enters largely into the composition of the Apennines, the Alps, the Carpathians, and the Balkans; it extends through Greece, Egypt, and Asia Minor, and thence through Persia and the Himalayas to the coasts of China and Japan.

Nun (O.E. *nunna*; Low Lat. *nunna* or *nonna*, 'mother'; Gr. *nannē*, *nenna*, 'aunt'; Sansk. *nandā*, a familiar word for 'mother,' corresponding to Sansk. *tatā*, 'father'), a member of a religious order of women. The general characteristics of the religious orders will be found under the head MONACHISM (q.v.) and under those of the several orders. Of arrangements peculiar to the religious

orders of women the most striking perhaps is the strictness in the regularly authorised orders of nuns taking solemn vows, nuns of the 'cloister,' or enclosure, which no extern is ever permitted to enter, and beyond which the nuns are never permitted to pass, without express leave of the bishop. The superiors of convents of nuns are called by the names Abbess, Prioress, and, in general, Mother Superior. They are, ordinarily speaking, elected by chapters of their own body, with the approval of the bishop, unless the convent be one of the class called exempt houses, which are immediately subject to the authority of the holy see. The ceremony of the solemn blessing or inauguration of the abbess is reserved to the bishop, or to a priest delegated by the bishop. The authority of the abbess over her nuns is very comprehensive, but a precise line is drawn between her powers and those of the priestly office, from which she is strictly debarred. The name of nun is given in general to the sisters of all religious congregations of females who live in retirement and are bound by rule; but it is primitively and properly applicable only to sisters of the religious orders strictly so called. In most cases, soon after the foundation of the orders for men corresponding orders have been established for women. The usages as to diet, fasting, clothing, &c. are very various in the different communities. The veil of reception given to a postulant at the beginning of her novitiate is white; that of profession, given at the end of it, is black in some orders, white in others.

Nunc Dimittis, the name given to the canticle of Simeon (Luke, ii. 29-32), which forms part of the compline office of the Roman Breviary, and is retained in the evening service of the Anglican Church when it follows the second lesson.

Nuncio. See LEGATE.

Nuncomar. See HASTINGS (WARREN).

Nundydroog (*Nandidrug*), a fortified hill in Mysore, 31 miles N. of Bangalore, and 4810 feet above the sea. The extensive fortifications on the plateau-summit were erected by Hyder Ali and Tippoo Saib, and were stormed by a British force in 1791. The place is now used as a health-resort by Europeans from Bangalore.

Nuneaton, a municipal borough (1909) in the Warwickshire coalfield, 9 miles N. of Coventry. Industries besides coal-mining are the ancient ones of worsted, cotton, and woollen spinning and weaving, iron and sheet metal, hats, artificial silk, and elastic webbing. To the 'Etone' ('water town'), of Domesday the prefix 'Nun' was added when a Benedictine nunnery, of which some ruins remain, was founded in Stephen's time. There is a good Gothic church (mostly 14th century). John Ryder, archbishop of Tuam, was a native (1697); and George Eliot was born at Arbury Farm, just outside Nuneaton (the 'Milby' of *Scenes from Clerical Life*). See also *Amos Barton*, *Felix Holt*, and *The Mill on the Floss*. Pop. 42,000.

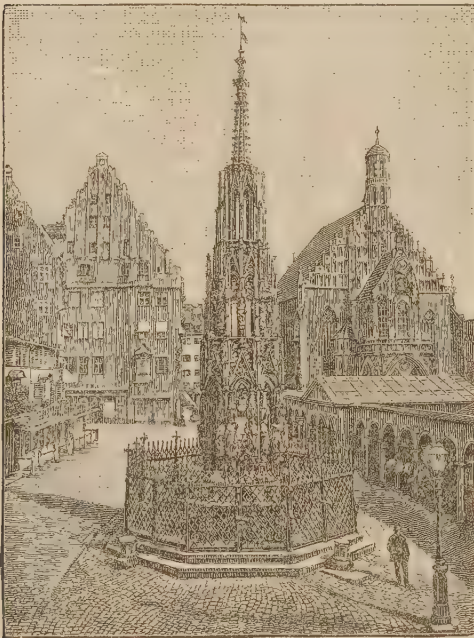
Nuraghe, or NURHAG, the name of round towers, in shape truncated cones, of which 3000 are scattered about the island of Sardinia. They vary from 20 to 60 feet in diameter, rise 30 or 40 feet above the ground, with two or three stories of domed chambers connected by a spiral staircase, and are made of granite, limestone, basalt, porphyry, sandstone, and schist, built in regular courses of roughly-hewn stone, without cement. Some of the stones in the lower courses weigh 12 tons each. Believed to be late Bronze Age fortified dwellings, they closely resemble the tal-yots of Minorca and the Brochs (q.v.) of Scotland.

Nur ed-Din Mahmūd, MALEK AL-ADEL, emir and sultan of Syria, was born at Damascus

in 1117. His father, Omad ed-Din Zenghi, originally governor of Mosul and Diarbekir under the Seljuk sultans, had established his independence, and extended his authority over northern Syria. Nur ed-Din Mahmūd succeeded him in 1145, and changed the seat of government from Mosul to Aleppo. From this time onwards his life was one long duel with the Christians—the Crusaders, Hospitallers, Templars, and Knights of the Latin Kingdom of Jerusalem. The most notable incidents in this contest may be briefly summarised. Count Joscelin, in an attempt to recover his capital, Edessa, was signally discomfited under its walls, and his army almost annihilated. This gave occasion to the second Crusade. The Crusaders were, however, foiled by Nur ed-Din before Damascus, and, being defeated in a number of conflicts, abandoned their enterprise. The emir next conquered Tripolis and Antioch, the prince of the latter territory being defeated and slain in a bloody conflict in June 1149; and before 1151 all the Christian strongholds in Syria were in Nur ed-Din's hands. He next took possession of Damascus (which till this time had been ruled by an independent Seljuk prince) in 1153. About this time a terrible earthquake devastated Syria, levelling large portions of Antioch, Tripolis, Hamath, Hems, and other towns; and Nur ed-Din devoted all his energies to repairing the damage done. In 1157 the Christian orders suffered a severe defeat near Paneas; but an illness which prostrated their enemy in 1159 enabled them to retake some of their lost territories. Recovering, Nur ed-Din soon won back what had been taken from him, and turned his attention to Egypt, then governed by the effeminate and degenerate Fatimites. In 1168 his brother, Asad al-Din Shirkoḥ, overran Egypt, but, dying soon afterwards, was succeeded by his nephew, the celebrated Saladin (q.v.), who completed the conquest of the country, and restored the Sunnite faith. This won for Nur ed-Din the gratitude of the khalif of Bagdad, who created him sultan of Syria and Egypt. Nur ed-Din, however, grew jealous of his able young lieutenant, and was preparing to march into Egypt in person, when he died at Damascus in May 1173. This prince is one of the great heroes of Moslem history. He was not a savage conqueror, but zealously promoted the cultivation of the sciences, arts, and literature, and established a strict administration of justice throughout his dominions; he was revered by his Moslem, and greatly respected by his Christian, subjects.

Nürnberg (English sometimes *Nuremberg*), a city in the Bavarian province of Middle Franconia, in a sandy but well-cultivated district, on the little Pegnitz (a sub-affluent of the Main), 95 miles N. by W. of Munich. It is the quaintest and most interesting town of Germany, on account of the wealth of mediæval architecture which it presents in its many-towered walls, its gateways, its picturesque streets with their gabled house-fronts, its bridges, and its beautiful Gothic fountains. The Burg or palace, built (c. 1024-1158) by Conrad II. and Frederick Barbarossa, commands a glorious view of the surrounding country, and is rich in paintings and wood-carvings. Of eight fine churches the two finest are St Lawrence (1274-1477), with two noble towers 233 feet high, exquisite stained glass, the famous stone tabernacle (1495-1500) by Adam Kraft, and the wood-carvings of Veit Stoss; and St Sebald's (c. 1225-1377), with the superb shrine of Peter Vischer. Other noteworthy objects are the Italian Renaissance town-hall (1622); the law-courts (1877); the gymnasium, founded by Melanchthon (1526); the Germanic museum (1852); an industrial museum (1871); a library; Albrecht Dürer's house; and the statues of him, Hans Sachs, and

Melanchthon, with the 'Victoria' or soldiers' monument (1876). Although the glory of Nürnberg's foreign commerce has long since passed away, the home trade is still of high importance. It includes the specialties of metal, wood, and bone carvings, and children's 'Dutch' toys and dolls, which, known as 'Nuremberg wares,' find a ready sale in every part of Europe, and are largely exported to America and the East. There are numerous factories, producing also machinery, rolling-stock, lead-pencils, beer, &c.; and the town besides does a vast export trade in hops. Pop. (1818) 26,854; (1875) 91,018; (1890) 142,590; (1910) 332,651; (1919) 352,679, mainly Protestants.



Schönbrunnen Fountain, Nürnberg.

First heard of in 1050, Nürnberg was raised to the rank of a free imperial city by Frederick II. in 1219. In 1417 the Hohenzollerns sold all their rights to the magistracy. This put an end to the feuds which had hitherto raged between the burghs and the municipality; and Nürnberg for a time became the chief home in Germany of the arts and of inventions—watches or 'Nuremberg eggs,' air-guns, globes, &c. Simultaneously it grew rich with the fruits of the great commerce which it maintained between the traders of the East and the other European marts. The discovery of the Cape passage to India deprived it of its pre-eminence, and the Thirty Years' War completed the decay of the city, which a century before had embraced the Reformed doctrines. In 1803 it retained its independence, with a territory of 483 sq. m. and 80,000 inhabitants, but in 1806 was transferred to Bavaria.

Nursery Rhymes, metrical jingles transmitted in folklore and mechanically repeated by children at their play, without knowledge of their significance or origin. Being in verse form they are easily preserved, either as mere traditional rhymes, or as formulas to be used in games; and, as unconscious survivals of a remote antiquity, they not infrequently preserve for the scientific inquirer fragments of ancient incantations for healing diseases or revealing the future, and invocations combined with ceremonial observances, while

the intimate nature of the religious conceptions involved points back unmistakably to a mediæval origin. Children with all their inventiveness and imagination are slaves of the letter, and most of their game-formulas are handed down from generation to generation along with the games themselves. In their characteristic directness, point, and quaintness of phrase, they defy imitation, and in their faculty of arresting the imagination from age to age they reveal the instinct of perpetuity. Many of them are beyond doubt survivals among children of May games, ring-songs and dances, rounds, and kissing games which in old England were played by grown-up people, and those of the higher grades of society.

Under the same general head we include nursery rhymes proper, and counting-out rhymes (to decide who shall begin a game), cumulative rhymes, courting and love games, playing at work, flower oracles, and riddle and guessing games; while on the other hand popular mottoes, old saws and maxims relating to husbandry, the weather, or the like, and all the wealth of local rhymes and sayings belong to the popular rhymes of folklore generally. The verses usually consist either of a rhyming couplet, or of four lines in which the second and fourth rhyme; they are often accompanied by a refrain, which may be a single added line, or may be made up of two lines inserted into the stanza; and in place of exact consonance, any assonance, or similarity of sound, will answer for the rhyme.

See FOLKLORE, PROVERBS, SHEEP-SCORING NUMERALS, and RIDDLES; also J. O. Halliwell-Phillips, *Nursery Rhymes of England* (1842; 6th ed. 1860); R. Chambers, *Popular Rhymes of Scotland* (1842); E. Rolland, *Rimes et Jeux de l'Enfance* (Paris, 1883); W. Wells Newell, *Games and Songs of American Children* (new ed. 1903); Lady Gomme, *Traditional Games of Great Britain* (1894-98), *Children's Singing Games* (1904); Haddon, *The Study of Man* (1898); and Miss Eckenstein, *Comparative Studies in Nursery Rhymes* (1906).

Nursing. The nursing of the sick, which has become one of the largest and most important professions open to women, traces its origin from early Greek history. The daughter of Asclepius, who assisted in the rites of the temples in which the diseased were laid, was known as Hygieia. The temple of Hippocrates, the celebrated physician of antiquity, in the island of Cos, was the most famous of all, and the 'oath of Hippocrates' has governed the healing profession to this day, as it has given it its highest ideals. The careful bedside study of disease which he initiated made nursing, i.e. tending and watching the patient, a matter of immense importance. He also realised the absolute necessity for cleanliness, and his advice might stand nurses in good stead even to the present time. In Roman days there is not much to relate of the development of the nurse as apart from the multitude of drug-sellers, bath-attendants, midwives, &c.; it was in the middle ages that the Christian idea of help to the weak and suffering arose, and this was largely undertaken by women through religious orders and associations. There was a great hospital movement in Europe dating from the 12th century, and by the 15th century quite a number of hospitals were established in England. Our great London hospitals, such as St Bartholomew's (1123) and St Thomas's (1215), date from these early days. The work of nursing was one of charity or penance, and there were no technical qualifications needed for the nurse.

It may be said that these conditions obtained until the middle of last century. Certainly at that time nursing had reached a very low ebb. Perhaps Dickens in his picture of the immortal 'Sairey Gamp' did as much as any one to bring home to the nation the depths that it had reached.

Nursing was not a profession; it was hardly an occupation for respectable young women. In the great hospitals the records of the early part of last century continually tell of dismissals for drunkenness and other misdemeanours. Though it was considered desirable that nurses should be able to read and write, this regulation had to be relaxed owing to the difficulty of obtaining nurses. 'We always engage them without a character,' wrote a doctor, 'as no respectable person will undertake so disagreeable an office.'

The movement for a change in their condition proceeded from Germany, though the influence of the great religious revival under Wesley, and the advanced views of the Society of Friends and notably of Elizabeth Fry, had a marked effect upon it in England. In Germany it was even more distinctly religious than it was in England, and it started with a Protestant Order of Deaconesses at Kaiserswerth, under the direction of Pastor Fliedner. Fliedner had come into touch with English philanthropists, and it was at Kaiserswerth that the real reformer of nursing, not only in England, but throughout the civilised world, Florence Nightingale, obtained her training. It was through the immense power and driving-force of this one woman that nursing became what it is—a woman's profession so organised as to be the admiration of every country. Florence Nightingale began her work in a private institution in London, but the breaking out of the Crimean war gave her the chance she longed for of developing nursing on an adequate scale. The British sick and wounded were suffering terribly from neglect, and Sidney Herbert, the Minister for War, took the bold step of sending out Florence Nightingale with a company of women nurses, whom she collected with the greatest possible difficulty. How Miss Nightingale did her work at Scutari and elsewhere, and brought order out of chaos, is known to all the world. She had to act sanitary officer as well as nurse, to improve food and clothing as well as give medical care, and hence 'The Lady with the Lamp' became a power to be reckoned with in ill-conducted departments. The health of the army after the war was her constant care, and it is to her influence that the appointment of a Royal Commission to inquire into army medical affairs was due. She wrote much on the subject, but above all she grasped the idea that preventive work is more important even than curative.

The empire gave her a tribute of £44,000, and this—the 'Nightingale Fund'—was used by her for the training of nurses on lines which she devised, and which have been followed to the present day. The scheme was set on foot at St Thomas's Hospital in London. It was thought a severe one in those days, but from the Nightingale students there went forth high-minded and well-educated women who set the standard in hospitals all over the country. Even workhouse and district nurses became transformed under the new influence.

As regards the present condition of nursing, the training given in our large hospitals is very thorough, is rapidly improving under the influence of increased medical and surgical knowledge, and the improvement has been hastened by the experience gained in the Great War. The definite organisation of the profession has been a matter of great difficulty and controversy. The controversy principally raged over the question of state regulation, which, after many futile private efforts, became law under the newly created Ministry of Health in the year 1919. The profession now has self-government; there is a nursing council for England and Wales and another for Scotland. Of the 25 members of the English council, 16 must be registered nurses elected by persons registered

under the act. There are four supplementary registers for male, mental, fever, and sick children's nurses, as well as the general register, and the council regulates the admission to, and the removal from, the register, and it also has to deal with training and examination. There is a college of nursing, which is established as a centre for every sort of nursing activity, and as a body which may help on nursing education in many directions.

Of recent years considerable advance has been made as to increase of pay and reduction of hours of work, but in both these matters much remains to be done. The usual course of general training is now four years, or a minimum of three years before a certificate is given. The endeavour is made to make this general training as comprehensive as possible. Most large hospitals have sister-tutors, specially appointed to give instruction, and all have courses of lectures for the probationers and nurses, followed by examinations. Nurses usually enter on their work in general hospitals about the age of 21. There is also post-graduate teaching in many hospitals. Trained nurses may qualify in some hospitals for the certificate of the Central Midwives Board, in massage and in venereal diseases, as well as in mothercraft. At King's College in London there is a course for trained nurses who aim at becoming tutor-nurses.

Nursing on the Continent has not developed on such thorough lines as in Britain, but it has made great strides in America and in our oversea dominions. In the United States, Teachers College, Columbia University, makes elaborate provision for graduate nurses preparing for special branches of nursing work, and most of the students are working for their bachelor's or master's degree. The effort is made to take a girl straight from school and give her a good general education before she enters on her professional hospital training. The importance of a nurse's work to the state is fully realised in America.

As regards the types of nursing work, they are numerous. There are *district nurses* now to be found in most districts or parishes, who are frequently 'Queen's nurses,' i.e. nurses who have received their ordinary training and, later on, special district training. These nurses are supported locally, and if they do child-welfare or tuberculosis work, they have to qualify specially as health visitors. For child-welfare work the certificate of the Central Midwives Board is required. *Poor law work* has greatly improved in recent years. Excellent training is given in the large poor law infirmaries, but in the small workhouses there is still something to be desired. *Public health nursing* is required in different directions. Besides the county, city, or borough schemes for tuberculosis visiting, &c., the education authorities employ a large number of nurses for dealing with children who have been medically inspected, and whose cases require following up. Fever and isolation hospital cases come under this category, and the course for fever training lasts for two years, possibly being taken before general training begins. *Private nursing* is carried on either from a hospital which sends out its certificated nurses or from an institution, 'co-operation,' or home. There are not many independent nurses, but some visit by the day. Nurses in private nursing homes vary in quality. *Sick children nurses*.—The admission to this part of the register, containing the names of registered sick children nurses, entails their having been trained in a general hospital for children for three years. *Mental nursing*.—For mental nursing there is a three-years' course in a recognised institution for the treatment of mental disorders, and a certificate is granted by the Medico-Psychological Association. Nurses are of both sexes, but

women are being increasingly made use of. Excepting for mental work, there are few male nurses now employed.

There is a Colonial Nursing Association which sends trained nurses to crown colonies and small British communities in foreign countries; and also an Indian Nursing Association which provides trained nurses for Europeans in India.

Army Nursing.—Queen Alexandra's Imperial Military Nursing Service originated in 1902. It has a matron-in-chief at its head, and principal matron, matrons, sisters, and staff under her. There is also a Reserve Service, which in peace time is small, but during the European War it increased to over ten thousand. There is likewise a Territorial Force Nursing Service, which was established in 1907 in connection with the Territorial Army. It is a volunteer and in peace an unpaid service, but was called up along with the Territorial Force in 1914, and by the end of the war its numbers reached 8000. The work of army nursing was assisted by members of Voluntary Aid Detachments (see RED CROSS), two V.A.D. members taking the place of one trained nurse. *Queen Alexandra's Royal Naval Service* is a small one, which serves mainly on land in naval hospitals. The *Royal Air Force Nursing Service* has recently been established, and its nurses mainly serve abroad.

See M. Adelaide Nutting and Lavinia L. Dock, *A History of Nursing* (4 vols. 1921); Sarah Tooley, *History of Nursing in the British Empire* (1906); Sir Edward Cook, *The Life of Florence Nightingale* (2 vols. 1914); Sir Henry Burdett, *The Nursing Profession* (1915), *The Science and Art of Nursing* (4 vols. 1908); E. S. Haldane, *The British Nurse in Peace and War* (1923).

Nut, in popular language, is the name given to all those fruits which have the seed enclosed in a bony, woody, or leathery pericarp, not opening when ripe. Amongst the best-known and most valuable nuts are the Hazel-nut, Brazil-nut, Walnut, Chestnut, and Coconut, all of which are edible. Other nuts are used in medicine and the arts. Some of the edible nuts abound in a bland oil, which is used for cooking, and 'nut-butter.'—In Botany the term nut (*nux*) is used to designate a one-celled fruit, with a hardened pericarp, containing, when mature, only one seed. The Achene (q.v.) was by the older botanists generally included in this term.

Nutation is a slight oscillatory movement of the earth's axis which disturbs the otherwise circular path described by the pole of the earth round that of the ecliptic, known as the 'precession of the equinoxes.' It is produced by the same causes—viz. the attraction of the sun, moon, and planets (the attraction of the last mentioned being so small as to be quite imperceptible) upon the bulging zone

about the earth's equator, though in this case it is the moon alone that is the effective agent. It also, for reasons which need not be given here, depends, for the most part, not upon the position of the moon in her orbit, but of the moon's node. If there was no precession of the equinoxes nutation would

appear as a small elliptical motion of the earth's axis performed in the same time as the moon's nodes take to complete a revolution, the axes of the ellipse being respectively $18''\cdot5$ and $13''\cdot7$, the

longer axis being directed towards the pole of the ecliptic. But this motion, when combined with the more rapid one of precession, causes the pole of the earth's axis to describe a wavy line round P, the pole of the ecliptic.

The effect of nutation, when referred to the equator and ecliptic, is to produce a periodical change in the obliquity of the ecliptic and in the velocity of retrogradation of the equinoctial points. It thus gives rise to the distinction of 'apparent' from 'mean' right ascension and declination, the former involving and the latter being freed from the fluctuations arising from nutation.

Nut-cracker (*Nucifraga*), a genus of birds of the family Corvidæ, with a straight, stout, conical bill, both mandibles terminating in an obtuse point, and tail nearly square at the end. Four species are known, ranging from northern Europe and Arctic Siberia to the Himalayas and China. One species (*N. caryocatactes*) is occasionally seen in Britain and is not uncommon in many parts of Europe and of Asia, particularly in mountainous regions covered with pines. It is about 12 inches long. The plumage is light brown, speckled with white, except on the wings, rump, and tail, which are nearly black. The female shows a somewhat redder brown colour on the wing-feathers. The nut-cracker frequents the tops of the high pine-trees, its favourite food being the pine-cone seeds, which it extracts, holding the cone in its foot. Its diet, however, is often very varied. Its nest of sticks, roots, and grass, lined with moss or lichens, is built on the bough of a tree near the stem and at



Nut-cracker (*Nucifraga caryocatactes*).

some distance from the ground.—A closely allied species (*N. multipunctata*) is found in Kashmir, and a larger species (*N. hemispila*), with browner plumage, in the Himalayas.

Nut-galls. See GALLS, GALL-FLY.

Nut-hatch (*Sitta*), a genus of birds of the family Sittidae, having a straight conical or prismatic bill, short stout legs, the hind-toe very strong, and large hooked claws. They run up and down trees with great agility, moving with equal ease in either direction, and without hopping, so that the motion is rather like that of a mouse than of a bird. They feed on insects, in pursuit of which they examine the crevices and remove large pieces of the bark; at other times on seeds, as those of pines, and the kernels of nuts, to obtain which they fix the nut in some crevice and then hammer it with their bill until the shell is broken, each blow being delivered with the whole strength of the body working from the hip-joint; hence the name of Nut-hatch or Nut-hack. Seventeen species are known, ranging south in the Old World to Southern India and Burma, and in the New World to Mexico, being well represented in North America.



One species (*S. caesia*) is fairly common in many districts of England containing old timber. It occurs in the south of Scotland, and has been reported as seen in Skye and in the Shetlands; but as yet it is unknown in Ireland. It extends through central and southern Europe to Persia and even south-eastern Siberia. Its whole length is about 5½ inches. The upper parts are generally of a blue slate colour; the wing-quills grayish brown; the middle tail-feathers more slate-gray, the remainder black at their bases and barred and



Nut-hatch (*Sitta caesia*).

tipped with white and gray; a black band runs from the base of the bill through the eye to the nape of the neck; the throat and under parts are of a pale cinnamon or rich buff colour; the bill, legs, and feet are brown. The plumage of the female is somewhat duller. Its nest is made of dry leaves or scales of cones, generally in the hole of a tree. From five to seven eggs are laid, of a white colour spotted with reddish brown.—A closely allied species (*S. europæa*), with nearly white under parts, is found in the Danish Islands and throughout northern Europe and northern Asia as far as Japan. The nut-hatch is absent from Malta and Sardinia, but in Corsica a distinct species (*S. whiteheadi*) is found, the under parts being white and the head jet-black in the male. The nut-hatches of Australia and New Guinea belong to a distinct though closely allied genus, *Sitella*. The Blue Nut-hatches (genus *Dendrophila*) are found from Ceylon and India to Burma and Malaya. The Coral-billed Nut-hatch, the only species of another genus (*Hypherpes*), is found only in Madagascar.

Nutmeg. This well-known and favourite spice is the kernel—mostly consisting of the albumen—of the fruit of several species of *Myristica*. This genus belongs to a family of dicotyledons called *Myristicaceæ*, which contains about 150 species, all tropical trees or shrubs, natives of Asia, Papua, Madagascar, and America. They generally have red juice, or a juice which becomes red on exposure to air. The leaves are alternate and without stipules. The flowers are unisexual, the perianth generally trifid, the filaments united into a column. The fruit is succulent, yet opens like a capsule by two valves. The seed is nut-like, covered with a lacinated fleshy aril, the albumen penetrated by its membranous covering. All the species are more or less aromatic in all their parts; their juice is styptic and somewhat acrid; the albumen and aril contain both a fixed and an essential oil, and those of some species are used as spices. The species which furnishes the greater part of the nutmegs of commerce is *M. fragrans*; but the long nutmeg (*M. fatua*), from the Banda Isles, is now not uncommon in our markets. The common nutmeg-tree is about 25 feet in height, with oblong leaves and axillary few-flowered racemes; the fruit

is of the size and appearance of a roundish pear, golden yellow in colour when ripe. The fleshy part of the fruit is rather hard, and is of a peculiar consistence, resembling candied fruit; it is often preserved and eaten as a sweetmeat. Within is the nut enveloped in the curious yellowish-red aril, the *Mace* (q.v.), under which is a thin shining brown shell, slightly grooved by the pressure of the mace, and within is the kernel or nutmeg. Up to 1796 the Dutch, being the possessors of the Banda Isles, jealously prevented the nutmeg from being transplanted; but during the British occupation plants were sent to Penang, India, the West Indies, Brazil, Réunion, where they are now successfully



Nutmeg (*Myristica fragrans*):

a, fruit bursting open; b, the same with one valve removed, showing the seed; c, section of seed; d, seed with the testa removed (Bentley & Trimen).

cultivated. Nutmegs are very liable to the attack of a beetle, which is very destructive, and it is a common practice to give them a coating of lime before shipping them to Europe to kill the vitality of the germ. The nutmeg yields by-expression a peculiar yellow fat, called oil of mace, because from its colour and flavour it was generally supposed to be derived from mace; and by distillation is obtained an almost colourless essential oil which has very fully the flavour of the nutmeg. Nutmegs are chiefly used as a spice, but medicinally they are stimulant and carminative. They possess narcotic properties, and in large doses produce stupefaction and delirium. The trees which are transplanted in the nutmeg parks are generally such as have been propagated from the fruit by a certain blue pigeon. This bird, extracting the nutmeg from its pulpy covering, devours the whole entire. The mace only is digested, and the nutmeg in its shell being voided is readily propagated by the assistance of the bird's dung when it falls in a shady place. If carefully lifted it may be transplanted at any age. The plants do not produce flowers till they are eight or nine years old. The sexes being on different trees, when the plants are two years old the greater number are headed down and grafted with scions from the female tree, a few only of the male to ensure fecundation. Other species of *Myristica* besides those already named yield nutmegs sometimes used, but of very inferior quality. The fruits of several species of *Lauraceæ* also resemble nutmegs in their aromatic and other properties, as the cotyledons of *Nectandra Puchury*, the *Pichurim* Beans of commerce, and the fruit of *Acrodictidium Camara*, a tree of Guiana, the *Camara* or *Ackawai* nutmeg. The clove nutmegs of Madagascar are the fruit of *Ravensara aromatica*, and the Brazilian nutmegs of *Cryptocarya moschata*. All these belong to the *Lauraceæ*. The Calabash Nutmeg is the fruit of *Monodora Myristica*, of the *Anonaceæ*.

Nutria. See COYPÚ, FURS.

Nutrition. See the articles on BLOOD, CIRCULATION, DIET, DIGESTION, FOOD, &c.

Nux Vomica, the seed of *Strychnos Nux-vomica*. The seeds are imported from the East Indies, and are flattish and circular, about an inch in diameter, umbilicated and slightly convex on one side, externally of an ash-gray colour, thickly covered with short satiny hairs, internally translucent, tough and horny, in taste intensely bitter, inodorous. The tree is a native of Coromandel, Ceylon, and other parts of the East Indies. It is a tree of moderate size, with roundish-oblong, stalked, smooth leaves, and terminal corymbs. The fruit is a globular berry, about as large as a small orange, one-celled, with a brittle shell, and several seeds lodged in a white gelatinous pulp.—The bark is sometimes known as *False Angostura Bark*, having been confounded with *Angostura Bark*, which is non-poisonous, and simply has the action of a bitter. The seeds contain (in addition to inert matters, such as gum,



Nux Vomica (Strychnos Nux-vomica) Branch with Flowers:

a, fruit; b, section of fruit (Bently & Trimen).

starch, woody fibre, &c.) two alkaloids closely related to each other, which act as powerful poisons on the animal frame, and speedily occasion violent tetanic convulsions and death. These alkaloids are named *Strychnine* (q.v.) and *Brucine* (q.v.), and exist in the seeds in combination with lactic and strychnic (or igasuric) acids.

Nyam-Nyams. See NIAM-NIAM.

Nyasa, the southernmost of the great lakes of Africa, is about 260 miles SE. of Tanganyika and 400 from the east coast. It lies at an altitude of 1570 feet, is very deep in the middle, shelving rapidly from the shores, which are rocky and high. Long and narrow, it measures 350 miles from north to south and an average of 40 from east to west. The river Shiré used to emerge at its southern extremity, and carry its waters south to the Zambezi. Of late the uppermost part of the Shiré has been dry, leaving Nyasa without an outlet. The waters of the lake are sweet, and abound in edible fish. Although the Portuguese had knowledge of the existence of the lake under the name of Maravi early in the 17th century, Livingstone in 1859 was the first to fix its exact situation and to navigate it.

NYASALAND PROTECTORATE, in 1891-1907 known as the British Central Africa Protectorate, lies along the southern and western shores of Lake Nyasa, extending nearly to the banks of the Zambezi; and includes the Shiré Highlands, the greater part of

the Shiré basin, and Lake Shirwa. It is administered under the Colonial Office by the governor, assisted by executive and legislative councils. The total area is 40,000 sq. m., and the population 1,000,000, of whom 1500 are Europeans and 660 Asiatics. The chief towns are Blantyre (6000), Zomba (seat of the administration), Fort Johnston (chief port of Lake Nyasa), Karonga, at the north end of the lake, and Kotakota, on the western shore. Cotton, tobacco, and tea cultivation has been rapidly developed; coffee and sugar are also grown; rice is largely cultivated; and oats and barley thrive in the uplands. Rubber and ivory are also exported. Almost all the trade is with Britain. The Shiré and the Zambezi having deteriorated as waterways, Nyasaland has come to look more to the railway for outer communications. Railway connection with the Portuguese port of Beira is broken only by the Zambezi, which is to be bridged. Northward extensions are planned. Education is progressing. See Johnston's *Central Africa* (1897), Duff's *Nyasaland* (1903), and Murray's *Handbook of Nyasaland* (1922).

Nyāya. See SANSKRIT LITERATURE.

Nyborg. See FÜNEN.

Nyctaginaceæ, a family including herbaceous plants, both annual and perennial, shrubs and trees. There are about 160 known species, natives of warm countries. Some have beautiful flowers, as those of the genus *Mirabilis*, known in gardens as *Marvel of Peru*. The fruits of the Australian and East Indian tree *Pisonia umbellifera* are so sticky that birds are often found adhering to them.

Nyctalopia, the defective vision of persons who can see in a faint light but not in bright daylight; sometimes applied to the opposite defect, inability to see save in a strong daylight.

Nycteribia, very remarkable, wingless, spider-like, Dipterous insects, parasitic on bats.

Nyiregyháza, a town of eastern Hungary, 130 miles E. by N. of Budapest, is the centre of an extensive wine district; pop. 43,000.

Nyköping, a seaport of Sweden, situated on a bay of the Baltic, 62 miles SW. of Stockholm, manufactures machinery and cotton. The castle ranked in strength next to those of Stockholm and Calmar. King Waldemar was imprisoned there after his dethronement in 1288, till his death in 1302. Eric and Waldemar, brothers of King Birger, were left in 1317 to perish of hunger in a dungeon, the keys of which the king threw into the sea. In horror of this deed the people seized the castle and demolished it. In 1719 the town was taken and dismantled by the Russians. Pop. 12,000.

Nyl-ghau, or NILGAI (*Boselaphus tragocamelus*), a species of antelope, with somewhat ox-like head and body, but with long slender limbs, and of great activity and fleetness. It is one of the largest of antelopes, and is more than four feet high at the shoulder. The horns of the male are about as long as the ears, smooth, black, pointed, slightly curved forwards. The female has no horns. The neck is deep and compressed, not rounded as in most of the antelopes. A slight mane runs along the neck and part of the back, and the breast is adorned with a long hanging tuft of hair. The back is almost elevated into a hump between the shoulders. The nyl-ghau inhabits the dense forests of India and Persia, where it has long been regarded as one of the noblest kinds of game. The name is Persian, and signifies 'blue ox.' It is often taken, like other large animals, by the enclosing of a large space with nets, and by great numbers of people. It is a spirited animal, and dangerous

to a rash assailant. It is capable of domestica-



Nyl-ghau (*Boselaphus tragocamelus*).

tion, but it is said to manifest an irritable and capricious temper.

Nymphæaceæ, a natural order of dicotyledons, growing in lakes, ponds, ditches, and slow rivers, where their fleshy root-stocks are prostrate in the mud at the bottom; and their large, long-stalked, heart-shaped, or peltate leaves float on the surface of the water. Their flowers also either float or are raised on their stalks a little above the water. The flowers are large, and often very beautiful and fragrant. There are usually four

sepals and numerous petals and stamens, often passing gradually into one another. The ovary is many-celled, with radiating stigmas, and very numerous ovules, and is more or less surrounded by a large fleshy disc. The seeds have a farinaceous albumen. More than fifty species are known, mostly natives of warm and temperate regions. The root-stocks of some of them are used as food, and the seeds of many. See WATER-LILY, LOTUS, NELUMBO, VICTORIA, and EURYALE.

Nymphs, in Greek Mythology, female divinities of inferior rank, inhabiting the sea, streams, groves, meadows and pastures, grottoes, fountains, hills, glens, and trees. Among them different classes were distinguished, particularly the *Oceanides*, daughters of Oceanus (nymphs of the great ocean which flows around the earth), the *Nereids*, daughters of Nereus (nymphs of the inner depths of the sea, or of the Inner Sea—the Mediterranean), *Potameides* (River nymphs), *Naiads* (nymphs of fountains, lakes, brooks, wells), *Oreads* (Mountain nymphs), *Napææ* (nymphs of glens), and *Dryads* or *Hamadryads* (Forest nymphs, who were believed to die with the trees in which they dwelt). They were the goddesses of the fertilising power of moisture, possessed prophetic power, and took interest in the nourishment and growth of infants, the chase, and dancing. They are among the most beautiful conceptions of the plastic fancy of the ancient Greeks. See W. H. Roscher's *Lexikon der Griechischen und Römischen Mythologie* (1890-1900). —For Nymph in natural history, see CHRYSALIS.



the fifteenth letter of the modern English alphabet, represents historically the sixteenth letter of the ancient Semitic alphabet. Alone among the Semitic letters it passed into the Greek and thence into the Roman alphabet in exactly the shape in which it appears in inscriptions of the

9th century B.C. In the later Semitic alphabets, on the other hand, the primitive O was variously altered, so that no resemblance to the original form remains. In the ordinary Hebrew alphabet it has become **ו**.

The original sound of the letter was a guttural consonant peculiar to the Semitic languages, somewhat resembling the original sound of the first letter of the alphabet (see the article A). The letter had also a harsher guttural sound, which was rendered by G in the Greek and Roman spelling of some proper names, as Gaza, Gomorrha; but in the dialect of the inventors of the alphabet the two sounds had probably become identical. To Western ears the softer of the two Semitic consonants does not seem to be an articulate sound at all. Hence in popular transcriptions the letter is omitted; it is, for instance, in Hebrew the initial of the proper names which in the English Bible appear as Amram, Eber, Iddo, Omri, and Uz, and in Arabic of the name commonly written Abdallah. In more scientific transcriptions the sound is rendered by a mark like the Greek rough breathing ('). In Hebrew the name of the letter is 'ayin, in Arabic 'ain, identical with the word for 'eye' in those languages; and the character O may have been intended to represent an eye.

To a Greek ear the name of the letter would seem to begin with a vowel; it was, therefore, natural that the Greeks should use the letter as a vowel. As four out of their five recognised vowels had obviously appropriate symbols in the alphabet, O was made to stand for the remaining one—viz. the rounded back vowel, uttered with the back of the tongue lowered from the position of *u* (as in *truth*, *püt*). This sound, in one or other of its possible varieties of articulation, is the normal value of O in all alphabets descended from the Greek. The Greek language had two *o*-sounds: the 'close *o*' (somewhat approaching *u*), which was short, and the 'open *o*,' which was long. Originally the letter O expressed both sounds, but afterwards the modified form Ω was invented for the long open vowel. As the Semitic name of the letter did not begin with its Greek sound, it was abandoned. In classical times the sounds of O and Ω were used as their names (the name of O, however, was written *ou*, pronounced as a lengthened 'close *o*'). By the Greek grammarians of the Middle Ages O and Ω were called respectively *o mikron* (small *o*) and *ō mega* (large *o*).

The Greek alphabet known to the early Romans did not include the letter Ω, so that in Latin O was used both for the short and for the long vowel. In the later periods of the language the long *o* was close and the short *o* open. The combination *oe*, originally representing a diphthong composed of

the sounds of the two letters, came in late Latin to be pronounced like long *e*.

In English the ordinary 'long *o*' (the sound which serves as the name of the letter) has in modern pronunciation become a diphthong (*o + u*); the ordinary short *o* (as in *not*) is an open *o*, more open than the French 'open *o*' in *cloche*. From various historical causes the letter is often used for other than true *o*-vowels, as in *do*, *love*; but these values are felt to be abnormal, so that they would not naturally be used in reading an unknown word. On the other hand, *oo* is the normal symbol for the long *u* vowel, and *ou* or *ow* for the diphthong *a + u*, though these diagraphs have also other pronunciations. In the continental languages O nearly always stands for a true *o* sound; exceptions occur in the French *oi* and *ou*, and in the Dutch *oe* (= English *oo*).

In German *ö* (formerly *ö*; in some proper names still written *oe*) stands for a rounded front vowel descended from an original *o*; the same sound is expressed by *ö* in Swedish and *ø* in Danish. The Portuguese *ô* is used in the combination *õe*, representing a nasal diphthong. The ligature *Œ*, *œ*, as used in Latin and English, has the same history as *Æ*, *æ* (for which see A); in modern French it occurs in the combination *œu* (pronounced like French *eu*) and in the word *aïl* (pronounced as *euil*); the abnormal spelling is confined to words in which the sound etymologically represents a Latin *o*.

Oahu. See HAWAII.

Oajaca, a mountainous state in the south of Mexico (q.v.), bordering on the Pacific. The capital, Oajaca, lies 5060 feet above the sea, in the fertile valley of the Atoyac. It contains a large cathedral (1729), a quaint bishop's palace, the Seminario Tridentino, and the State Institute. It was the birthplace of Porfirio Diaz. The manufactures are chiefly chocolate, cotton goods, cigars, candles, and soap. Pop. 28,000.

Oak (*Quercus*), a genus of trees and shrubs of the natural order Fagaceæ, having monœcious flowers, the male in slender catkins or spikes, the female solitary or clustered; the fruit a nut or acorn, oblong, ovoid, or globular, protruding from a woody cup formed by the enlarged scales of the involucre; the leaves are deciduous or evergreen, alternate, entire, lobed, or sinuate. The species, of which there are about 300, are spread over nearly the whole of the northern hemisphere, except the extreme north. They are more numerous in America than in Europe; a few are found in Asia, none in tropical Africa, in Australia, or in South America except about the Andes. The Common or English Oak (*Q. Robur*) is the most widely distributed of the species. It extends all over Europe, except the extreme north, and penetrates into central Asia by way of the Caucasus. In Britain there are two well-marked 'races,' which in their more extreme forms are reckoned by some as species, by others merely as varieties of *Q. Robur*. The form that is most common—*Q. Robur*, by some called *Q. pedunculata*—is characterised by having auriculate leaf-bases, leaves smooth on the under

side, regularly spaced longitudinal striation on the acorn. The other form—*Q. sessiliflora*—has petioles of $1\frac{1}{2}$ cm. or more, stellate hairs on the under side of most leaves, and smooth upper side. The former is found most plentifully in the south and midland counties of England, the latter in the west and north, and in Scotland. But not only are the two



Fig. 1.—Common Oak (*Quercus Robur pedunculata*): a, branch in fruit; b, male flower; c, female flower.

forms found growing together in all districts, but the extremes of structural difference are linked together by every intermediate gradation. The Durmast Oak (*Q. lanuginosa*), which is most abundant in the New Forest, differs only from the stalkless-fruited variety in having the leaves more or less downy on the under side, and in retaining them longer in winter than either of the others. But this variety is also found in company with the others in different parts of the country.

No other European tree combines in itself the essential elements of strength and durability, hardness and elasticity, in the same degree as the oak. Longevity is a characteristic of all species of



Fig. 2.—Sessile-fruited Oak (*Quercus Robur sessiliflora*) Branch in Fruit.

oak, but the British oak is celebrated above all others for the great age to which it attains. In many districts of England, and in a few also of Scotland, there exist huge venerable living remains of giant oaks, whose age cannot be computed with accuracy, but which, when compared with younger trees authentically known to be 300 or 400 years old, may, without improbability, be reckoned to have stood for more than 1000 years. Many of these ancient trees are historical landmarks, being associated with the events and the names of persons of the remote past. Legendary though some of these associations may appear to be when applied to such as the 'King Oak,' in Windsor Forest, which is said to have afforded

shade and shelter to William the Conqueror, it is far from improbable that the tree may have been of considerable age at the time of the Conquest. The circumference of the trunk of this tree in 1864, at 3 feet from the ground, was 26 feet. But there are many larger living oaks in other parts of the country. The Cowthorpe Oak, for instance, in the village of that name, 6 miles S.E. of Knaresborough, measured, at 3 feet from the ground, 48 feet in circumference. This tree is simply a wreck of former grandeur, yet lives and puts forth leaves annually. Taking the less favourable character of the climate of the West Riding of Yorkshire, when compared with that of Windsor Forest, into account along with the immensely greater bulk of the Cowthorpe Oak than the King Oak, it is not extravagant to assume that the former may be twice the age of the latter. Most often struck by lightning of all European trees, the oak was associated with the Indo-European thunder-god.

The history of the use of the timber of the oak as material for shipbuilding may be said to date from the time of King Alfred (see NAVY). The timber is also employed in architecture, cabinet-making, carving, mill-work, and coopering; and the sawdust was formerly employed in the dyeing of fustian. The bark furnishes tan, and yields a bitter extract named *Quercine*, employed in medicine as a tonic and astringent. Colouring matter is also obtained from it, which can be used in dyeing wool. The acorns are excellent food for swine; and their importance for this purpose is clearly shown by the pannage laws enacted by Ine, king of Wessex, in the 7th century, for the regulation of the rearing and fattening of hogs, then, and for centuries afterwards, perhaps the most important agricultural pursuit of the people. Although the fruit of the British oak is neither so palatable nor so easily digested as to recommend itself for human food, that of many other oaks is sweet, wholesome, and nutritious. In Turkey the acorns of several kinds, after being buried in the ground for some time to deprive them of their bitter principle, are dried, washed, and ground to powder along with sugar and aromatics. The compound thus prepared is called *palamonte*, and a food is made from it named *racahout*, which is much esteemed by the ladies of the seraglios for maintaining their plumpness and good condition. The fruit of the Barbary Oak (*Q. Ballota*) and the Evergreen Oak (*Q. ilex*), especially the former, is sweet and nut-like in flavour and wholesome to eat. The Dwarf Chestnut Oak (*Q. Prinoides*), a North American species, and several others of that country also produce edible acorns. Among other oaks remarkable for the utility of their products are the Cork Oak (*Q. Suber*; see CORK); the Valonia Oak (*Q. Egilops*), native of the Levant, whose cups are said to contain more tannin in a given bulk of substance than any other vegetable; the Black or Quercitron Oak (*Q. tinctoria*), an abundant native of the United States, whose bark yields the *Quercitron* dye of commerce; the Gall Oak (*Q. infectoria*), a native of Asia Minor, furnishing the *gall-nuts* of commerce (see GALLS); the Kermes Oak (*Q. coccifera*), a native of the south of Europe, the Levant, and the north of Africa, which supplies the *kermes* or *scarlet grain* of commerce. The timber of most of the American oaks is valuable. The following are the most esteemed as timber-trees: the White Oak or Quebec Oak (*Q. alba*), spread from the Gulf of Mexico to Canada, regarded as only inferior in quality to British oak; the Over-cup Oak (*Q. lyrata*), native of the southern states, occupying situations liable to inundation; the Chestnut-leaved White Oak (*Q. prinus*), also a native of the southern states; the Live Oak (*Q. virginiana*), extending from the Gulf of Mexico as

far north as Virginia, regarded as the most valuable of American oaks for shipbuilding; the Red Oak (*Q. rubra*), pretty generally distributed in the United States and in Canada, furnishing the *Red Oak Staves* so much in demand in the West Indies. Of the Turkey Oak (*Q. Cerris*) there are several interesting varieties, as the Fulham Oak (*Q. fulhamensis*), which is semi-evergreen although the parent is strictly deciduous. The hybrid Austrian Oak (*Q. austriaca*), the Evergreen or Holm Oak already named, and a number of the American species already noticed are much appreciated ornamental trees in Britain. Green oak is a condition of oak-wood caused by its being impregnated with the spawn of *Peziza æruginosa*, which communicates a beautiful tint of green, taken advantage of for inlaying, bead-making, &c.—The Common Oak and most others cultivated in Britain delight in deep moist loamy soil, in which, however, there should be no stagnant water. Great depth is of more consequence than superior quality of soil. Plantations of oak are slow in coming to marketable value, except in the shape of copsewood, for which the oak is one of the best adapted trees, owing to the facility with which it stools or sends saplings up from its roots on being cut down. Copsewood oak is valuable for firewood, the making of charcoal, crates, &c., while the bark is suitable for the purpose of the tanner. The acorns of all species of oak supply oil in considerable quantity, which has been used in cookery and for other domestic purposes.

In south-east Asia and its islands and in New Guinea are a number of closely related genera, which may be reckoned oaks in a wider sense—*Pasania*, *Lithocarpus*, *Cyclobalanopsis*, *Castanopsis*. Many other trees bear the name oak popularly applied. Thus, the Poison Oak (*Rhus Toxicodendron*), a shrub or small tree of North America, Indian Oak (*Tectona grandis*), African Oak (*Oldfieldia africana*), and the Australian She-oak (*Casuarina*), are examples of this erroneous use of the name oak.—For Oak-apples, see GALLS; and for Oak-apple Day, RESTORATION.

See Evelyn's *Sylva* (1664); Strutt's *Sylva*; Camden's *Account of the New Forest*; Gilpin's *Forest Scenery*; Loudon's *Arboretum Britannicum*; *Trans. Highland and Agric. Soc.* (1881); Marshall Ward's *The Oak* (1892); C. Mosley's *The Oak, its Natural History, Antiquities, and Folk-lore* (1912).

Oakham, the county town of Rutland, in the vale of Catmose, 25 miles WNW. of Peterborough. The castle, every peer passing which must forfeit either a horseshoe or a fine, is in ruins except the hall, used for county business. The town has a fine parish church, with a lofty spire, and Archdeacon Johnson's grammar-school (1584; reconstituted 1875). Beer, boots, and hosiery are made. Pop. 3300.

Oakland, an important seaport, capital of Alameda county, California, is on the east side of San Francisco Bay, $4\frac{1}{2}$ miles from San Francisco. It is a beautiful town, with wide streets adorned with evergreen oaks, and surrounded with gardens and vineyards. It is the terminus of the Southern Pacific Railroad, and steam ferry-boats ply constantly to San Francisco. Besides numerous churches, a medical college, and other schools, the city contains iron and steel works, shipyards, canning-factories, cotton-mills, &c. Pop. (1870) 10,500; (1910) 150,174; (1920) 216,261.

Oaks, THE. See HORSERACING.

Oamaru, a port of New Zealand on the east coast of South Island, 78 miles NE. of Dunedin by rail; a bathing resort and place of active trade; its principal export is grain; pop. 5700.

Oa'ses (through Latin and Greek from Coptic), fertile spots in a desert, due to the presence of wells or of underground water-supplies. The best known and most historically famous are those of the Libyan Desert and the Sahara; they occur also in the deserts of Arabia and Persia, and in the Gobi. The French have created many oases in the Algerian deserts by sinking Artesian Wells (q.v.). The chief vegetation of the African oases is palms—especially date and dum palms; with barley, rice, and millet, when the fertile area is large enough to admit of settled occupation. In the Libyan Desert are the oases of Siwa, Farafa, Bahriya, Dakhel, and Khargeh. In the western Sahara, Tuat, 1000 miles SW. of Tripoli, is the best known; in the eastern Sahara are Fezzan (q.v.), Gadames (q.v.), Bilma (q.v.), and Air (q.v.) or Asben. See DESERT.

Oastler, RICHARD (1789–1861), known for his work in factory reform as 'the factory king,' was born at Leeds in 1789. His name is principally associated with the movement for a ten hours' day. This agitation he led from 1830 till the successful carrying into law of the proposal in 1847. His opposition to the new Poor Law of 1835 led indirectly to his imprisonment for debt in 1840. During his three years' incarceration he published the *Fleet Paper*, in which periodical he continuously urged the need for factory reform.

Oates, TITUS, was born at Oakham about 1649, the son of a Norwich ribbon-weaver. He was brought up at Oakham school, Merchant Taylors' (1665), and Sedlescombe in Sussex; entered Caius College, Cambridge (1667); and two years later was admitted a sizar at St John's. Next taking orders, he held several curacies and a naval chaplaincy, but was as often expelled for infamous practices, of which perjury was not the worst. So, in concert with a Protestant alarunist, the Rev. Dr Tonge, he resolved to concoct the 'narrative of a horrid plot,' and, feigning conversion to Catholicism, was admitted as 'Brother Ambrose' to the Jesuit seminaries of Valladolid and St Omer. From both in a few months he was expelled for misconduct, but, returning to London in June 1678, he forthwith communicated to the authorities his pretended plot, the main features of which were a rising of the Catholics, a general massacre of Protestants, the burning of London, the assassination of the king, and the invasion of Ireland by a French army. Charles treated the story with contempt; but Oates swore to the truth of it before a magistrate, Sir Edmund Berry Godfrey, who on 17th October was found dead in a ditch—murdered possibly by Titus and his confederates. All London straightway went wild with fear and rage; Shaftesbury skilfully fanned the excitement; and Oates became the hero of the day. A pension of £480 was granted him, and a suite of apartments at Whitehall set apart for his use. Bedloe, Dangerfield, and other wretches came forward to back or emulate his charges; the queen herself was assailed; and many Catholics were cast into prison. Some thirty-five of them were executed, including five Jesuits and old Viscount Stafford; but after two years a reaction set in, and Oates was driven from his rooms in the palace. In May 1683 he was fined £100,000 for calling the Duke of York a traitor, and being unable to pay was imprisoned; in May 1685 he was found guilty of perjury, and sentenced to be pilloried, flogged, and imprisoned for life. The Revolution of 1688 gave him liberty and a pension, but in 1696 he had sunk into utter destitution, and he died 12th July 1705.

See *The Popish Plot*, by John Pollock (1903), and Father Gerard's reply (1903); A. Lang's *Valet's Tragedy* (1903); and *Who Killed Sir Edmund Berry Godfrey?* (1905).

Oath, in LAW, is the declaration, attested by the name of God, which is required on entering certain public offices and before giving evidence in a court of justice. Of oaths taken on entering office, the most important is the coronation oath, administered to the sovereign by an archbishop or bishop of the Church of England in presence of all the people (see CORONATION). The oaths required to be taken to government by the holders of certain offices have now been reduced to three in number—the oath of allegiance, the official oath, and the judicial oath. The oath of Allegiance (q.v.), ‘to be faithful and bear true allegiance to his Majesty,’ and the official oath, ‘to well and truly serve his Majesty,’ must be taken by all the principal officers of state in England, Scotland, and Ireland. Short forms of these oaths are provided in the Promissory Oaths Act, 1868, and in a schedule appended to this statute will be found a complete list of the officials to whom these different oaths are to be tendered. All the judges of the land on entering office take, in addition to the oath of allegiance, what is known as the ‘judicial’ oath, ‘to do right to all manner of people after the laws and usages of this realm, without fear or favour, affection, or ill-will. Members of parliament now take only the oath of allegiance, which has come in the place of the several oaths of allegiance, supremacy, and abjuration formally required from every member of both Houses of Parliament and from all persons holding office under the crown. The form of the oath of allegiance is different for members of the Imperial Parliament and the members of the parliament of Southern Ireland respectively. Till comparatively recent times, oaths were required on many trivial occasions and from numerous classes of persons. By 5 and 6 Will. IV. chap. 62, and several succeeding statutes, however, nearly all these unnecessary oaths have been abolished and declarations have been substituted. Special oaths are, nevertheless, still taken by privy-councillors, by archbishops and bishops, by peers, baronets, and knights on their creation, by aliens on being naturalised, by recruits, and others.

The most important oaths affecting the general public are those which are administered in courts of justice to jurors and witnesses. Jurymen, who are called on to exercise their functions, whether in civil or criminal cases, are sworn ‘to well and truly try the issue between the parties, and a true verdict give, according to the evidence.’ Further, no person can give testimony upon any trial until he have in one form or another given a pledge that he will narrate the truth; he thus renders himself liable to the temporal penalties of perjury in the event of his wilfully and corruptly giving false testimony. In England, the oath which is administered to witnesses is in this form: ‘The evidence I shall give shall be the truth, the whole truth, and nothing but the truth, so help me God.’ The universal usage in England and Ireland for many centuries was for the witness, after hearing the oath repeated by the officer of court, to kiss the New Testament. This form and the still older form of laying the hand on the book are in accordance with an ordinance of the Emperor Julian prescribing that the oath be taken *sacrosanctis evangelis tactis*. In recent years the practice of swearing with uplifted hand came into use mainly for sanitary reasons; and now the standard manner of taking the oath is that directed by the Oaths Act, 1909 (9 Edw. 7, chap. 39) as follows: ‘The person taking the oath shall hold the New Testament, or, in the case of a Jew, the Old Testament, in his uplifted hand, and shall say or repeat after the officer administering the oath the words, “I swear by Almighty God that . . .” followed by the words of the oath prescribed by law.’ Under the act the

oath must be administered in this form, unless the person about to take the oath voluntarily objects, or is physically incapable of taking the oath, or is neither a Christian nor a Jew. In Scotland the witness, standing and holding up his right hand, repeats the oath after the judge, as follows: ‘I swear by Almighty God, and as I shall answer to God at the great day of judgment, that I will tell the truth, the whole truth, and nothing but the truth.’ Children are sworn only if and when the judge is satisfied that they understand the nature and moral obligation of an oath. By the Act 1 and 2 Vict. chap. 105, legislative sanction has been given to the rule of the common law that all persons shall be bound by the oaths which are lawfully administered to them, ‘provided they are administered in such form and with such ceremonies as the parties sworn declare to be binding on their consciences.’ Thus a Jew is sworn on the Pentateuch, with his head covered; a Mohammedan, on the Koran, laying his right hand flat on the sacred book and then touching it with his forehead. A Chinaman is sworn by the ceremony of breaking a saucer before taking the oath. As regards the persons entitled to administer oaths, Lord Brougham’s Act of 1851 provides that ‘every court, judge, justice, officer, commissioner, arbitrator, or other person, now or hereafter, having by law or by consent of parties authority to hear, receive, and examine evidence, is hereby empowered to administer an oath to all such witnesses as are called before them.’ Further, by statute (18 and 19 Vict. chap. 42) all diplomatic and consular agents abroad are empowered to administer oaths and do notarial acts. The statute 5 and 6 Will. IV. chap. 62 renders it unlawful for any justice of peace, or other person, to administer or cause to be administered any oath, affidavit, or solemn affirmation touching any matter of which he has no jurisdiction or cognisance. To some extent it is left to the discretion of the justice whether the particular matter is one as to which it is proper to administer an oath.

Of late years there have been made many alterations of the law as to oaths in relief of persons having conscientious scruples. Relief in this direction was first granted to Quakers, Moravians, and Separatists; they were allowed to make affirmation, whether as witnesses or on other occasions where an oath was formerly required (see AFFIRMATION). A further concession was made in 1854 to those who, not being Quakers, yet refused to take the oath from sincere conscientious motives, such being allowed also to affirm. Previous to 1869 atheists and persons who admitted that they had no religious belief were excluded from giving evidence in courts of justice. This exclusion of the testimony of atheists was put an end to, and at the same time the principle of substituting affirmations for oaths was largely extended by the Evidence Further Amendment Act of 1869 (32 and 33 Vict. chap. 68). When in 1880 Mr Bradlaugh, member for Northampton, claimed to make an affirmation under these Evidence Amendment Acts in lieu of taking the usual parliamentary oath, a select committee of the House of Commons reported that the acts did not apply to the oath taken by members of parliament. This view was confirmed in 1883 by the courts of law in the case of *Clarke v. Bradlaugh*, 7 Q.B.D. 38. In 1883 the government brought in a bill permitting members of parliament to affirm, but it was lost. However, in 1888, a short statute, 51 and 52 Vict. chap. 46, provides that every person upon objecting to be sworn, and stating as the ground of such objection either that he has no religious belief, or that the taking of an oath is contrary to his religious belief, shall be permitted to make his solemn affirmation,

instead of taking an oath, in all places and for all purposes where an oath is and shall be required by law, which affirmation shall be of the same force and effect as if he had taken the oath; and if any person making such affirmation shall wilfully, falsely, and corruptly affirm anything which, if affirmed on oath, would have amounted to perjury, he shall be liable to prosecution as if he had committed perjury. Further, the Act 52 and 53 Vict. chap. 63, sect. 3, provides that in every statute passed since 1850, unless a contrary intention appears, the expressions 'oath' and 'affidavit,' in the case of persons allowed for the time being to affirm or declare instead of swearing, include affirmation and declaration, and the expression 'swear,' in the like case, includes affirm and declare. Prior enactments relating to the administration of oaths are consolidated by the statute 52 Vict. chap. 10, known as the Commissioners for Oaths Act. See PERJURY.

Oats (*Avena*), a genus of edible grasses, containing many species, among which are some valuable for the grain which they produce, and some useful for hay. The Linnean genus *Avena*, as now restricted, has the spikelets in loose panicles, the glumes as long as the florets, and containing two or more florets; the paleæ firm, and almost cartilaginous, the outer palea of each floret, or of one or more of the florets, bearing on the back a knee-jointed awn, which is twisted at the base. The awn, however, tends to disappear, and often wholly disappears in cultivation. Those species which are cultivated as corn-plants have comparatively large spikelets and seeds, the spikelets—at least after flowering—pendulous. The native country of the cultivated oats is unknown, although most probably it is central Asia. There is no reference, however, to the oat in the Old Testament; and although it was known to the Greeks, who called it *Bromos*, and to the Romans, it is probable that they derived their knowledge of it from the Celts, Germans, and other northern nations. It is a grain better suited to moist than to dry, and to cold than to warm climates, although it does not extend so far north as the coarse kinds of barley, owing to its requiring a longer growing period. The grain is either used in the form of groats or made into meal. Oatmeal cakes and porridge form great part of the food of the peasantry of Scotland and of some other countries. Oatmeal is now more largely used as food amongst the wealthier classes than formerly, but with the working-classes, alike in town and country, it is losing favour. No other grain is so much esteemed for feeding horses. Besides a large quantity of starch—about 65 per cent.—some sugar, gum, and 7 or 8 per cent. of oil, the oat kernel contains about 15 per cent. of nitrogenous or proteid compounds. The husk of oats is also nutritious, being similar in composition to good straw, and is mixed with other food for horses, oxen, and sheep. From the starchy particles adhering to the husk or *seeds* after the separation of the grain, a light dish, long popular in Scotland under the name of *souans*, is made by means of boiling water. The grain is sometimes mixed with barley for distillation. The Russian beverage called *kvass* is made from oats. The straw of oats is very useful as fodder, bringing, for that purpose, a higher price than any other kind of straw.

The varieties of oats in cultivation are very numerous, well over a hundred being distinguishable by definite morphological characters. A large majority of these are embraced in the species *Avena sativa*, but there are several others of some importance. The modern classification is as follows: (1) *Avena strigosa*, the Bristle-pointed Oat, has the outer palea terminating in two long bristles. Up

till the 18th century it was widely cultivated in Scotland, where it was generally known as the 'small' oat. It is still cultivated to some extent on poor soils in Orkney and Shetland, as well as in Wales; the grain is long, but thin, and of inferior quality; (2) *Avena brevis* is readily distinguishable from the last by its much shorter grain. The bristle-points occur only on the lower grain of the spikelet, and are much shorter than in *A. strigosa*. The Short Oat does not occur in Britain, but is cultivated as a grain-crop on poor soils at high elevations in France and Spain, ripening where others do not; it is also grown in some parts of Europe as a forage-crop; (3) *Avena fatua*, the common Wild Oat of Britain and northern Europe, is a frequent weed in corn-fields. The upper as well as the lower grain is awned, and the base of the grain is articulated, so that it very readily sheds when ripe; (4) *Avena sativa* is an artificial species, comprising the cultivated forms derived from *A. fatua*. It is distinguished from the latter by the absence of an awn on the upper grains, and also by the attachment of the grain. The articulation, which is characteristic of *A. fatua*, is completely solidified, so that the grain does not readily shed. Some authors make a sub-species, *orientalis*, to include the so-called Tartarian varieties, in which the head or panicle is contracted, and all turned to one side. Of much more importance is the distinction between winter and spring types. In the former the young plant is prostrate, and tillers or proliferates very freely, while in the latter type the young plant is erect or sub-erect and tillers less freely, being consequently less resistant to frost, &c. Winter Oats are largely grown in Britain south of the Humber, and occasionally farther north. In the extreme south and south-east of England they are much more reliable than the spring sorts; (5) *Avena nuda*, the Naked Oat, is like *A. sativa* in many vegetative characters, but the outer palea is glume-like and does not closely invest the seed, which therefore readily falls out in threshing. This species was formerly grown in England under the name of 'Pilcorn,' and its cultivation survived in West Cornwall until the latter half of the 18th century. The Chinese Naked Oat is a variety of this species, with very numerous grains in the spikelet, usually 4-7; (6) *Avena sterilis*, the Wild Oat of the Mediterranean region, is sometimes known as the Animal Oat, because the ripe seeds, which somewhat resemble insects, move about in an extraordinary manner through the twisting and untwisting of the awns. The lower grain is articulated as in *A. fatua*, but the upper grains are persistent to the rachilla of the grain below. There is a thick tuft of hairs at the base of the grain; (7) *Avena sterilis culta* embraces a group of cultivated varieties, sometimes referred to as Algerian Oats, derived from *A. sterilis*, and differing from the latter in the same way as does *A. sativa* from *A. fatua*. Algerian Oats, and hybrids between them and common varieties, are grown somewhat extensively in Australia. Amongst the species of oat useful not for their grain but for fodder are the Downy Oat-grass (*A. pubescens*) and Yellow Oat-grass (*A. flavescens*, referred by some botanists to the genus *Trisetum*—the short awn being like a middle-tooth in the bifid palea), both natives of Britain, the former growing on light ground and dry hills, especially where the soil is calcareous, the latter on light meadow-lands.

Far more ground is occupied with oats in Scotland than with any other grain. In all the higher districts it is almost the only kind of grain which is cultivated. Throughout Scotland it is the crop that is chiefly sown after land has been in pasture for one or more years. The seed is sometimes sown

broadcast by hand over the ploughed land, which is afterwards well harrowed and rolled. Sowing by broadcast or drill machines is now largely practised, and in the latter case the harrowing is done before the seed is sown. On soils that are infested with annual weeds, such as charlock, it is common to drill the seed, which permits the land to be hand-hoeed and thoroughly cleaned. Oats thrive best upon deep and good soils, especially if enriched by decayed vegetable matter. They yield but poorly on thin sandy soils, where they suffer sooner from drought than barley, rye, or wheat. The produce per acre varies from 20 to over 80 bushels, weighing from 36 lb. to 48 lb. per bushel. Common yields run from 32 to 56 bushels; average weight from 40 lb. to 44 lb. per bushel. A crop of 45 bushels per acre will absorb and carry away about 55 lb. of nitrogen, 46 lb. of potash, and 19½ lb. of phosphoric acid per acre. Few soils, in ordinary tillage, require the direct application of potash for oats. Very light soils are most likely to need it. Superphosphate of lime and nitrate of soda are suitable manures for oats; common quantities being from 1 to 2 cwt. of the former and from ½ to 1 cwt. per acre of the latter, applied as a top-dressing. The Potato Oat is a variety widely cultivated on average soils in Scotland. It is an early and productive variety. The Hopetoun Oat is also much sown in the earliest districts. The Sandy Oat is still largely sown, more particularly when the climate is inferior and wet. It is not liable to shed its grain, and the straw is of fine quality for fodder. Many new varieties have been produced in recent years by crossing or by selection. Among the most popular are the Abundance, Record, Crown, Victory, &c. &c. All these are varieties of the Common Oat. The White and Black Tartarian are much cultivated in some districts. They are very productive, and well suited for feeding horses, cattle, and sheep. On the continent of Europe this grain is seldom seen of quality equal to what is produced in Scotland; even in most parts of England the climate is less suitable to it, and it is less plump and rich.

Oaxaca. See OAJACA.

Ob, or **OBI,** the great river of Western Siberia, rises in two branches, the Biya and the Katun, both of which have their origin in the Altai Mountains, within the frontier of the Chinese dominions, and flows north-west and north for 2120 miles to the great Gulf of Ob in the Arctic Ocean. Its chief tributaries are the Irtysh, Tcharysh, Tom, and Telulym, all navigable. On the banks of the Ob are Barnaul, Tomsk, and Narym. For accessibility by sea, see KARA SEA.

Obadiah, the shortest book in the Old Testament canon, the work of one of the twelve 'minor prophets,' of whose personality absolutely nothing is known. The name is not uncommon, meaning 'servant of Jehovah,' and was borne by the devout chamberlain of Ahab (1 Kings, xviii. 3-16), who protected the prophets of the Lord from the fury of Jezebel. Delitzsch thinks the author of the prophecy may have been identical with the Obadiah mentioned in 2 Chron. xvii. 7, as one of the Levites sent by Jehoshaphat to teach the law in the cities of Judah. From internal evidence the date of composition of the book may, with much probability, be put shortly after the capture of Jerusalem by Nebuchadnezzar, about 587 B.C. The book was placed next to Amos merely because the prophecy of doom upon Edom is an amplification of that pronounced earlier by Amos (Amos, ix. 12). This passage in Obadiah (verses 1-9) is closely parallel to Jeremiah, xlix. 7-22, from which indeed Knobel, Bleek, and Reuss think it directly borrowed. Ewald maintained that the first seven verses of

Obadiah were written by a prophet of that name during the inroads of Rezin and Pekah, that the eleventh refers to the capture of Jerusalem by the Arabs and Philistines in the reign of Jehoram, and that the remaining verses were compiled by a later writer, partly from the older prophet (who was also used by Jeremiah), and partly from other sources. Caspari offers strong reasons for his statement that the words of Obadiah were modified and expanded by Jeremiah. Some scholars again, as Keil, have supposed unnecessarily that Joel, ii. 32, is a distinct reference to Obadiah 17. The book of Obadiah possesses high individuality of style, and contains some peculiar words. It has ever been favourite reading among the Jews, and it was from it that they derived the name of 'Edom' as applied to Rome, to Christians, and all their enemies. The book falls naturally into two well-marked divisions, of which the first (1-16) denounces destruction to Edom, and the second (17-21) prophesies the restoration of Israel.

See the commentaries on the prophet by Ewald, Orelli, Hitzig, Keil and Delitzsch, and Pusey; the books on Hebrew prophecy by Kuenen (Eng. trans. 1877), Robertson Smith (1882), Duhm (1875); commentaries by Hendewerk (1836), Caspari (1842), and Perowne (1883); Farrar's *Minor Prophets* (1890); and the *International Critical Commentary* (on six minor prophets, 1912).

O'ban, a fashionable watering-place of Argyllshire, 84 miles WNW. of Stirling, and 136 of Edinburgh, by a railway opened in 1880. It curves round a beautiful and almost land-locked bay, which, sheltered from every wind by the island of Kerrera on the west and by the high shores of the mainland, forms a spacious haven, crowded in summer by yachts and steamers. A mere 'clachan' when Dr Johnson visited it in 1772, Oban began to be feued in 1803-20. In 1832-1918 it was one of the Ayr parliamentary burghs. It is now the great tourist headquarters of the West Highlands, possessing many hotels, splendid steamboat facilities, Roman Catholic and Anglican cathedrals. Objects of interest are the picturesque ruins of Dunolly and Dunstaffnage Castles (see ETIVE). Prehistoric cave-dwellings were discovered in 1890-94, with Azilian relics. Pop. (1821) 1359; (1871) 2413; (1881) 3991; (1901) 5427; (1921) 6344.

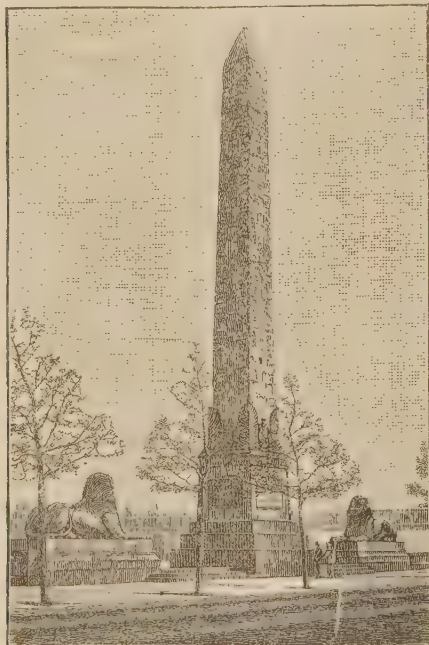
O-Becse. See BECSE.

Obedientiaries were the officers of a conventual institution as subject to the superior, whether charged or not with special duties.

Obeid, EL, capital of the province of Kordofan, in the Egyptian Sudan, 220 miles SW. of Khartum, consists of a number of villages originally separate. Gum-arabic, ivory, cattle, and ostrich-feathers are the chief articles of trade. Pop. about 15,000. Near it, in 1883, a force of Egyptians under Hicks Pasha, with an English staff, was exterminated by a large army of the Mahdi. The railway from Khartum reached it in 1912. See also UR.

Obelisk (Gr. *obelos*, *obeliskos*, 'a spit'), a word applied to four-sided monuments of stone and other materials, terminating with a pyramidal or pointed top. These monuments were placed upon bases before gateways of the principal temples in Egypt, one on each side of the door. They served in Egyptian art for the same purposes as the stelæ of the Greeks and columns of the Romans, and appear to have been erected to record the honours or triumphs of the monarch. They were placed upon a cubical base of the same material, which slightly surpassed the breadth of the base. Their measurements were always in fixed proportion. Their sides are slightly concave, to increase their apparent height. Their height varies from upwards of 100 feet to a few inches. The sides are generally sculptured with hieroglyphs and representations, recording the names and titles of kings, generally

in one line of deeply-cut hieroglyphs down each side. Hewn in the rough out of a solid piece in the quarries, they were transported on rafts down the Nile during the inundation, to the spot where they were intended to be placed, and raised by inclined planes, aided by machinery. Some obelisks, before their erection, had their pyramid capped with bronze gilded, or gold, the marks of such covering still being evident on their surfaces. At the time of the 18th dynasty it appears that religious ceremonies and oblations were offered to the obelisks, which were treated as divinities. Their sepulchral use is evinced by their discovery in the tombs of the 4th dynasty, and the vignettes of early papyri. The most of them date from the 18th and 19th dynasties. Two which formerly stood at Heliopolis (q.v.) were re-erected in the 1st century A.D. at Alexandria, and have been



Cleopatra's Needle, Thames Embankment, London.

popularly known as Cleopatra's Needles. One, which long lay prostrate, was, after an adventurous voyage, brought to London in 1878, and erected on the Thames Embankment; it weighs 186 tons, and is 68½ feet high. The other, presented by the Khedive to the United States, was set up in Central Park, New York, in 1881. There are several large ones in Rome (that now at St Peter's having been taken to Rome by Caligula), one in Florence, one in Paris (given by Mehemet Ali in 1837), and Lepsius's in Berlin (the oldest and smallest of all, 2 feet 1½ inch high), besides many others that have found their way into European museums. By far the largest obelisk in the world is the Washington monument (1885), at Washington, D.C. It is of marble, 55 feet square at the base, and 555 feet high.

Ober-Ammergau, a village in the valley of the Ammer in Upper Bavaria, 45 miles SW. of Munich. Here the famous Passion Play (established 1633; discontinued between 1910 and 1922) is performed decennially. See article MYSTERIES AND MIRACLE PLAYS.

Oberhausen, a manufacturing town in the Rhine province of Prussia, 40 miles N. of Cologne.

Of recent origin, it is an important industrial railway centre, and has large iron and other works, and coal-mines. Pop. 100,000.

Oberland. See BERN.

Oberlin, a village of Lorain county, Ohio, 34 miles by rail WSW. of Cleveland. It is primarily an educational centre, having grown up round Oberlin College, which, founded in 1833, now embraces a college of arts and sciences, an academy, a theological seminary (Congregational), a conservatory of music, and considerable libraries. Oberlin was the first American college to adopt co-education of the sexes, and was a pioneer also in the co-education of the black and white races. Pop. 4200.

Oberlin, JOHANN FRIEDRICH, born at Strasbourg, 31st August 1740, in 1767 became Protestant pastor of Waldbach, in the Steinthal, a wild mountainous district of Alsace. Here he spent the remainder of his life. The district had suffered terribly in the Thirty Years' War, and the scanty population which remained was sunk in poverty and ignorance. Oberlin introduced better methods of cultivating the soil, and various branches of manufacture, and made roads and bridges. He founded an itinerating library, began the first infant schools, and introduced ordinary schools in the district. Population and general prosperity rapidly increased. Oberlin was ably assisted in his reformatory labours by his pious housekeeper, Louise Scheppler (1763-1837). He died 1st June 1826. A collected edition of his writings appeared at Stuttgart (4 vols. 1843).

See Sims's *Brief Memorials of Oberlin* (1830); the *Memoirs of Oberlin* (1852); and the biographies by Bode-mann (1868), Spach (Paris, 1866), and Butler (1882).

Obermann. See SÉNANCOUR.

Oberon, the king of the elves or fairies, and the husband of Titania. The name is derived from the French *Auberon* or *Alberon*, and that from the German *Alberich* (*alb*, 'elf,' and *rich*). Oberon is first mentioned as 'Roi du royaume de la féerie' in the 13th-century French poem of *Huon de Bordeaux*. The quarrel between Oberon and Titania and their subsequent reconciliation through Huon, a French noble, and Amanda, daughter of the sultan of Babylon, whom the former leads home by the help of Oberon, after many difficulties, form the basis of this tale, which was afterwards shaped into a popular prose romance. Lord Berners's early 16th-century translation of *Huon de Bordeaux* contains the first reference to Oberon in English. The name appeared thereafter in many ballads, and was adopted by Spenser and by Greene in his play, *The Scottish History of James Fourth, slain at Flodden*. It was really Shakespeare, however, with his *Midsummer Night's Dream*, where the fairies form a community ruled over by the princely Oberon and the fair Titania, who made the name familiar. Wieland used the subject of Oberon and Titania for his well-known romantic poem, and Planché's adaptation of this forms the subject of Weber's opera. The old *chanson de geste* was edited by Guessard and Grandmaison (Paris, 1860).

See FAIRIES; HUON OF BORDEAUX; Voretzsch's *Epische Studien* (vol. i. 1900).

Obesity, or CORPULENCE, may be defined to be 'an accumulation of fat under the integuments or in the abdomen, or in both situations, to such an amount as to embarrass the several voluntary functions. A certain degree of fatness is not only quite compatible with health, but, as has been shown in the article FATS, the fatty tissue is of considerable use in the animal body, partly in consequence of its physical and partly in consequence of its chemical properties; and it is only when the fatness begins to interfere with the

discharge of any of the vital powers that it can be regarded as a morbid condition. Obesity may occur at any period of life, but it is most commonly after the fortieth year that the tendency to an inordinate accumulation of fat begins to show itself. After that time, in the case of men the pleasures of the table are usually more attractive than in earlier life, and much less muscular exercise is taken; while in women the cessation of the power of child-bearing induces changes which tend remarkably to the deposition of fat. The extent to which fat may accumulate in the human body is enormous. Daniel Lambert (1770-1809) weighed 739 lb.; his exact height is not recorded, but, according to the tables generally accepted by life insurance companies, the normal weight of a man 6 feet high should not exceed 178 lb. Dr Elliotson has recorded the case of a female child, a year old, who weighed 60 lb.

The predisposing causes of obesity are a peculiar habit of body, hereditarily transmitted; inactivity; sedentary occupations, &c.; while the more immediate or exciting causes are a rich diet, including fatty matters, and matters convertible in the body into fats, such as saccharine and starchy foods, and the partaking of such a diet to a greater extent than is necessary for balancing the daily waste of the tissues. 'Fat meats, butter, oily vegetable substances, milk, saccharine and farinaceous substances are the most fattening articles of food; whilst malt liquors, particularly rich and sweet ale, are, of all beverages, the most conducive in promoting obesity. The fattening effect of figs and grapes, and of the sugar-cane, upon the natives of the countries where these are abundant, is well known. In various countries in Africa and the East, where obesity is much admired in females, warm baths, indolence, and living upon saccharine and farinaceous articles, upon dates, the nuts from which palm-oil is obtained, and upon various oily seeds are the means usually employed to produce this effect' (Copland's *Dictionary*). The knowledge of the means of inducing obesity affords us the best clue to the rational treatment of this affection. It is a popular belief that the administration of acids—vinegar, for example, or one of the mineral acids—will check the deposition of fat; but if the desired effect is produced it is only at the cost of serious injury to the digestive, and often to the urinary organs. The employment of soap and alkalies, as advocated over a century ago by Flemming, is less objectionable than that of acids, but the prolonged use even of these is usually prejudicial. An extract of the common sea-wrack (*Fucus vesiculosus*) has been strongly recommended, and its value probably depends on the iodine it contains. Thyroid extract is also useful, particularly in reducing the obesity of elderly persons.

A very interesting *Letter on Corpulence*, published in 1863 by Mr William Banting (1797-1878), in which he records the effect of diet in his own case, after all medicinal treatment had failed, is well worthy of the attention of those who are suffering from the affection of which this article treats. The following are the leading points in his case. He was sixty-six years of age, about 5 feet 5 inches in stature (and therefore, according to the life insurance tables, ought to have weighed about 142 lb.), and in August 1862 weighed 202 lb. 'Few men,' he observes, 'have led a more active life . . . so that my corpulence and subsequent obesity were not through neglect of necessary bodily activity, nor from excessive eating, drinking, or self-indulgence of any kind, except that I partook of the simple aliments of bread, milk, butter, beer, sugar, and potatoes, more freely than my aged nature required. . . . I could not stoop to tie my shoe, nor attend to the little

offices humanity requires without considerable pain and difficulty; I have been compelled to go downstairs slowly backwards, to save the jar of increased weight upon the ankle and knee joints, and been obliged to puff and blow with every slight exertion.'

By the advice of a medical friend he adopted the following plan of diet: 'For breakfast I take four or five ounces of beef, mutton, kidneys, broiled fish, bacon, or cold meat of any kind except pork; a large cup of tea (without milk or sugar), a little biscuit, or one ounce of dry toast. For dinner, five or six ounces of any fish except salmon, any meat except pork, any vegetable except potato, one ounce of dry toast, fruit out of a pudding, any kind of poultry or game, and two or three glasses of good claret, sherry, or Madeira: champagne, port, or beer forbidden. For tea, two or three ounces of fruit, a rusk or two, and a cup of tea without milk or sugar. For supper, three or four ounces of meat or fish, similar to dinner, with a glass or two of claret' (p. 18). 'I breakfast between eight and nine o'clock, dine between one and two, take my slight tea meal between five and six, and sup at nine' (p. 40). Under this treatment he lost in little more than a year (between the 26th of August 1862 and the 12th of September 1863) 46 lb. of his bodily weight, while his girth round the waist was reduced 12½ inches. He reported himself as restored to health, as able to walk up and down stairs like other men; to stoop with ease and freedom; and safely to leave off knee-bandages, which he had necessarily worn for twenty years past. Other more or less similar systems have since been recommended; such as the Salisbury treatment of subsisting only on meat, with a large draught of hot water before every meal. Such a radical change of diet, however, should not be adopted without medical advice, as in some cases it might cause disturbance of digestion or excretion, and lead to new dangers to health. See FASTING.

Obi. See OB.

Obi, OBEAH, or OBE, the sorcery or witchcraft once practised by *Obi-men* and *Obi-women* among the negroes of the West Indies and the United States, of which at least traces survive. Essentially a propitiation of the snake-god *Obi*, it was doubtless an importation from West Africa in the days of the slave trade. The *Obi-man*, a sorcerer trafficking in philtres, potions, and spells, possessed enormous influence over the credulous blacks. See WITCHCRAFT; and H. J. Bell, *Obeah* (1889).

Obit, in the Roman Catholic Church especially, an office performed in commemoration of or on behalf of the soul of a deceased person on the anniversary of his death. It usually consisted of matins and lauds, followed by a mass. Records kept in churches of obits there performed often contain valuable antiquarian and genealogical materials.

Object, and its correlative, **SUBJECT**, are terms used philosophically, even by the same writers, in a perplexing multiplicity of senses. Thus, it may be said that while ordinarily the *subject* is the knowing mind, the *object* is that which is known, thought, felt, seen, imagined—the psychological corresponding fairly with the grammatical usage. At another time the subject is the ego, while the object is the non-ego, the external world, with an implication that the objective has a firmer, surer ground, if not wholly independent of the subjective at least less liable to vary or fluctuate. On the other hand, if the *noumenon*, the subject, is the truly real, the phenomenal object is comparatively an accident. Yet again, that which is the law of the consciousness, which is prior to experience, is by

some regarded as more indefeasible and objective than the fleeting elements of conscious experience. For some, objective is that which is common to *all* minds (and to the absolute mind) at all times, and the subjective that which is peculiar to my mind or any given mind at any given time. Thus the essence of the subjective becomes the most objective thing in existence; really objective truth is that which from the nature of the case is prior to and independent of experience. It is needless to point out that, when the subject thinks of itself, the subject may be said to become its own object. In general, however, that is objective which deals much with the external world, and that subjective which is mainly based on introspection of mental states.

In addition to the possibility of confusion arising out of current usage, it should be remembered that in the middle ages, and even in Descartes and Spinoza, *subject* meant almost the same as *substance* (something highly real); and in William of Ockham *objective* is that which the mind feigns, the image or representative idea as opposed to the real object which exists independently.

Oblates (Lat. *oblatus*, *oblata*, 'offered up'), the name of a class of religious bodies in the Roman Catholic Church, which differ from the religious orders strictly so called in not being bound by the solemn vows of the religious profession. The institute of oblates was one of the many reforms introduced in the diocese of Milan by St Charles Borromeo towards the close of the 16th century. The members consisted of secular priests who lived in community, and were merely bound by a promise to the bishop to devote themselves to any service which he should consider desirable for the interest of religion. St Charles made use of their services chiefly in the wild and inaccessible Alpine districts of his diocese. The oblates of Mary Immaculate, founded at Marseilles in 1816, have twelve houses in Great Britain and Ireland, and are numerous in Canada, British India, and the United States. Two Irish reformatories are under their charge.

Obligation, DAYS OF, holidays on which faithful Catholics are bound to abstain from servile work and to hear mass. These are, for England and Wales, Circumcision, Epiphany, Ascension Day, Corpus Christi, SS. Peter and Paul, Assumption, All Saints, Christmas Day. Scotland adds to these St Andrew, and Ireland St Patrick and the Annunciation.

Oboe (Fr. *hautbois*; Ger. *Oboe*), a treble reed musical instrument, to which the bassoon may be said to be the bass. Its reed is double, like that of the bassoon and the chanter of the bagpipe, and consists of two thin blades of cane attached by silk thread to a short metal tube. A similar instrument may be traced from the earliest times from Egyptian and Greek sculpture and paintings; and the Kensington Museum contains many specimens from Arabia, China, India, Walachia, &c. The modern instrument, however (shown in the figure), from successive improvements and additions bears little resemblance to its ancient prototype, and is one of the most complicated and intricate of wind-instruments. It is made variously of boxwood, ebony, cocco-wood, and silver, having holes for the fingers and usually fifteen keys, besides two automatic octave keys to assist the higher notes. It is an octave instrument like the Flute (q.v.), and its usual compass is from

B below the stave to F in alt, although several semitones higher can be produced. For orchestral purposes it is pitched in the key of C, but in military bands a B♭ instrument is sometimes used, and its music is written in the G clef. The tone of the oboe is rich, and, from its great power in swelling and diminishing the sound, it is capable of every variety of expression. The oboe has the privilege of giving the pitch to the violin in the orchestra. Beethoven, Mozart, Bach, and nearly all the great composers make extensive use of it in their compositions. Strauss in his *Salome* (1905) introduced a baritone oboe, between oboe and bassoon, since used by Weingartner and other composers. See also COR ANGLAIS. The Oboe d'Amore and the Oboe di Caccia, oboes in the key of A and F or E♭ respectively, are nearly obsolete.—*Oboe* is also the name of a treble stop on the organ, its bass being the *bassoon*.

Obok, a French possession, now part of French Somaliland, with a decayed part of the same name, opposite Perim; population, 500.

Obolus (Gr. *obolos* or *obelos*, 'a spit'; see NUMISMATICS), the smallest of the four common Greek coins and weights, the sixth part of a Drachma (q.v.).

O'Brien, WILLIAM, born at Mallow, Co. Cork, 2d October 1852, was educated at Cloyne and at Queen's College, Cork. In 1880 he founded *United Ireland* as mouthpiece of the Land League, and in 1883 entered parliament as a Nationalist. Prosecuted nine times on political charges, he spent over two years in prison. He was a member of the Land Conference of 1903. He became leader of the Independent Nationalists, founded the All-for-Ireland League, and continued to sit for Cork till 1918. He wrote several books on Irish politics—*An Olive Branch* (1910), *Evening Memories* (1920), *The Irish Revolution* (1923), &c.

O'Brien, WILLIAM SMITH, Irish patriot, was born 17th October 1803. Descended from the royal line of Thomond, he was the second son of Sir Edward O'Brien, Bart., of Dromoland, in County Clare. He was educated at Harrow and Trinity College, Cambridge, and entered parliament for the pocket borough of Ennis in 1826. Though a Protestant, he supported the Catholic claims; and for some years he gave an independent support to the Tory party. He lost his seat in 1831, but was returned for the county of Limerick in 1835, and till 1843 generally supported the Whigs. But in October 1843 he announced his adhesion to O'Connell's Repeal Association. O'Connell's rooted aversion to an appeal to physical force soon made a wide gulf in sympathy between his party and those fiery spirits who became known as 'Young Ireland,' and whose fervid and warlike poetry and prose filled the columns of the *Nation* newspaper. To this party O'Brien soon joined himself; and after the death of Thomas Davis (q.v.) in 1845 he withdrew from the association. Next the Young Irelanders set up a Repeal League of their own, under the leadership of O'Brien; and his ardent temperament soon brought him into collision with the law. The sentence of John Mitchel (q.v.) in 1848 hastened the projected rising, which proved a miserable fiasco, ending in an almost bloodless fight in a Tipperary cabbage-garden. O'Brien was arrested and sentenced to death; but the sentence was commuted to transportation for life. In 1854 he was released on condition of not returning to Ireland, and in 1856 he received a free pardon. He died at Bangor, in North Wales, 16th June 1864. See A. M. Sullivan's *New Ireland* (1877), and Sir C. G. Duffy's *Young Ireland* (new ed. 1896).



Oboe.

Obscenity in books, prints, or pictures exhibited in public renders the exhibitor liable to be indicted for a misdemeanour. Persons exposing them in streets, roads, or public places are also liable to be punished as rogues and vagabonds with hard labour. Lord Campbell's Act was passed in 1857 to suppress the traffic in obscene books, pictures, prints, and other articles. By the Customs Laws Consolidation Act, 1876, such articles were prohibited to be imported into the United Kingdom. The Post Office (Protection) Act, 1884, made it a misdemeanour to send or to attempt to send such articles by post, punishable on summary conviction by fine not exceeding £10, and on conviction on indictment by imprisonment not exceeding twelve months. By the Burgh Police Act, 1892, such articles are forbidden to be published, printed, sold, exhibited or distributed under penalty of £10 or imprisonment for sixty days. See also the Indecent Advertisements Act, 1889.

Obscurantists ('lovers of darkness'), the name given to those who are supposed to look with dislike and apprehension on the progress of knowledge, especially to such as defend theological prejudices against what is believed to be scientific truth.

Observantists. See FRANCISCANS.

Observatory, an institution supplied with instruments for the regular observation of natural phenomena, whether astronomical, meteorological, magnetical, or seismological. These different classes of observation may be carried on in the same or separate institutions. Astronomical observatories were first established for the determination of the apparent movements of the sun, moon, and planets. This is most satisfactorily accomplished by determining the positions of these bodies at different times relatively to the fixed stars, whose positions relatively to one another are almost invariable. The Greek astronomers employed Armillary Spheres (q.v.) and Astrolabes (q.v.), and Ptolemy in the 2nd century A.D. used a Quadrant (q.v.). At the time of the revival of astronomy in Europe in the 16th century, Tycho Brahé built a great observatory at Uraniborg, on the island of Hveen, between Copenhagen and Elsinore, which was equipped with finer instruments than any previously used by astronomers. In particular he employed a quadrant in the meridian for the determination of declinations, and a vertical quadrant in another azimuth for the determination of time and right ascension. The use of the quadrant in the meridian was continued by astronomers for several centuries. Bradley, at Greenwich, in 1750 had two, one facing north and the other south, for the determination of declinations. The difficulty of preserving the quadrant from distortion led to its being superseded by the Mural Circle (q.v.), which was greatly improved by the substitution of micrometer microscopes for verniers. The determination of time and right ascension by the Transit Instrument (q.v.), invented by Römer, was rendered possible by the improvement of the clock by Graham. A transit instrument with a telescope of 8 feet focal length and an axis of $4\frac{1}{2}$ feet was constructed by Bird for Bradley about 1750. Early in the 19th century the mural circle and transit instrument were combined in the Transit Circle (q.v.); and about the middle of it the method of observing transits chronographically instead of by eye and ear, introduced in America, simplified the work of observing, and increased the number of stars observable in a given time. Methods for eliminating and correcting various errors to which this instrument is liable have made it the principal means of determining the positions and thence the movements of sun, moon, planets, and the brighter stars. The most complete series of lunar and

planetary observations is that made at Greenwich, from 1750 to the present time.

Now that a close agreement has in the main been reached between observation and gravitational theory for the movements of the sun, moon, and planets, more attention is being given to observations of the stars for the study of their movements. A comparatively small number of stars are observed at a large number of observatories possessing excellent instruments, and the positions and movements of these fundamental stars obtained with all possible accuracy. Observations with the transit circle of a much larger number of stars—amounting to several hundred thousand—have been made at many different observatories, the known positions of the fundamental stars being used to a greater or less extent in simplifying the work and securing great accuracy. The positions of these secondary stars are again used as points of reference in determining the positions of several millions of stars by photography, an international project inaugurated in Paris in 1884, in which eighteen observatories co-operate.

The largest telescopes in observatories are usually mounted equatorially (see EQUATORIAL), so that the telescope mechanically follows the daily motion of the stars across the sky, and the observer's attention can be given for any length of time to one object or small area in the sky. Most differential observations—i.e. the determination of the position of a body with reference to neighbouring bodies—are made with a telescope so mounted. Also, most observations of the brightness of stars and other objects, descriptive observations of planetary features, of sun-spots, of the forms of nebulae, or of comets' tails, are made with instruments mounted to follow the diurnal motion of the sky. Three different kinds of telescopes may be employed: (1) Visual refractors, used mainly for double-star observations and study of planetary detail, and for visual photometry. (2) Photographic refractors—i.e. telescopes whose object-glasses are constructed so that blue light, to which photographic plates are generally more sensitive, is brought to sharp focus. These are used for all differential observations of position up to distances of one or two degrees, and are specially valuable for determinations of the 'parallaxes' of stars. The study of sun-spots, for example, is pursued by daily photographs of the sun taken at various observatories. With double or triple object-glasses refracting telescopes are made which cover a large field, and are used to photograph large areas on a small scale. (3) Reflecting telescopes: these may be used either visually or photographically, but are generally employed to obtain photographs of faint objects, such as nebulae; and especially for spectroscopic observation of faint objects.

Spectroscopic researches form an important part in the work of many observatories. These are directed to the determination of the physical and chemical constitution of the heavenly bodies, and also of their movement to or from the observer. The latter class of observations, initiated by Huggins and greatly improved by Vogel, depending on 'Doppler's principle,' is usually carried on photographically. Large telescopes and long exposures are required for the spectra to impress themselves on the photographic plate. The large telescopes at the Lick Observatory and the Mount Wilson Observatory in California, and of the Victoria Observatory in British Columbia, have been employed in this manner. A new type of mounting called a 'Tower' telescope has been employed by Hale at Mount Wilson. By means of mirrors sun-light is reflected down a vertical tower into a powerful spectroscope or other physical apparatus.

In addition to observations made for the study

of the stars, the movement of the earth's axis indicated by the variation of latitude is determined in some astronomical observatories. The national observatories are generally charged with the determination of time and the distribution of time-signals.

The national astronomical observatories in Great Britain and Ireland are Greenwich, founded in 1675 for the service of navigation as well as astronomy; Edinburgh and Dunsink, which are in close relationship with the universities of Edinburgh and Trinity College, Dublin; and the Solar Physics Observatory at Cambridge. At Oxford there are the University and the Radcliffe Observatories, and at Cambridge the University Observatory and the Newall Astrophysical Observatory. At the Cape of Good Hope there is a large observatory, which, like that at Greenwich, is under the control of the Admiralty. At Kodaikanal and Dehra-Dun are solar observatories under the control of the India Office. The Australian states possess observatories at Adelaide, Melbourne, Perth, and Sydney; Canada, at Ottawa, Montreal, and Victoria.

The following are some of the many European observatories: the National Observatory at Paris (founded 1671), the Astrophysical Observatory at Meudon, the National Observatory at Potsdam (Astrophysics), the National Observatory at Pulkova, near St Petersburg. There are observatories in nearly all the European capitals and in many university towns. In the United States the National Observatory at Washington, the University Observatories of Harvard and Yale, the Yerkes Observatory near Chicago, the Lick Observatory near San Francisco, and Mount Wilson Observatory near Los Angeles are best known.

For the work carried out at different observatories, see *Les Observatoires Astronomiques*, by M. Stroobant, astronomer at the Royal Observatory of Belgium.

Obsidian, a natural glass—the vitreous condition of an acid lava. It is hard and brittle, with remarkably vitreous lustre, and perfectly conchoidal fracture, the edges of the fractures very sharp and cutting like glass. It varies from semi-transparency to translucency only on the edges. It is often black or very dark gray; sometimes green, red, brown, striped, or spotted; and sometimes *chatoyant* or *aventurine*. Some obsidians are rendered porphyritic with microscopic crystals of sanidine; others are often highly vesicular and plentifully charged with spherulites usually arranged in the line of lava-flow. The rock is usually rich in crystallites and microlites (the ‘beginnings of crystallisation’), which are frequently arranged in parallel or undulating lines = ‘fluxion-structure.’ Steam- or vapour-pores of minute size occur abundantly in some obsidians. Obsidian is thus a kind of lava. It is capable of being polished, but is apt to break in the process. It is made into boxes, buttons, ear-drops, and other ornamental articles; and before the uses of the metals were well known it was employed, in different parts of the world, for making arrow and spear heads, knives, &c. It is found in Iceland, the Lipari Isles, Vesuvius, Sardinia, Hungary, Spain, Tenerife, Mexico, South America, Madagascar, Siberia, &c. Black obsidian was used by the ancients for making mirrors, and for this purpose was brought to Rome from Ethiopia. It was used for the same purpose in Peru and Mexico. Mirrors of black obsidian are indeed still employed by artists. Chatoyant or aventurine obsidian is very beautiful when cut and polished, and ornaments made of it are sold at a comparatively high price.

Obstetrics (Lat. *obstetrīx*, ‘a midwife,’ from *obsto*, ‘I stand before,’ thus literally ‘a woman who

stands before or beside another’), called also MIDWIFERY (O.E. *mid*, ‘together with,’ and *wif*, ‘a woman’). As a branch of medical science and practice obstetrics is concerned with the study and care of women during the processes of pregnancy, parturition, and the puerperium, or lying-in. As a department of medical study it embraces the anatomy and physiology of the female organs of generation, the phenomena of conception and pregnancy, of labour, normal and abnormal, and of the puerperium or the return of the organs to their non-pregnant position. Strictly speaking, these processes are normal and physiological, and in perfectly natural conditions require little or no skilled help or assistance. But, while theoretically this may be so, it is still the case that these processes each produce an effect on the female organism which results in great modifications of the ordinary vital functions, so that the condition is one of continued physiological tension, which at any moment may pass into a pathological or abnormal condition in which skilled assistance is of the utmost importance. There can further be no doubt that many influences at work in states of civilisation tend greatly to increase the dangers of the reproductive process, so that the members of highly civilised communities are peculiarly liable to disaster; but at the same time the rudest savages are by no means free from these risks, and the care which most of them take of their women during pregnancy and parturition amply proves how conscious they are of this fact (but see COUVADE). The dangers with which the reproductive process is associated may be in some measure realised when it is understood that during pregnancy women are liable to be affected by many of the ordinary diseases in an aggravated form, which may give rise to premature expulsion of the ovum—abortion—a process in itself attended by grave dangers; that during parturition the child may present by some part of the body other than the head, causing increased difficulty, often impossibility of spontaneous delivery; that there may be some disproportion between the size of the child's head and the pelvis, due to disease or deformity; that from disease or exhaustion the uterus may be incapable of expelling its contents; that after the birth of the child the natural processes for checking hemorrhage from the site of the placenta may be at fault, or again the retention of a blood-clot or fragments of placenta may expose the patient to the risks of septicæmia or blood-poisoning. These are but a tithe of the dangers which surround the reproductive process, but they give an ample explanation of the existence of a science and art of obstetrics by which these and similar dangers may be obviated. With regard to parturition itself it may be noted that the great majority of labours (95 per cent.) are natural—i.e. the head presents, and they are spontaneously accomplished within twenty-four hours. But in civilised countries, and under the best practice, it is estimated that one in 120 women dies within a fortnight after labour. It would be out of place in a work of this kind to enter into the details of this science, but a sketch of the history of its origin and development may be of interest.

Until about the beginning of the 16th century the practice of obstetrics was mainly empirical. It was founded on experience and superstition, and was in great measure destitute of an anatomical or physiological foundation. Such practice is seen in the present day among uncivilised races, and we find procedures described as employed by the Egyptians, Jews, Greeks, and Romans in vogue among the North American Indians and negroes at the present time. During the empirical period we find, as we might expect, that the ordinary practice was wholly in the hands of women. At first female

friends and neighbours would perform what kindly offices they could, but soon a distinct class of midwives arose, whose experiences or special aptitude fitted them for the duty. All ordinary labours were attended by them, and they did not yield up a difficult case to the surgeon or physician until they had exhausted a code of practice partly reasonable as founded on experience, partly superstitious, but often very elaborate. When these resources failed, the aid of the male practitioner, who combined the offices of priest and physician, was usually invoked. At first the aid yielded by these was largely based on superstition, consisting in charms, incantations, and invocation of special deities. Ellithyia among the Greeks and Lucina among the Romans were the chief deities presiding over childbirth, though among the Romans particularly a number of minor deities were regarded as specially available for special complications. With the growth of medical knowledge the purely religious office of the priest became detached from that of the physician, and among the Egyptians in quite early times the physician became a separate functionary and rendered much more practical aid. The ignorance of the anatomy of the organs involved greatly limited their practice, and cases of difficult or delayed labour were usually treated by Cæsarean (q.v.) section, or later by some form of embryotomy.

The writings of Hippocrates (400 B.C.) contain the earliest attempt to formulate a practice of obstetrics. While his writings on this subject show keen observation and shrewd judgment, yet his imperfect anatomical knowledge led him into grave errors. The presentation of the head was the only way by which he considered it possible that delivery could be effected, and then cephalic turning was enjoined by him in all cases where the head did not come first. When this was found to be impossible, as in many cases it must have been, embryotomy or Cæsarean section were the only alternatives. For over 300 years the teaching of Hippocrates was practically unquestioned, until the study of anatomy in Alexandria, under the Ptolemies, served to clear up many of his errors, and so advance the art. To the knowledge of anatomy gained here is due the great advance in obstetrics shown by the Greek physicians who practised in Rome about the beginning of the Christian era. Chief among these is Soranus (98-137 A.D.), who published a work 'on the diseases of women,' which shows a wonderful advance in the knowledge of the anatomy of the female organs of generation. He further showed a knowledge of obstetrics which is a long way ahead of Hippocrates. He insisted upon the safety of foot and breech presentations, and recommended and described the operation of podalic turning. He showed the importance of posture in favouring difficult labours, and gave careful instruction for the performance of various destructive operations. After Soranus came Galen (born 130 A.D.), who gave an account of obstetric art as it existed at that time, but whose anatomy was very defective as compared with that of Soranus. His teaching and opinions seem to have largely influenced the Persians, and through them the Arabs, for their practice all through the middle ages seems to have been founded on Galen. Probably about the 4th century a remarkable book was published by Moschion, *Peri tōn Gunaikeiōn Pathōn*, which is sometimes, though not quite correctly, called the first obstetric work published. It is based on Soranus, and shows a much sounder anatomical knowledge than Galen possessed. Three hundred years later Paulus Æginetus published a work on this subject which is really a compilation from previous authors, and shows no advance on

Moschion. From this time until the beginning of the 16th century it may be said that obstetrics made no progress. Indeed, with the fall of the Roman empire this, like other arts and sciences, fell on evil days, and the knowledge was in great measure lost and its practice degenerated, gradually passing into the hands of the lowest and most degraded women. All trace of the earlier teaching was lost with the knowledge of the anatomical principles on which it rested; practice was regulated by the grossest superstition and ignorance, and the male practitioner was never allowed to enter a lying-in room save as a last resort. Indeed, the practice of midwifery by men was for many centuries in Europe regarded as a crime and an offence against morals, and so late as 1522 Werdt of Hamburg, who donned female attire in order to permit his attending and studying a case of labour, was detected and publicly burned at the stake. And a hundred years later a Dr Willoughby, an Englishman, whose daughter was a midwife, crawled into a darkened room on his hands and knees in order to assist her at a difficult labour! Nothing could have been more deplorable than the state of obstetric practice during this period, and the suffering and mortality resulting from this condition of affairs could not be easily estimated.

The first indication of a new order of affairs is found in the training of midwives in the medical school of Salerno about the beginning of the 16th century. Some time previously this school had inaugurated the study of anatomy, and the light shed thereby had its influence on the dark and degraded practice of obstetrics. Progress was, however, slow, and its practice still largely remained in the hands of women, to whom clung the superstition of the dark ages. Yet in the hands of anatomists like Vesalius, Fallopius, Berengarius, and surgeons such as Paré, a scientific basis was again being laid, and the knowledge of Soranus and Moschion being rediscovered. And, while all ordinary labours were managed by women, the surgeons were called in to assist when a difficulty arose. By them turning was rediscovered, and embryotomy, Cæsarean section, &c. were restored and developed on more scientific principles. By-and-by, especially in France, the practice of obstetrics by surgeons gradually gained ground, though there, and still more elsewhere, its practice by men lay under a reproach. The invention of the obstetric forceps by the Chamberlens, about the beginning of the 17th century, gave a great impulse to the art. In 1668 Mauriceau published his *Treatise*, which ran through seven editions, and was for long the standard work on the subject. It was translated into English by Hugh Chamberlen in 1672, and it seems to be about this time that men began generally to engage in the practice of midwifery: Harvey, the Chamberlens, and others took it up in England; whilst La Vallière, the mistress of Louis XIV., by employing Julian Clement, a surgeon of high eminence, in her first confinement in 1663, did much to establish the practice in France.

Since the revival of the study of anatomy and physiology the progress of scientific obstetrics has been steady and sure. The reproach under which its practice so long lay has been entirely removed, and the colleges of physicians and surgeons, which at one time refused their fellowships to any one engaged in obstetric practice, now receive them on the same terms as other practitioners, and all medical licensing bodies demand an adequate knowledge of its theory and practice from every candidate for their diplomas. The science and practice have been built up by a host of workers, the mere mention of whose names here space precludes. But it may be of use to indicate some of

the great advances and discoveries on which the art rests.

(1) *The Rediscovery of Podalic Version or Turning*.—In 1550 Paré described this operation, whose value had been recognised and its method described in the 1st century by Soranus. It had, however, been lost to practice since the 7th century. Paré showed how it could be performed, and pointed out its advantages in saving foetal life; and it is certain many children were delivered safely by this means whose lives could not have been otherwise saved. The operation has been extended and modified in various ways since.

(2) *The Invention of the Forceps*.—About the end of the 16th or beginning of the 17th century the forceps (for application to the head of the living child) was invented by Dr Peter Chamberlen, a son of a William Chamberlen, a Huguenot refugee living in England (see **FORCEPS**). The secret, long kept, ultimately leaked out, and by 1747 the instrument was generally known and employed. The original instrument was modified by Levet of Paris, Smellie and Simpson in Great Britain; and, later, its construction was elaborated by Tarnier of Paris on what is called the 'axis-traction' principle. It is probable that no single invention has been more successful in saving life and relieving suffering.

(3) *The Employment of Anaesthetics*.—In 1847 Sir James Young Simpson first employed chloroform anaesthesia to relieve the pain of labour, and this certainly marks one of the most beneficent advances in the history of obstetrics, as of surgery in general. Besides relieving and abolishing untold suffering in ordinary labour, it permits the performance of many operations and the correction of untoward conditions which previously were impossible or irremediable. In recent years further steps have been taken in the same direction with the hope of relieving the sufferings of child-birth in the earlier stages, when the use of chloroform is generally inadvisable. Hypodermic injections of morphia and hyoscine induce a condition of narcosis—the so-called 'twilight sleep' (*Dämmerschlaft*)—which diminishes the pain without arresting the progress of the labour, and at the same time abolishes the memory of any suffering.

(4) *The Prevention of Puerperal Fever*.—Up to 1870 the great scourge in maternity hospitals and a frequent cause of disease in private practice was the prevalence of Puerperal Fever (q.v.). In that year the teaching of Lister began to influence obstetric teaching and practice, and since then the rigorous use of antiseptics, and in more recent years the observance, in so far as possible, of strict asepsis, have become the rule in all maternity hospitals. The result has been to reduce the mortality in many instances from about 6 per cent. to practically zero. A maternity hospital, or a nursing home in which proper surgical conditions can be obtained, is now the safest place for a woman in labour.

(5) Since the beginning of the present century the improvements in surgical technique have rendered the operation of Cæsarean Section vastly more successful than it used to be. In favourable circumstances the maternal mortality from the operation has now been reduced to about 2 per cent. This has greatly extended the scope of the operation, with corresponding benefit to both mothers and children in some of the more serious complications of labour.

(6) Unquestionably the most important development in obstetrics since the beginning of this century has been the increasing realisation of the paramount importance of adequate ante-natal care. Most of the important complications of pregnancy can be detected in their earliest stages, and their more serious developments averted, if the pregnant

woman is under the constant observation of the physician; and many of the greatest difficulties likely to be met with in the actual confinement can similarly be foreseen, and either obviated or properly prepared for by suitable measures. The recognition of these points has led to the establishment in most large towns of ante-natal clinics, where women attend during pregnancy, and are seen from time to time by competent obstetricians. The result has been a considerable diminution in the frequency of the necessity of sacrificial operations (embryotomy, &c.), and a very welcome drop in the number of still-births in different hospitals where proper records are kept. The development of obstetrics along such preventive lines is bound to continue, and promises to be increasingly fruitful in good results.

The teaching of midwifery is provided for in the curricula of all the medical schools of the United Kingdom. A course of lectures, varying from three to six months in different schools, is necessary, and in addition the student has to receive clinical instruction in maternity hospitals and attend a certain number of cases of labour. In view of the enormous importance of obstetrics in the daily work of the medical practitioner, the General Medical Council has recently recommended an increase in the clinical teaching of this subject, and steps are being taken by the medical schools to meet the requirements of the council in this respect. The proper training of nurses in midwifery is also being undertaken on an increasing scale. Every large maternity hospital is now a training-school, where lectures and demonstrations are regularly given to nurses, so that the ignorant midwife of the past is being rapidly replaced by trained women, who are competent to undertake the management of all ordinary cases of labour.

A great advance in this direction was made by the passage in 1902 of the Midwives Act. This provides a central examining and controlling authority in the Central Midwives Board, and prohibits any person acting as a midwife, either habitually or for gain, who does not hold the certificate of that body. Certificates of practice are granted only after full examination, and all breaches of the rules laid down by the board are punishable at law. A similar act for Scotland was passed in 1915, and for Ireland a few years subsequently, a separate central board being established in each case.

BIBLIOGRAPHY.—Among recent standard books on the subject are those of Whitridge Williams, Eden, Jellett, Johnstone, Munro Kerr and Haig Ferguson, Edgar, De Lee; in French, Fabre; in German, Bumm, v. Winkel. See also articles in this work on **ABORTION**, **CÆSAREAN SECTION**, **FÆTUS**, **FORCEPS**, **PREGNANCY**, **PUERPERAL FEVER**.

Ocarina, an instrument of flute-like sound, made of pottery, and shaped like the body of a bird (without head or neck), used by many savage peoples and revived as a toy in Italy.

O'Carolan (or *Carolan*), **TURLOUGH** (1670–1738), a blind bard of Ireland, the writer and composer of many pieces in Irish, the most famous perhaps his *Receipt for Drinking*. His work is still familiar in Ireland.

Occam, **WILLIAM**. See **OCKHAM**.

Occasionalism. See **DESCARTES**.

Occleve, **THOMAS**. See **HOCCKLEVE**.

Occlusion, a term applied to the solution of a gas by a melted solid—as of oxygen by melted silver—which gas is given up by the melted material when it solidifies, so that in the case of silver the metal sometimes 'spits' or gives off the gas in bubbles, thereby roughening its otherwise smooth surface. Sometimes the gas is absorbed or

'occluded' (in a wider sense) even though the metal be not fused—e.g. hydrogen gas by cold palladium, carbonic oxide by red-hot cast-iron.

Occultations (Lat. *occultatio*, 'a concealment') are neither more nor less than 'eclipses'; but the latter term is confined by usage to the obscuration of the sun by the moon, and of the moon by the earth's shadow, while the former is restricted to the eclipses of stars or planets by the moon. Occultations are phenomena of frequent occurrence; they are confined to a belt of the heavens about $10^{\circ} 17\frac{1}{2}'$ wide, situated parallel to and on both sides of the equinoctial, and extending to equal distances north and south of it, being the belt within which the moon's orbit lies. These phenomena serve as data for the measurement of the moon's parallax; and they are also occasionally employed in the calculation of longitudes.

Occultism. See MAGIC, ALCHEMY, ASTROLOGY, DIVINATION, SECOND-SIGHT, THEOSOPHY, WITCHCRAFT.

Ocean. See SEA.

Ocean Island, one of the chief of the Gilbert Islands, is the administrative centre of the Gilbert and Ellice Islands Colony. Its guano deposits are worth many millions sterling.

Oceanography, the study of the ocean in all its aspects—extent, depth, tides, currents, compositions, deposits, temperature, vegetation, animal life, &c. See SEA.

Oceanus, the god of the river Oceanus, which, according to Greek mythology, having neither source nor mouth, flows ceaselessly round the whole earth, never mingling with the sea, which it encloses. Oceanus was the husband of Tethys, and father of all the river-gods and water-nymphs of the earth. As the geographical knowledge of the Greeks advanced the name was applied to the outer sea, especially the Atlantic.

Ocelot (*Felis pardalis*) is a species, with several varieties, which is confined to the New World, and ranges from Arkansas in the north to Paraguay. These animals are inhabitants of forests, and very expert in climbing trees. Their prey consists in great part of birds. They are beautifully marked and coloured. The coloration varies



Ocelot (*Felis pardalis*).

considerably, but the ground tint is always a rich red or tawny colour, blending finely with the dark brown on the margins of the open spots, of which there are chains along the sides; the head, neck, and legs being also variously spotted or barred with dark brown or black.

Ochil Hills, a pastoral range occupying parts of the Scottish counties of Stirling, Perth, Clackmannan, Kinross, and Fife, and extending from the vicinity of Stirling north-east to the Firth of Tay. It is 24 miles in length, and about 12 in breadth. Chief summits are Benclough (2363 feet), Dumyat (1375), and King's Seat (2111). The hills, which are formed chiefly of lavas, contain silver, copper, and iron ores.

Ochino, BERNARDINO, Italian reformer, was born at Siena in 1487, and joined the Franciscan Observants, but in 1534 changed to the Capuchin order, as being more strict. In four years' time he was vicar-general of the order, having already before joining it gained the reputation of a man of great piety and eloquence. In 1542 he was summoned to Rome to answer to the Inquisition for certain evangelical tendencies which had been manifested in sermons delivered by him at Venice three years before, and had been much talked about. Warned by Cardinal Contarini, Ochino turned back at Bologna and fled to Geneva, where Calvin gave him a welcoming hand. In December 1545 he was appointed preacher to the Italian congregation in Augsburg, but fourteen months later was driven from the city by the advent of the imperial troops. From this time Ochino was dogged by misfortune, and was never able to stay long in any one place. He first found refuge in England, invited there by Cranmer; he was made pastor to the Italian exiles and given a prebend in Canterbury Cathedral. In England he wrote the *Tragedy*, a series of dramatic dialogues translated from the original Latin into English by Bishop Ponet, which is believed to have had some influence upon Milton's *Paradise Lost*. At Mary's accession (1553) Ochino fled to Switzerland, and ministered to the Italian exiles in Zurich for ten years. Then the publication of *Thirty Dialogues*, one of which the Calvinists stated to contain a defence of polygamy, occasioned his being banished precipitately from the canton. In the dialogue in question Ochino states expressly and repeatedly that 'polygamy is immoral;' but, being a man of inquiring, questioning intellect, he at the same time threw out the suggestion that there might be individual cases in which it might perhaps be permissible, provided the individual were quite certain he had God's approval. Ochino fled to Poland, but was soon driven thence by an edict directed against all foreigners, and died in flight at Schlackau in Moravia in the end of 1564. See Life by Benrath (trans. Helen Zimmern, 1876).

Ochotona, or LAGOMYS, a genus of Duplicitate Rodents, known as tailless hares or Pikas, represented in mountainous regions in both the Old World and the New; the only European species is *Ochotona pusilla*, in southern Russia. They are small alpine animals, with fore and hind legs almost equal, with short ears, and without external tail.

Ochres are native pigments consisting of clays or earths composed chiefly of silica and alumina, along with oxide of iron or more rarely with other oxides. Some are found in a natural state fine enough to be used after being simply washed. The two important classes of ochres are the yellow and the red, the colouring material of the former being the hydrated oxide of iron, and that of the latter the red or sesquioxide. Umber (q.v.), which is classed with the ochres, contains manganese as well as oxide of iron. Yellow ochres are reddened by being burned. Most of the ochres can be prepared artificially, but these are not so safe for artists' purposes as the native earths. The latter are remarkable for their stability, as can be seen in many pictures by the old masters. Yellow ochre and Roman ochre are much used both by artists and house-painters, and so also (but the first more by artists) are the red ochres, known as light red, Indian red, and Venetian red. This last, however, is an artificial product, and, although it is an oxide of iron colour, it contains no earthy base, so that correctly speaking it is not an ochre. Ochre is worked in Anglesey and Devonshire. Canada has large deposits. The earthy or powdery varieties of

some of the less common metallic compounds found native are called ochres—e.g. bismuth ochre, antimony ochre, nickel ochre, chrome ochre. See *MAGIC*.

Ochrida, OKHRIDA, or OHRID, a town (pop. 10,000) and beautiful lake (area about 100 sq. m., but variable) in south-west Yugoslavia. Ochrida was for centuries a Bulgarian patriarchate. The lake is near the point where Yugoslavia, Albania, and Greece meet.

Ochroma, a genus of Bombacaceæ, consisting of *O. Lagopus* (Balsa or Corkwood), a West Indian tree, whose wood being very light is used for floats, life-saving apparatus, and the like.

Ochterlony, SIR DAVID, British general, was born of Scottish (Forfarshire) descent, at Boston, Massachusetts, on 12th February 1758, went out to India as a cadet at eighteen, and was made lieutenant-colonel in 1803. In the following year he defended Delhi against Holkar; but his greatest services were rendered against the Goorkhas. In 1814 he stormed their hill-forts one after the other, and compelled them to sue for peace; on the renewal of the war in 1815 he shut up their principal chief in the hill-fort of Malaun, forced it to surrender, and penetrated to within a few miles of the Nepalese capital. Peace was again made; and the treaty has remained in force down to the present time. Ochterlony was made (1816) a baronet for his success. He rendered excellent service in the Pindari and Mahratta wars of 1817 and 1818. He died at Meerut, 15th July 1825.

Ockham (more usually in the Latinised form OCCAM), WILLIAM OF, surnamed *Doctor Singularis et Invincibilis*, a famous 14th-century schoolman, was born in England, at Ockham in Surrey, but when is not known; the date usually given is 1270 or 1280. He entered the Franciscan order, and studied at Oxford and Paris, being a pupil, afterwards the rival, of Duns Scotus. It seems not to be correct that he took part in the contest between Philip the Fair of France and Boniface VIII., the famous *Disputatio super Potestate Prælati Ecclesiæ . . . commissæ*, usually attributed to him, having been probably written by another. But in the revolt of the Franciscans against Pope John XXII. at Perugia in 1322 he did take part, being one of the most active in the movement. After four months' imprisonment at Avignon he repaired to Munich, and found there a defender in the Emperor Louis of Bavaria, whom he in his turn defended stoutly against the temporal pretensions of the pope. In 1342 he seems to have become general of the Franciscans. Besides insisting on the independent divine right of temporal rulers, and so in some measure clearing the way for modern constitutional ideas, Ockham won greater fame as the reviver of Nominalism (q.v.), for which he won a final victory over the rival Realism, chiefly by setting forth its real meaning in plain and simple language. He seems to have died at Munich in 1349. His views on civil government are expounded in *Super Potestate Summi Pontificis octo Questionum Decisiones* (1339-42) and *Tractatus de Jurisdictione Imperatoris in Causis Matrimonialibus*, his philosophical views in *Summa Logices* (1488) and the commentary on the *Sentences* of Peter the Lombard, and his theological in this last and the *Tractatus de Sacramento Altaris* (1516). See T. M. Lindsay in *Brit. Quart. Review* (1872).

Ockley, SIMON (1678-1720), Orientalist, was educated at Oxford, and in 1711 became Arabic professor. His *History of the Saracens* (2 vols. 1708-18; long a standard, though not based on the best authorities) was partly written in a debtor's prison.

O'Clery, MICHAEL, Irish chronicler, was born in 1575 at Kilbarron on Donegal Bay. Educated in

East Munster, he was for some time in the Franciscan convent of Louvain. Returning to Ireland he, with the assistance of other Irish scholars, did much valuable work in Irish historical research. His principal works are the *Royal List* (1624-30), an account of the Irish kings and their pedigrees; the *Book of Invasions* (1627-31), an account of the several settlements of Ireland; the *Annals of the Four Masters* (1632-36), a digest of the old *Annals of the Kingdom of Ireland*; and *Martyrologium Sanctorum Hiberniæ* (1636), a complete calendar of the saints of Ireland. He died at Louvain in 1643.

O'Connell, DANIEL, 'the Liberator,' great Irish patriot and orator, was born near Cahirciveen in County Kerry, 6th August 1775. He was the eldest son of Morgan O'Connell, but was early adopted by his uncle, Maurice O'Connell. He was sent in 1791 to the college of St Omer, where his unusual promise was recognised. In 1792 he went to the English college at Douai. On more than one occasion he witnessed the follies and excesses of the French Revolution, and the experience served in later life to give to his mind a deep conservative tinge. He entered Lincoln's Inn in 1794, and was called to the Irish bar in 1798. He was on the Munster circuit for twenty-two years. He soon became famous as a counsel as well as an unrivalled cross-examiner of Irish witnesses, and before long was plunged in an enormous practice. The wide popularity of 'the Counsellor'—to the last a favourite title among his Irish admirers—was due to his fearlessness and professional dexterity, his boisterous wit and good-humour, his constant tact and readiness in reply, and not least to the violent language he often employed in court. In 1802 he married his cousin, Mary O'Connell, who bore him five sons and three daughters, and with whom he lived till her death in 1836 in uninterrupted happiness. With an inherited dislike to British rule in Ireland, O'Connell was early drawn into political agitation. It appears that he had some connection with the rebellion of 1798, the unhappy issue of which cured him for life of all love for secret societies.

At the beginning of the 19th century the worst severities of the penal code had been relaxed in Ireland, but Catholics still laboured under many and grievous disabilities. It was then that O'Connell rose as a champion of the cause of Catholic emancipation, and became by 1811 the real director of the movement. Grattan's motion in favour of emancipation was carried in March 1813, but his bill was lost in committee. The 'securities' it proposed were most distasteful to the Catholic bishops, and O'Connell supported them in their policy of opposition to Grattan. The timid counsels of the pope, then a pensioned prisoner of Napoleon, were displeasing to the Catholic party, but it was O'Connell's own conscientious convictions that nothing short of repeal would be permanently satisfactory that made him fight resolutely against all compromise. His attacks on the 'beggarly corporation' of Dublin, then an Orange stronghold, brought him a challenge from J. N. D'Esterre, and in the duel that ensued his pistol unfortunately inflicted a fatal wound on his antagonist, 1st February 1815. O'Connell was filled with lifelong remorse; he settled a pension on the widow, and never till his latest day passed the dead man's house without uncovering his head and breathing a prayer. His fiery invectives brought him in the course of his lifetime many challenges, but only once did he allow himself to accept—in the case of Peel in September 1815. The duel was only prevented by his being arrested on his wife's information and bound over to keep the peace. Meantime the

Catholic cause languished; Grattan died in 1820, and Plunket took up his mantle, but again the Lords threw out the bill. The visit of George IV. to Ireland in August 1821 raised hopes only to be nipped in the bud, while famine and commercial insecurity paralysed the public confidence. In 1823, at the moment of deepest gloom, O'Connell formed on a broad and popular basis the Catholic Association, and before the end of the year had brought the priests into it. The movement for emancipation then became for the first time really national and irresistible. The Association was a gigantic organisation, perfectly new to Ireland, and aroused the greatest enthusiasm from sea to sea. By the 'Catholic Rent' a large sum of money was raised for its purposes, a penny a month not being too little as a test of membership. By the end of 1824 it had grown to a formidable power, the average weekly rent for its last three months being as much as £500. The government in alarm brought in a bill to suppress the Association, but it dissolved itself, 18th March 1825. The Irish forty-shilling freeholders now began to find courage to oppose their landlords at the elections. Waterford was carried in 1826, and O'Connell himself stood for Clare in 1828, and was elected amid enormous enthusiasm, yet perfect order. The Clare election set the whole country aflame, but O'Connell seeing that an outbreak would ruin the Catholic cause on the very eve of its triumph ended the agitation with magical effect. In 1829 the Catholic Emancipation Bill was passed, admitting Catholics to parliament, repealing the oath of abjuration, and modifying that of supremacy, the 'securities' being the abolition of the forty-shilling franchise and raising the qualification to £10. On the 15th May 1829 O'Connell came to take his seat, but his claim was refused on the ground that re-election was necessary. Going down to Clare like a conqueror he was returned unopposed, and, now fifty-five years old, took his seat at the beginning of 1830. At the new election following on the death of George IV. later in the year he was returned for Waterford.

Much of the good effect of the act of 1829 was lost by the unnecessary insult to a sensitive people of not allowing its champion to take his seat without re-election, still more by the fact that no Catholics were appointed to the bench, and by the placing in the hands of the lord-lieutenant the power to suppress arbitrarily by proclamation any assembly that seemed to him dangerous. O'Connell now formed a new society for Repeal, 'The Friends of Ireland of all Religious Persuasions,' which was quickly suppressed, only to be revived as often as suppressed by a succession of others under new names and forms so as to elude the letter of the law. For these legal evasions he was threatened with prosecution in 1831, but saved himself by temporising. In the same year he became King's Counsel, the honour having been kept back as long as possible. Liberal in every part of his imperial policy, during the Reform struggle O'Connell supported the Whigs, as later he advocated free trade in corn, negro emancipation, the removal of the disabilities of the Jews, the cause of Poland, not to speak of universal suffrage, and the drastic reformation of the House of Lords. In the autumn of 1830 the potato crop had been very poor, and much misery was the result in Ireland. Under O'Connell's advice the people declined to pay tithes, and that winter disorder was rampant everywhere.

He had sat last for Kerry, when at the general election of 1832 he was returned for Dublin. At this time he nominated about half of the candidates returned, while three of his sons and two of his sons-in-law composed his 'household brigade.' Of the 105 Irish members but 23 were Tories; while of the 82 Liberals as many as 45—his famous 'tail'

—were declared Repealers. The severest of all coercion acts hitherto in force was that of 1833, against which O'Connell fought in the House of Commons with masterly courage and ability. The disgraceful interruptions and outrageous insults of his opponents somewhat excuse the violence of his tone and the frequent vulgarity of his language. He was constrained by Feargus O'Connor, the *Freeman's Journal*, and his more ardent followers to bring the Repeal movement into parliament; but prematurely, and in the spring of 1834, his motion for a committee to inquire into the Act of Union was overwhelmingly defeated. The Whigs under Lord Melbourne came into power in 1835, and, Repeal being for the time set aside as hopeless, O'Connell would have accepted office had not the king intervened to forbid it. For the next five years he gave the Whigs a steady support. His phrase, 'a bloated buffoon,' applied to Lord Alvanley, brought a challenge which was refused, but his son Morgan went out in his stead, and two shots were fired. A later challenge to the same son by D'Israeli, whom O'Connell had designated as 'heir-at-law of the blasphemous thief who died upon the cross,' was, however, declined. O'Connell visited the north of England and Scotland in 1835, and was everywhere received by enormous crowds. An incident in the Carlow election of the same year brought upon him from unscrupulous and watchful enemies the charge of having pocketed money to procure a man a seat, but the inquiry only brought out that he was grossly careless in managing affairs, and left no real stigma on his character. One of the most common Tory slanders upon him was that Repeal was not so much the object of 'the big Beggarman' as the Repeal rent; but it must be remembered that to serve his country O'Connell surrendered a very lucrative practice at the bar, and all hope of professional promotion; true, £10,000 of tribute flowed yearly into his hands, but despite the large fortune bequeathed by his uncle in 1825 and a subscription of £50,000 in 1829 raised on his behalf, he died worth scarcely a thousand pounds. The vast hospitality he certainly exercised was undoubtedly a necessity of his position.

Mulgrave and Drummond governed Ireland so mildly and impartially that O'Connell was prepared to abandon the Repeal agitation in the prospect of at last obtaining justice for his country. In 1836 he was unseated on petition for Dublin, but was subsequently returned for Kilkenny. He had loyally supported the Whigs at the risk of vanishing popularity in Ireland, but he began to feel misgivings as he saw his dreams of justice to Ireland vanishing in a more and more distant future. In 1838 he was offered the Mastership of the Rolls, but declined. In August he founded his 'Precursor Society,' and on 15th April 1840 his famous Repeal Association, the members of which were grouped in three classes—volunteers who subscribed or collected £10 a year, members who subscribed £1, and associates who subscribed one shilling. That summer and autumn he addressed meetings incessantly, but the agitation languished till the appearance of the *Nation* in October 1842 brought him the aid of Dillon, Duffy, Davis, Mangan, and Daunt. In 1841 O'Connell lost his seat at Dublin, but found another at Cork, and in November he was elected Lord Mayor of Dublin. On 25th February 1843 he successfully raised the question of Repeal in the Dublin corporation. The agitation now leaped into prominence, and the priests came pouring in to swell its strength. That year's rent was £48,400; Conciliation Hall was built in Dublin, and a magnificent and perfect organisation arranged with great enthusiasm and perfect harmony. Even a Repeal police was instituted under a Head Paci-

ficator. Arbitration courts were formed, and a great mass of national literature disseminated. O'Connell travelled that same year 5000 miles. Monster meetings, attended by hundreds of thousands (one at the Hill of Tara estimated at three-quarters of a million), were held in every corner of Ireland. These meetings, however, were never mobs—nowhere was there crime. O'Connell had, indeed, an innate horror of rebellion and bloodshed—'he who commits a crime adds strength to the enemy' was a favourite motto; another, 'no political change whatsoever is worth the shedding of a single drop of human blood.' Throughout a whole generation with wonderful skill he had kept the public mind at a pitch of the highest political excitement, yet restrained it from unconstitutional action. But now the Young Ireland party, with all the infallibility of youth and enthusiasm, began to grow impatient of the old chief's tactics, and, impelled by their enthusiasm and certain of the speedy surrender of the government, O'Connell allowed himself in his speeches to outrun his better judgment. But this time Wellington was resolute in his measures, and poured 35,000 men into Ireland. A great meeting was fixed at Clontarf for Sunday, 8th October 1843, but it was proclaimed the day before. O'Connell, apprehensive of a bloody scene, issued a counter-proclamation abandoning the meeting. Early in 1844 he was tried with his son and five of his chief supporters for a conspiracy to raise sedition. Being found guilty, he was sentenced to twelve months' imprisonment, a fine of £2000, and £5000 security for good behaviour for seven years. The House of Lords, however, set aside the verdict, and at once bonfires blazed across Ireland from sea to sea. But during the fourteen weeks the Tribune lay in prison the disease seized him of which three years later he was to die. And he found that in his absence the Young Ireland party had taken a forward step, and that his moral force policy was now discredited. His proposed scheme of federation and local parliaments found no favour, and he withdrew it. He opposed Peel's provincial 'godless colleges,' and soon came an open split between him and Young Ireland, the members of which seceded from the Association after angry disputes in 1846. Next followed the potato famine. Distraction at the sufferings of his country, dismay at the stalking shadow of famine, vexation at the breach in his party, consciousness of failure in the dearest project of his life, religious austerities in expiation of the errors of his youth, the progress of insidious disease, and last of all a crazy passion for a young English girl, now combined to break down his herculean frame. He left Ireland for the last time on 26th January 1847, made a touching but scarce audible speech in the House of Commons on 8th February, next went to Hastings and to Folkestone, and as he felt the hand of death upon him was filled with a great longing to reach Rome. Boulogne, Paris, Moulins, Lyons, Marseilles, and Genoa were the slow stages of the journey. At the last, after some days of delirium, he died, 15th May 1847. His heart by his own desire was carried to Rome, and buried in the church of St Agatha; his body rests in the Glasnevin Cemetery, Dublin, in a crypt at the base of an Irish round tower 165 feet high.

Daniel O'Connell was framed by nature for the part he had to play in life. Almost six feet high, of burly figure, giant strength, inexhaustible energy, and enormous powers of work, he had a splendid command of nervous language, and a mighty voice that rose high above the uproar of the crowd. A magnificent orator, trenchant, versatile, self-possessed, sincere with all his exaggeration, ready in unstudied and effective retort, richly endowed with a coarse but genuine humour, and ever thoroughly

Irish, he controlled at will the wildest emotions of an Irish mob, and passed with the ease of a master from bursts of passion and outrageous buffoonery to the tenderest pathos. He was master of all the artillery of vituperation, but it should be remembered in extenuation that he was assailed all his life by a malignity and hatred now difficult to realise. O'Connell was no demagogue; he opposed the poor-laws of 1838 on the most unpopular grounds, and rejected the proffered alliance of the Chartists, constantly denounced rebellion, and was unswerving in personal loyalty to the sovereign. He was no mere tool of Rome, and never abused Protestants as such, but advocated a large tolerance in religion far beyond the ideas of either his antagonists or his supporters, making for his aim a really Liberal Catholicism. His church policy was carried out far beyond his dreams in 1869, his fixity of tenure granted by the Land Bill of 1870; and indeed the magnitude of the measures since his time adopted to heal the distresses of Ireland but shows how sound was his statesmanship and how real were the evils that he denounced. Yet together with all this good there was mixed much evil also. He was coarse, scurrilous, cunning, violent, bombastic, unscrupulous, more than Celtic in his looseness of phrase and exaggeration, he often played upon unworthy passions, and left behind him an inheritance of bitterness. But it should never be forgotten that he taught his country to manage within constitutional limits the whole machinery of political agitation, and again aroused within her the spirit of nationality and the instinct of freedom. He said himself with justifiable pride, 'Grattan sat by the cradle of his country, and followed her hearse: it was left for me to sound the resurrection trumpet, and to show that she was not dead, but sleeping.' With all his faults he was a great and sincere patriot, whose devotion to the best interests of Ireland will never fade from her remembrance.

Of O'Connell's published writings the most characteristic is the *Letter to the Earl of Shrewsbury* (1842). His *Memoir of Ireland, Native and Saxon* (1843), never saw its second volume, and is poor and inaccurate. There are Lives by his son John O'Connell (1846), William Fagan (1847-48), M. F. Cusack (1872), O'Rourke (1875), R. Dunlop (1900), and M. MacDonagh (1903). See also W. J. O'Neill Daunt's *Personal Recollections* (2 vols. 1848); his son's *Recollections and Experiences during a Parliamentary Career from 1833 to 1848* (2 vols. 1849); W. E. H. Lecky's *Leaders of Public Opinion in Ireland*, unquestionably the ablest estimate of his character (revised ed. 1903); M. F. Cusack's *Speeches and Public Letters of the Liberator* (2 vols. 1875); Shaw Lefevre's *Peel and O'Connell* (1887); the excellent study by J. A. Hamilton in the 'Statesmen' series (1888); and W. J. Fitzpatrick's authoritative and invaluable *Correspondence of Daniel O'Connell, the Liberator* (2 vols. 1888). The delightful letters to his wife and Archbishop M'Hale, contained in the last, gave a new revelation of his character.

O'Connor, FEARGUS EDWARD (1794-1855), Chartist, was educated at Portarlington and Trinity College, Dublin. He was called to the Irish bar, and in 1832 entered parliament for Co. Cork. At first a supporter of O'Connell, he became estranged from his leader, and devoted himself to the cause of the working-classes in England. His great stature and strength, his eloquence and enthusiasm, gave him vast popularity as a leader, and by his paper, the *Leeds Northern Star* (1837), he did much to advance the cause of Chartism. Elected for Nottingham in 1847, he presented the monster Chartist petition in the April of the following year. In 1852 he became hopelessly insane.

Oconto, capital of Oconto county, Wisconsin, on Green Bay, at the mouth of the Oconto River,

149 miles by rail N. of Milwaukee. It has large steam sawmills, and exports pine lumber. Pop. 5000.

Ocotea, a genus of trees of the order Lauraceæ, sometimes called Mountain Laurel. *O. opifera* is a native of the countries on the lower part of the Amazon. A volatile oil obtained from the bark is used as a liniment, and when kept for a short time deposits a great quantity of camphor. *O. cupularis* is a very large tree with strong-scented wood, the bark of which yields the cinnamon of Mauritius. It grows also in Bourbon and Madagascar. *O. foetens*, a native of the Canaries, has wood (*Til-wood*) of a most disagreeable odour. *O. bullata*, the *Stink-wood* of the Cape of Good Hope, is also remarkable for the disagreeable odour of its wood; but it is hard, durable, beautiful, and takes an excellent polish.

Octave (Lat. *octavus*, 'eighth'), in the church calendar, is the eighth day after a festival, counting in the festival day itself; also, the week after a church festival.—In Music octave is the interval between any musical note and its most perfect concord, which is double its pitch, and occupies the position of the eighth note from it on the diatonic scale. The name octave is often given to the eighth note itself as well as to the interval.

Octavia, the sister of the Roman emperor Augustus, and wife of Mark Antony, distinguished for her beauty, her noble disposition, and womanly virtues. On the death of her first husband, Marcellus, she consented in 40 B.C. to marry Antony, to make secure the reconciliation between him and her brother; but in a few years Antony forsook her for Cleopatra. In 32 B.C. war, long inevitable, broke out between Antony and Octavian; and the former crowned his insults by sending Octavia a bill of divorce. But no injury was too great to be forgiven by this patient Griselda of the ancient world; and after her husband's death she brought up with maternal care not only her own children by Antony, but also those of Cleopatra. She died 11 B.C.

Octavian. See AUGUSTUS.

October (Lat. *octo*, 'eight') was the eighth month of the so-called year of Romulus, but became the tenth when Numa changed the commencement of the year to the first of January, though it retained its original name, in spite of attempts to change it made by the Roman senate, and by the emperors Commodus and Domitian. Many Roman and Greek festivals fell to be celebrated in this month, the most remarkable of which was the sacrifice at Rome of the October horse to the god Mars.

Octopus, a widely distributed genus of eight-armed cuttle-fishes, the members of which (e.g. *O. vulgaris* in Europe, and *O. bairdii* in America) usually live near shore, lurking among the rocks, preying upon crustaceans and molluscs. The term is often extended to related genera, such as *Eledone*, and to other members of the sub-order Octopoda. These differ in many ways from the Decapoda, such as *Sepia* and *Loligo*: thus, the suckers on the eight arms are sessile and without a horny ring; the body is more rounded, and there is no internal residue of a shell. Of the half-hundred species some are large: thus, *O. vulgaris* may have tentacles about 8 feet long, and *O. punctatus* of the Pacific coasts even twice as much. These are dwarfed, however, by the gigantic ten-armed *Architeuthis*, of which one specimen exhibited in America had a head and body $9\frac{1}{2}$ feet long and arms of 30 feet, while another had a body twice as big. Many fanciful descriptions have been given of the Octopus, notably that by Victor Hugo in his

Toilers of the Sea, in which the characters of cephalopod and polyp are dramatically combined. Large specimens may of course act powerfully on the defensive, but by nature they are timid, lurking animals, the conger eel and other voracious fishes being their most formidable foes. They are sometimes caught in sunken pots, into which they creep, and the flesh is used both as food and bait. The



Common Octopus (*Octopus vulgaris*).

predominant colour is reddish, but it changes rapidly with that of the surroundings and with the temper of the animal, which has also the power of discolouring the water by a discharge of inky fluid. The eggs are enclosed in small translucent sacs, and hundreds are attached to a common stalk which is glued to the rock, and protected and kept free of small seaweeds, &c., by the female. For their general structure, see CEPHALOPODA, CALAMARY, and CUTTLE-FISH.

Octroi (Lat. *auctoritas*, 'authority'), a term which originally meant any ordinance authorised by the sovereign, and thence came to be restrictively applied to a toll or tax in kind levied from a very early period in France and other countries of northern Europe on articles of food which passed the barrier or entrance of a town. The octroi was abolished in France at the Revolution, but in 1798 it was re-established. The octroi officers are entitled to search all carriages and individuals entering the gates of a town. Similar taxes are raised in Italy, Spain, Portugal, and elsewhere.

O'Curry, EUGENE (1796–1862), Irish antiquary. See IRELAND, *Language and Literature*.

Od, the name given by Baron Reichenbach (q.v.) to a peculiar physical force which he thought he had discovered, intermediate between electricity, magnetism, heat, and light. This force, according to him, pervades all nature, and manifests itself as a flickering flame or luminous appearance at the poles of magnets, at the poles of crystals, and wherever chemical action is going on. All the phenomena of mesmerism were ascribed to it. See Buchner, *Das Od* (1854); Fechner, *Erinnerungen an die letzten Tage der Odlehre* (1876); and the *Transactions of the Psychical Research Soc.* (1883).

Odænathus, or ODENATUS. See ZENOBIÆ.

Odal. See ALLODIUM.

Oddfellows. See FRIENDLY SOCIETIES.

Ode (Gr. *ōdē*, from *aeidō*, 'I sing'), a form of lyrical poetry associated in its supreme form with

the name of Pindar, but practised with splendid success by many English poets. The Greek ode was simply a chant or poem arranged to be sung to an instrumental accompaniment, and all the variations of form that occurred were merely subjective, incapable of imitation, and conditioned only by the exigencies of the music. Archilochus was the first to expand the simple distich into an *epode*; Aleman, to adopt the more complex form of the *carmen* or ode. Sappho, Alcæus, and Anacreon carried it further, and shaped the lighter form of ode, known to us, through the masterpieces of their greatest imitator, as the Horatian. Stesichorus modified the ode of Aleman by elaborating a triple movement, in which the metrical wave moving in the *strophe* was answered by the counter-wave moving in the *antistrophe*, the whole concluded by the *epode*, a blended echo of the two. Simonides adapted this elaborate form to Dorian music, and next followed Pindar, the greatest master of the ode. His *Parthenia* or odes for virgins, his *Skolia* or dithyrambic odes in praise of Dionysus, and his encomiastic odes have all perished; only his *Epinikia*, or triumphal odes, remain. These display an infinite variety of metrical ingenuity; no two odes have the same metrical structure, yet each obeys a definite structural law. The Humanist poets imitated the simplest Ætolian measures as they found them in Catullus and Horace; but many of our poets, taking Pindaric as synonymous with irregular, produced so-called odes whose only likeness to their great original was their 'unshackled numbers.' But irregularity in verse is not allowable except in cases where it is a natural aid grasped by the poetic mood in its moment of exaltation; for the most constant charm of poetry is the inevitableness of cadence, which must never be lightly flung away unless to subserve another and still higher law—that of emotional necessity. It is only in the hands of a master that the ode may safely be imitated in English; by all others the apparent artifice of the form and the necessary spontaneity of the impulse may not be reconciled.

Ben Jonson's odes are unequal; Herrick's, poor; Spenser's *Epithalamium*, or marriage ode, is one of the most splendid triumphs of English poetry; and Milton, in his magnificent poem, *On the Morning of Christ's Nativity*, found in this a form adequate for that poetic exaltation which was his habitual mood. Cowley was already an expert in the Horatian ode, when he fell in with Pindar, and imitated him, in externals at least, in a number of elaborate compositions, usually redeemed from dullness by bursts of undoubted poetic power. Dryden has left at least three immortal odes, *To Mistress Anne Killigrew*, *For St Cecilia's Day*, and *Alexander's Feast*; and Congreve wrote not only a few admirable, if formal, examples, but an excellent critical *Discourse on the Pindarique Ode* (1705). The matchless Orinda, Lord Orrery, Ambrose Philips, Young, Akenside, and Shadwell followed after their kind; and Gray, first drawn to this form by Gilbert West, translator of Pindar, produced in 1754 and 1756 his two inimitable Pindaric odes, the *Progress of Poesy* and *The Bard*. The exquisitely poetic, though not Pindaric, odes of Collins were given to the world somewhat earlier. Wordsworth, Coleridge, Shelley, Keats, and Tennyson poured some of their noblest verse into this form, while modifying it further, whether as *regular*—i.e. following a definite arrangement in stanzas, or as *irregular*, following no such arrangement. There are no finer odes or nobler poems in our language than Coleridge's odes *To the Departing Year* and *To France*; Wordsworth's *To Duty* and *Intimations of Immortality from Recollections of Early Childhood*; Shelley's *To the West Wind*, *To*

a *Skylark*, *To Liberty*, and *To Naples*; Keats's odes *To a Nightingale*, *On a Grecian Urn*, and *To Autumn*; Tennyson's funeral ode *On the Death of the Duke of Wellington*; and Swinburne's *To Victor Hugo in Exile*.

See *English Odes* (1881), admirably selected by Edmund Gosse, with an excellent introduction; and the subtle and suggestive article 'Poetry,' by Theodore Watts-Dunton, in the *Encyclopædia Britannica*; also R. Shafer, *The English Ode to 1660* (1918).

Ödenburg. See OEDENBURG.

Odense, the chief town of the Danish island of Fünen (q.v.). Its cathedral was founded in 1086; and diets were held here in 1527 and 1539. Hans Andersen was a native. Pop. 50,000.

Odenwald, a mountainous system partly in Baden and Bavaria, but mainly in Hesse (q.v.).

Oder (Lat. *Viadrus*), one of the principal rivers of Germany, rises in the Oderberg on the tableland of Moravia, 1950 feet above the level of the sea, traverses Prussian Silesia, Brandenburg, and Pomerania, then empties itself into the Stettiner Haff, whence it passes into the Baltic by the triple arms of the Dievenow, Peene, and Swine, which enclose the islands of Wollin and Usedom. It has a course north-west and north of 550 miles, and a basin of 50,000 sq. m. The rapid flow, induced by its very considerable fall, together with the silting at the embouchures of the numerous tributaries, renders navigation difficult; great expense and labour being, moreover, necessary to keep the embankments in order, and prevent the overflowing of the river. Canals connect the Oder with the Spree, the Havel, and the Elbe; the Warthe is the only tributary of importance for navigation. On the banks of the Oder are Ratibor (where it is navigable for barges), Brieg, Breslau, Frankfurt-on-the-Oder, Stettin, and Swinemünde.

Odescalchi, BENEDETTO. See INNOCENT XI.

Odessa, great seaport and city of Ukraine, stands on the shore of the Black Sea, about midway between the estuaries of the Dniester and the Dnieper, by rail 967 miles SSW. of Moscow and 381 S. of Kieff. The city is built facing the sea on low cliffs, seamed with deep ravines and hollowed out by galleries in the soft rock, in which numbers of the poorest inhabitants, casual dock labourers for the most part, herd together. Above ground the streets are long and broad, the town presenting a west-European aspect. Odessa was only founded in 1794, near a Turkish fort that fell into Russian hands in 1789; but it quickly became the principal export town for the extensive corn-growing districts of South Russia. Its progress was greatly aided by its being declared a free port from 1817 to 1857, and again by the construction of the railway to Kieff in 1866. The population increased rapidly, from 3150 in 1796 to 25,000 in 1814, 100,000 in 1850, 184,800 in 1873, 270,600 in 1887, 404,651 in 1897, and 631,040 in 1912. In 1923, however, it was reckoned at 317,000. A very large percentage of the inhabitants are Jews, who share with the Greeks most of the trade. Merchants of many other nationalities dwell here also. The harbour is made up of a roadstead and three basins, protected by moles against the dangerous winds that sweep the Black Sea. It is impeded by ice—scarcely ever closed by it—during an average of only a fortnight in the year. The bulk of the exports is grain, especially wheat. Sugar in very large quantities, wool, and flour are the other chief items. The main branches of industrial activity are flour-milling, sugar and oil refining, and, in a secondary degree, the manufacture of tobacco, machinery, leather, soap, chemicals, biscuits, &c. Odessa has a university (1865) with about 3000 students; a great number of schools,

including a cadet, a commercial, and two music schools; several learned societies, and a public library (1829) with many rare books. The museum of the Historical and Antiquarian Society contains treasures from the coasts of the Black Sea, belonging to the Hellenic, the Veneto-Genoese, and the Tataro-Mongol civilisations. Amongst the public buildings of Odessa are the cathedral (1802-49), which is the church of the Archbishop of Kherson, three dozen other churches, a very fine opera-house (1887), palatial grain-warehouses, corn-elevators, and the 'palais royal,' which, with its gardens and park, is a favourite place of resort. Monuments to Count Worontsoff (1863), the Duke de Richelieu (1827)—both great benefactors of Odessa—and Pushkin (1889) adorn the city. The statue of Catherine II. (1900) was pulled down by the Odessa Soviet and a monument to Karl Marx raised in its place in 1920. The town is defended by numerous coast-batteries. Water is brought by aqueduct (27 miles long) from the Dniester. Odessa has an unenviable reputation as a home of cholera. Lagoons outside the city supply mud-baths, reckoned among the best in Europe. Odessa was bombarded by an Anglo-French fleet in 1854 and by the Turkish in 1876, on both occasions unsuccessfully. It has been the scene from time to time of Jewish persecutions. In 1905 it witnessed violent revolutionary disorders, accompanied by a naval mutiny. During the Great War it was frequently bombarded by the Turks, and ultimately fell into the hands of the Central Powers (March 1918). With their defeat the town experienced many alternations in its fortunes, being now in the hands of Ukrainian troops, and now in the possession of the anti-Bolshevist or Bolshevist forces of Russia. The latter finally held it.

Odeypoor. See UDAIPUR.

Odilon-Barrot. See BARROT.

Odin (*Odhinn*; O. H. Ger. *Wuotan*; O. E. *Woden*, or *Woden*—whence *Wednesday*), the chief god of northern mythology, common to all Germanic peoples. He is not the creator of the world, but its ruler, king of heaven and earth. Odin, as the highest of the gods, the *Alfadur*, rules heaven and earth, and is omniscient. As ruler of heaven, his seat is the palace Hlidskialf in Asgard, from whence his two black ravens, Hugin (Thought) and Munin (Memory), fly forth daily to gather tidings of all that is being done throughout the world. As god of war, he holds his court in Valhalla, whither come all brave warriors after death to revel in the tumultuous joys in which they took most pleasure while on earth. His greatest treasures are his eight-footed steed Sleipner, his spear Gungner, and his ring Draupner. As the concentration and source of all greatness, excellence, and activity Odin bears numerous different names. By drinking from Mimir's fountain he became the wisest of gods and men, but he purchased the distinction at the cost of one eye. He is the greatest of sorcerers, and imparts a knowledge of his wondrous arts to his favourites. Frigga (q.v.) is his queen, and the mother of Balder (q.v.), the Scandinavian Apollo; but he has other wives and favourites, and a numerous progeny of sons and daughters. He is claimed as ancestor of various royal dynasties. Rhys contends that the myths relating to Woden, the great Teutonic sky-god, may be traced to a Celtic origin, and compares the name Woden with the Celtic Gwydion. See SCANDINAVIAN MYTHOLOGY.

Odoacer, ODOVACAR (434-493), the ruler of Italy from the year 476 to 493, was the son of Ædico, a captain of the Germanic Scyri. He entered the military service of the western Roman empire, and rapidly rose to eminence. He took part in the revolution by which Orestes (475) drove the Emperor

Julius Nepos from the throne, and conferred on his son Romulus the title of Augustus, which the people scoffingly changed into *Aūgustūlus*. He soon perceived the weakness of the new ruler, and at the head of the Germanic mercenaries—Herulians, Rugians, Turcilingians, and Scyri—marched against Pavia, which Orestes had garrisoned, stormed the city, and put his opponent to death (476). Romulus abdicated, and withdrew into obscurity. Thus perished the Roman empire. Odoacer showed himself to be a wise, moderate, and politic ruler, sought to conciliate the Byzantine emperor Zeno, and, with the title of *Patricius*, ruled Italy from Ravenna. The barbarian ruler did everything in his power to lift Italy out of the deplorable condition into which she had sunk. Though an Arian himself, he acted with a kingly impartiality that more orthodox monarchs have rarely exhibited. He conducted a successful campaign in Dalmatia, and against the Rugii on the Danube. The increasing power of Odoacer excited the jealousy and alarm of Zeno, who encouraged Theoderic, king of the Ostrogoths, to undertake an expedition against Italy (489). Odoacer, defeated in three great battles (at Isonzo, at Verona, and on the Adda), shut himself up in Ravenna, which he bravely defended for three years. Compelled by famine, he capitulated (493) on condition that the kingdom of Italy should be shared between him and Theoderic; but a fortnight after Odoacer was assassinated at a feast by Theoderic himself. See Hodgkin, *Italy and her Invaders*.

Odometer. See PEDOMETER.

O'Donnell, LEOPOLD, Marshal of Spain, born at Teneriffe, 12th January 1809, was descended from an ancient Irish family. He entered the Spanish army when young, and espoused the cause of the infant Queen Isabella against Don Carlos (see CARLISTS). When the Carlists were overthrown he was created Chief of the Staff to Espartero. He took the side of the queen-mother in 1840, emigrated with her to France, and took up his residence at Orleans, where he planned many of the political risings which took place under the rule of Espartero. In 1843 his intrigues against Espartero (q.v.) were successful; and he was rewarded by the governor-generalship of Cuba, where he amassed a large fortune by favouring the iniquitous trade in slaves. When he returned to Spain (1848) he intrigued against Bravo Murillo and Narvaez; was made war minister by Espartero in 1854; but plotted against his benefactor, and in 1856 supplanted him by a *coup d'état*. He was in three months' time succeeded by Narvaez, but in 1858 he returned to power; in 1859 he commanded the army in Morocco, and after a tedious campaign took the Moorish camp, and the city of Tetuan surrendered, whereupon he was made Duke of Tetuan. In 1866 his cabinet was upset by Narvaez, and he died at Bayonne, 5th November 1867.

Odontopteryx (Gr. *odous*, 'a tooth'; *pteryx*, a 'wing'), an extinct bird, probably related to the Solan Goose or Gannet. It is known only by an imperfect skull from the London Clay (Lower Eocene) of Kent (see EOCENE SYSTEM). The most remarkable feature is the presence on both jaws of pointed bony processes, which are parts of the bone itself and not teeth. They seem to have been continued into similar processes of the horny beak.

Odontornithes, a general name applied by Marsh to a number of types of extinct toothed birds. It is necessary to distinguish several distinct groups. Thus the *Odontolcae*, with teeth in grooves, are well represented by *Hesperornis* from the Upper Cretaceous of Kansas. This was a large flightless bird, standing over three feet high,

specialised for aquatic life. The wing was greatly reduced, and the breast-bone was without a keel. The vertebrae were like those of modern birds. Very different were the Odontornæ, with teeth in distinct sockets, represented by Ichthyornis, also from the Upper Cretaceous of Kansas. This was a relatively small bird, about a foot high, with a well-formed wing and a keeled breast-bone. In its teeth and biconcave vertebrae it was distinctly reptilian; it is regarded by many as ancestral to the group of birds including gannets, cormorants, and pelicans. With types so different as Hesperornis and Ichthyornis, the Odontornithes cannot be regarded as a natural division. See O. C. Marsh, *Odontornithes: a Monograph of the Extinct Toothed Birds of North America* (Washington, 1880).

Odoric (1286?–1331), born near Pordenone in Friuli, became a Franciscan, and travelled by Constantinople through Persia to India, and thence by sea to China, where he spent three years (1324–27?) in mission work. He returned by Tibet and Persia to Italy (1330), and died at Udine on his way to the Pope, then at Avignon. His narrative, taken down from his lips by a friend, was first published in 1513, and was included in the second edition (1574) of the great collection of *Navigazioni e Viaggi* compiled by the Venetian state secretary Gian Battista Ramusio (1485–1557); and it was translated with notes by Sir H. Yule in *Cathay and the Way Thither* (1866). It was from Odoric's story that Mandeville (q.v.) plagiarised so shamelessly.

Odyssens, Odyssey. See ULYSSES, HOMER.

Ecclampadius, JOANNES (1482–1531; his real name was Hausschein or Hussgen), born at Weinsberg in Swabia, studied at Bologna and Heidelberg, and as a monk at Basel was employed by Erasmus on his New Testament. Stirred by Luther's teaching, he was for a while chaplain to Franz von Sickingen (q.v.), and at Basel in 1522 became a reformed preacher and professor of Theology. Inclining more and more to Zwingli's views on the Lord's Supper, he in 1529 disputed with Luther in the conference at Marburg, and he wrote several treatises. He was remarkable for his gentleness of character. There are Lives in German by Herzog (1843) and Hagenbach (1859). The theological faculty of Basel has undertaken a complete edition of writings by or relating to him.

Ecology. See ECOLOGY.

ECUMENICAL. ECUMENICAL.

Edema (Gr., 'swelling,' or 'dropsy') is the term applied in medicine to the swelling occasioned by the effusion or infiltration of serum into cellular or areolar structures. The subcutaneous cellular tissue is the most common seat of this affection. Edema is not a disease, but a symptom, and sometimes a symptom indicating great danger to life. The means of removing it must be directed to the diseased condition or cause of which it is the symptom, e.g. kidney disease, heart disease, &c.

Oedenburg (Magyar *Sopron*, the *Scarabantia* of the Romans), a town of Hungary, 3 miles W. of the Nunsiedler See and 48 S. by E. of Vienna. It is one of the most beautiful towns in Hungary, and has manufactures of candied fruits, sugar, soap, &c., with a large trade in wine, corn, and cattle, the neighbourhood being rich and well cultivated. A plebiscite (1921), not recognised by Austria, resulted in Hungary's retaining Oedenburg contrary to the Treaty of Trianon (1920), by which, along with the rest of western Hungary, the town and district should have passed to Austria. Numerous Roman remains have been found. Pop. 35,000.

Ædipus (Gr. *Oidipous*), the hero of a legend which supplied subjects for some of the noblest tragedies of Sophocles and Euripides. Ædipus was the son of Laius, king of Thebes, by Jocasta, the sister of Creon, and was exposed after his birth, with his feet pierced through, on Mount Cithæron, because his father had learned from an oracle that he was doomed to perish by the hands of his own son. The child was discovered by a herdsman of Polybus, king of Corinth, and was named Ædipus from his swollen feet. Polybus brought him up as his own son. Being told by the oracle at Delphi that he was destined to slay his father and commit incest with his mother, he would not return to Corinth, but proceeded to Thebes to escape his fate. As he drew near he met the chariot of the king, and the charioteer ordering him out of the way, a quarrel ensued, in which Ædipus unwittingly slew Laius. In the meantime the famous Sphinx had appeared near Thebes, and propounded a riddle to every one who passed by, putting to death all who failed to solve it. In the terror of despair the Thebans offered the kingdom, together with the hand of the queen, to whoever should deliver them from the monster. Ædipus offered himself, whereupon the Sphinx asked him, 'What being has four feet, two feet, and three feet; only one voice; but whose feet vary, and when it has most, is weakest?' Ædipus replied that it was man, whereat the Sphinx threw herself headlong from the rock on which she sat. Ædipus became king, and husband of his mother, Jocasta. From their incestuous union sprung Eteocles, Polyneices, Antigone, and Ismene. A mysterious plague now devastated the country, and, when the oracle declared that before it could be stayed the murderer of Laius should be banished from the country, Ædipus was told by the seer Tiresias that he himself had both murdered his father and committed incest with his mother. In his horror he put out his own eyes, that he might no more look upon his fellow-creatures, while Jocasta hanged herself. He wandered towards Attica, accompanied by his daughter Antigone, and at Colonus near Athens the Eumenides charitably removed him from earth.

Ehlenschläger, ADAM GOTTLÖB, Danish poet, was born 14th November 1779 in a suburb of Copenhagen, where his father, a Sleswicker, was an organist. After an irregular and desultory course of education, he tried unsuccessfully the career of an actor, and then took to law studies, but soon devoted all his energies to the cultivation of the history and poetry of his own country. In 1803 appeared his first collection of poems; and the *Vaulunders Saga* (1805) and *Aladdins forunderlige Lampe* raised him to the rank of the first of living Danish poets. These early efforts were rewarded by a travelling pension, which enabled him to spend some years in travelling the Continent, and becoming acquainted with Goethe and other literary celebrities. During this period (Ehlenschläger wrote his *Hakon Jarl*, the first of his long series of northern tragedies (1807; Eng. trans. by F. C. Lascelles, 1875), and at Rome his *Correggio* (1809; Eng. trans. by Theodore Martin, 1854). In 1810 Ehlenschläger returned to Denmark, where he was hailed with acclamation, and made professor of Æsthetics in the university. In 1814 took place his literary feud with Baggesen (q.v.). In 1819 appeared one of his most masterly productions, *Nordens Guder*, which showed that the severe criticism to which his writings had been exposed during the celebrated Baggesen quarrel had corrected some of the faults, and lessened the self-conceit which had characterised his earlier works. His reputation spread with his increasing years both abroad and at home. In

1829 he went to Sweden, where he was welcomed by a public ovation; and he was honoured in his own country in 1849 by a grand public festival in the palace at Copenhagen. He died 20th January 1850. His fame rests principally on his twenty-four tragedies, most of them on northern subjects. Besides those already referred to, the best are *Knud den Store*, *Palnatoke*, *Axel og Walborg*, *Væringerne i Miklagord*. His lyrical and epic poems are of less value. His *Poetiske Skrifter* were edited in 1857-62 in 32 vols.; the German translations were done by himself. An Autobiography appeared in 1830-31, his *Reminiscences* in 1850; and there are *Lives* by Arentzen (1879) and Nielsen (1879). His Danish and German works amount in all to 62 volumes.

Oehler, GUSTAV FRIEDRICH (1812-72), one of the greatest Old Testament scholars of the 19th century, was born at Ebingen, studied at Tübingen, taught at Basel and Tübingen, became in 1840 professor in the theological seminary in Schönthal, and in 1845 ordinary professor of Theology at Breslau. In 1852 he was called to Tübingen to be head of the theological seminary.

Öland, or **ÖLAND**, a long and narrow island in the Baltic, 4 to 17 miles from the east coast of Sweden. It is 55 miles long and 5 to 12 broad. Scarcely more than a limestone cliff, it is scantily covered with soil, but in some parts well wooded. It has good pasture-ground, large alum-works, excellent fishing.

Oels, a manufacturing town of Prussian Silesia, 16 miles ENE. of Breslau by rail; pop. 11,000.

Enanthic Ether. See **ETHER**.

Enothera, a genus of ornamental plants of the family Onagraceæ, related to the Fuchsia (q.v.), though strikingly dissimilar in general appearance. The Evening Primrose (*E. biennis*),

a native of Virginia, has been known in Europe since 1614, and is now naturalised in many parts of Europe and in some parts of Britain, on the banks of rivers, in thickets, on sandy grounds, &c. The flowers are fragrant in the evening. The roots somewhat resemble a carrot in shape, but is short; it is usually red, fleshy, and tender, and is eaten in salads, or in soups, and as a boiled vegetable. Eaten after dinner it incites



Evening Primrose
(*Enothera biennis*).

to wine-drinking, as olives do: hence possibly the name (literally 'wine-catcher'). Many other species, chiefly North American, are cultivated in England. The genus is interesting from a Mendelian point of view.

Oera Linda Book. See **FRISIANS**.

Örebro, a town of Sweden, at the entrance of the Svarta into the Hjelmars Lake, 170 miles W. of Stockholm by rail. It has an ancient castle, in which many diets have been held; and there is a trade in minerals and matches. Pop. 36,000.

Oersted, HANS CHRISTIAN, physicist, was born 14th August 1777 at Rudkjöbing, on the Danish island of Langeland, and studied medicine at Copenhagen, where in 1806 he was appointed extraordinary professor of Physics. He held numerous scientific appointments and honorary offices and distinctions, and died 9th March 1851. He may be regarded as the father of the science of electromagnetism (see **ELECTRICITY**). Of his many works the best known are *Naturlarens Mechaniske Deel* (1845; 3d ed. 1859) and *Aanden i Naturen* (1850).

Oesel, or **SAARE-MAA**, an island in the Baltic belonging to Esthonia, and lying across the mouth of the Gulf of Riga. It is about 45 miles in length from north-east to south-west, has an area of 1000 sq. m., and a pop. of 60,000. The surface is undulating, broken by low hills, marshy, watered by numerous small streams, and well wooded. The coast is generally formed by high cliffs. The climate is milder than that of the neighbouring continental districts. Agriculture and fishing are the principal industries. The only town is Arensburg, or Kuresaare, on the south-east coast (pop. 6000). Long governed by the Teutonic Knights, Oesel became a Danish province in 1559, was given up to Sweden in 1645, and in 1721 fell into the hands of Russia, where it remained till the emergence of the Esthonian Republic in 1918.

Esophagus, or **GULLET**, a membranous canal about 9 inches in length, which extends from the pharynx to the stomach, and thus forms part of the alimentary canal. See **DIGESTION**, and **CHOKING**.

Estridæ. See **BOT**.

Oetinger, CHRISTOPH FRIEDRICH (1702-82), theosophic theologian, was born at Göppingen, and, after holding various cures, died at Murrhardt. His system, developed in various works, has been described as lying between Jacob Boehme and Schelling.

Ofen. See **BUDAPEST**.

Offa (d. 796), king of Mercia from 757, contended successfully against Wessex and the Welsh, and made Mercia the principal state in England.

Offa's Dyke, an entrenchment extending along the border of England and Wales, from the estuary of the Dee to near the mouth of the Wye. In some places it is nearly obliterated by cultivation; in others it is of considerable height. Nearly parallel with it, some two miles to the east, is *Watt's Dyke*, which, however, seems never to have been so great a work. Offa (q.v.) is said to have erected Watt's Dyke in 765 to keep back the Welsh, and Offa's Dyke a few years later. See J. H. Hewlett, *Offa's Dyke* (1924).

Offenbach, a manufacturing town of Germany, in Hesse, on the south bank of the Main, 5 miles by electric railway SE. of Frankfurt. Among its manifold industrial products are chemicals, fancy leather goods, machines, and carriages. The *schloss* was a residence of the princely House of Isenburg-Birstein. Pop. (1831) 7802; (1875) 26,012; (1890) 35,079; (1900) 50,468; (1919) 75,380.

Offenbach, JACQUES, a composer of opera-bouffe, born of Jewish parents at Cologne, 20th June 1819. He went to Paris in 1833, and settled there, becoming *chef d'orchestre* in the *Théâtre Français* in Paris, and manager of the *Bouffes Parisiens* in 1855. He died 4th-5th October 1880. Offenbach composed a vast number of light, lively operettas, *Le Mariage aux Lanternes*, &c., perfect as musical trifles; but the productions by which he is best known are a series of burlesque operas, in virtue of which he must be regarded as the inventor of the modern form of opera-bouffe. Amongst the most notable are *Orphée aux Enfers* (1858), *La Belle Hélène*, *Barbe Bleue*, *La Grande-*

are cut. Taking an Ogam stone *in situ*, one most commonly reads upwards, and the scores are placed on either side of the edge. In some instances the vowels are not mere notches in the edge of the stone, but scores of nearly the same length as those of the third group, but differing from them in being cut perpendicular to the edge. This would seem to supply a reason for the slanting of the digits of the third group, but that is not supported by the most ancient class of inscriptions. Turning to the individual characters, the value of *h* given to the first of them is derived only from Irish tradition, but there is no reason to doubt its accuracy, though good inscriptional evidence on the point is lacking. The same was for long the case of *ng*, but the

character  was eventually found in an ancient inscription for the nasal in the borrowed word,  *Sancti*. The case of 

is one of some difficulty, as the letter has never been found in an inscription, while Irish tradition ascribes it the value of *z* or *st*. This, however, does not mean two different accounts of the Ogam, as the Irish sometimes treated *z* and *st* as equivalents, as, for example, when they wrote *steta*, *Stephyrus*, and *Elistabeth* for *zeta*, *Zephyrus*, and *Elizabeth*. It should be explained that *st* has long been commonly reduced in Irish words to *s* or *ss*. Thus all that Irish tradition respecting this Ogam seems to mean is, that it was *z* or a certain other sibilant. Now, as to *z* representing the soft sound corresponding to the sharp sound of *ss*, it is not to be found in Irish from the 9th century down, and it is doubtful whether it existed in the language late enough to claim a place in the Ogam alphabet. We venture to accept the indication afforded by

Irish tradition that ~~///~~ was a sibilant, or let us

say an *s*, for that is the only sibilant known to the language, except *sh*, which is written *s* preceding *e* or *i*; we must therefore look for a class of words where the actual or attested *s* of Irish stands for a consonant which was at one time not an *s*. We have such probably in borrowed words, like *srian*, 'a bridle,' from the Latin *frenum*, or *seinstir*, 'a window,' from the Latin *fenestra*. But the change from *f* to *s* is not confined to borrowed words, as there is a group of words with *s* in modern Irish corresponding to Welsh *ff*, as in Irish *sonn*, Welsh *ffon*, 'a staff,' in which the initial combination of consonants seems to have been at first *sp* or *sp-h*. This would seem to have been simplified into *f* or *φ*, and that ultimately changed in Irish into *s*. We should accordingly be inclined to believe that *f* or *φ* was the value of the

Ogam ~~///~~; and the phonetic change afterwards

into *s* would account for the sibilant value ascribed to this Ogam by Irish tradition. Moreover, a genitive *Fanoni* in a Devonshire inscription, reading in Roman letters FANONI MAQVIRINI, shows that early Irish had the sound of *f* or *φ*; and as the Ogam alphabet provided no symbol for it, un-

less it was ~~///~~, this consideration confirms the conclusion already suggested. It is right here to remark that modern Irish has the consonant *f* in abundance, but in earlier Irish this was *w* or *v*, which between vowels has since been everywhere elided, while initially it has been strengthened into *f*; thus, in Adamnan's *Life of St Columba* the name *Fergna* is *Virgnous*, while the ancient *Terra Convaleorum* in Louth appears in the Annals of the Four Masters as *Tir-Conaille*, or rather *Tir-Conaille-Cerd*, to distinguish it from the district of Tirconnell in Donegal. As to the Ogam ~~||||~~, which we have transliterated *qu*, that combination,

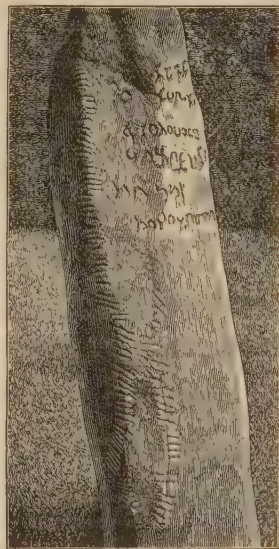
when written in Latin capitals, is found represented by QV, as in the MAQVIRINI, already cited; the exact pronunciation of the *u* cannot be ascertained, but it was probably not very far from that of the English *w*, as in one instance the QV is represented in Ogam by *go* or , and in one other by *qw* or . In any case, it is worthy of note that

no instance of confounding |||| (*gu*) with |||| (*e*) is known to occur in the more respectable class of Ogam inscriptions. Lastly, a character $\times$ occurs which was, as it were, outside the Ogam alphabet of twenty symbols. In Ireland this $\times$ had two values: sometimes it represented one of the sounds of *e* and sometimes the consonant *p*; the latter was also its value in South Wales, where it occurs in the Ogmic spelling of the genitive of the Roman name *Turpillus*. In Goidelic words themselves it cannot have been often wanted, as the *p* of the Aryan parent speech is nowhere retained in the Celtic languages. It is noticed, however, that in some words the place of Aryan *p* was occupied in Old Irish by *h*; e.g. *huile*, 'all,' from the same stem as the Greek πολλοί, 'many,' and *huathad*, 'the singular number,' from the same root as Latin *paucus*, English *few*.

A word must now be said of the distribution of Ogam monuments. All the Ogam inscriptions, whether still existing or known to have once existed, number just over 300, most of which consist of epitaphs. Of that number about 250 belong to Ireland, mostly the southern counties, especially Kerry, Cork, and Waterford, though one has been heard of as far north as Londonderry. The Ogam

in Britain and the islands make rather more than fifty in all. Of these some thirty are in England and Wales. Pembrokeshire (including Caldy Island) has most specimens to show. Next in order come the other South Welsh counties and Devon, while Cornwall boasts only a single instance, and that of a somewhat doubtful nature. No Ogams have been found in Mid-Wales, and only one is known in North Wales—to wit, near Ruthin, in the county of Denbigh. The Ogams of Wales, however, and Devon have an importance out of all proportion to their number, owing to the fact that most of them are accompanied by a version in Latin. An isolated Ogam has been found as far east as Hampshire. Proceeding

northward, one comes across a highly interesting group of Ogams in the Isle of Man; but the first Scottish Ogam is a very doubtful one, found, as it is supposed, in the island of Gigha. There are, however, about twenty-two Ogams mentioned as

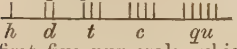


The Newton Stone, Aberdeenshire, from a photograph appended to the reprint of the Earl of Southesk's paper mentioned below.

The Ogam inscription, as distinguished from that in alphabetic characters, is thus read by the Earl of Southesk: (A)IDDAI QNEAN FORRERI IBH UA IOSIE, and interpreted as 'Ada, daughter of Forar, of the race of the sons of Huas.'

belonging to Scotland, most of which have no doubt attaching to them as to their being Ogams, though more doubt than enough exists as to the import of some of them, or even to the language employed. They occur in the counties of Fife, Aberdeen, Elgin, and Sutherland; also in Orkney, and more frequently in Shetland.

A common origin was at one time claimed for Ogmie and Runic writing (see RUNES), but that theory has now been entirely abandoned. The Ogam alphabet was most probably invented during the Roman occupation of Britain, by a Goidelic grammarian who had seen the Brythons of the Roman province making use of Latin letters. The Celts were in the habit probably of setting up stones to mark the tombs of their great men, but it was presumably from the Romans they learned to inscribe them. It has been supposed that the inventor of the Ogam alphabet took a hint from a habit of scoring for the purpose of counting, and that his group

 were the initials of the first five numerals, which in modern Irish are *aon*, *dá*, *tri*, *ceathair*, *cúig*. Such a theory proves on examination to be substantially tenable, as the early Goidelic forms of the numerals in question were approximately the following: *oinos*, *duō'u*, *tris*, *ceitūō's*, *quē'gque*. The case of the first Ogam is difficult, as we should have to suppose *h-aon* and *h-oinos*, where the cognate languages prove that the *h* cannot have been organic, even though it sometimes crept into the pronunciation of this word. It is possible, however, that the word doing service for the first numeral was one of a different origin—for instance, a word related to *huathad*, 'the singular number,' and *huaitiu*, 'lonelier,' 'loneliest;' and it is worthy of notice that one of the names of the Ogam for *h* was *huath*. In such words as these the *h* may be supposed, as already suggested, to have been of ancient standing.

The distribution of the Ogams indicates that the connection was close between the districts now represented by the counties of Pembroke and Waterford. The latter is divided by a low ridge of hills into Decies within Drum and Decies without Drum, where the name Decies refers to an ancient people called the *Déisi*, whom Irish tradition traces across to Pembrokeshire.

The ancient Ogams are all epitaphs on stone, but a few of the later ones occur on lead and on rings and brooches. So far as this goes, it might be gathered that stone was the most common material on which Ogams were cut; this may, however, be doubted, and more use may have been made of pieces of wood. In any case, when a workman had to cut an Ogam inscription on a tombstone, it was probably handed to him on a slip of wood with prepared angles. We can call to mind more than one instance where it can be shown that the cutter, so far from knowing what he was cutting, began the Ogam at the end instead of at the beginning. Had he had the Ogam before him on a piece of skin or any plane surface he might be expected to have cut the scores on the middle of the face of the stone. In fact, some of the specimens of Ogams from Shetland are found to have been so written; and as the edge of the stone would be represented in manuscript by a continuous straight line, we find a groove scratched on the flat part of the stones, and the Ogam scores arranged in connection with it instead of following one of the edges. So it is not improbable that prepared pieces of wood formed the most usual material for cutting Ogams, as they seem to have done for the Runic alphabets of Teutonic nations. It is needless to mention that Ogam is not a species of shorthand: few hands could well be longer; and

it ought likewise to be needless to say that there is nothing cryptic about this method of writing. Lastly, for the study of Goidelic philology the importance of the Ogam inscriptions extant, few comparatively speaking and meagre as they are, is much the same as that of Roman inscriptions would be for Romance philology, supposing all other remains of Latin speech had utterly perished.

The most comprehensive work on Ogams is Brash's *Ogam-inscribed Monuments of the Gaedhil in the British Islands, with a Dissertation on the Ogam Character* (Lond. 1879); and next to it in point of comprehensiveness must be ranked Sir Samuel Ferguson's *Ogam Inscriptions in Ireland, Wales, and Scotland* (Edin. 1887); R. A. S. Macalister's *Studies in Irish Epigraphy* (1897, 1902, 1907) is a work of much importance. Papers on Ogams will be found in the *Trans. Roy. Irish Acad.*, especially by the Bishop of Limerick, who also propounded a theory of the origin of Ogmie writing in the *Hermathena*. The journal which has above all others kept its pages open for Ogam finds in Ireland is that of the Royal Hist. Archæo. Assoc. Ireland (originally founded as the Kilkenny Society in the year 1849). Among other things its Journal for 1874 contains tracings made by G. M. Atkinson of old treatises on Ogams, together with explanations, including the theory of the numerical origin of the Ogams for *h*, *d*, *c*, *qu*, contributed by the Rev. Edmond Barry. The Ogams of Wales and Devon will be found in their places in Hübnér's *Inscriptiones Britannicæ Christianæ* (Berlin, 1876). Further, those of the Principality have from time to time been noticed and illustrated in the *Archæologia Cambrensis*, and they will also be found in Westwood's *Lapidarium Walliæ* (Oxford, 1876-79). The Ogams of the Isle of Man have been described in the *Academy* and the *Manx Note-book*; and papers on the Scottish Ogams were read before the Society of Antiquaries of Scotland in the years 1882-84 by the Earl of Southesk after careful examination of the stones. The names in the Ogams of Wales and Devon have been discussed in detail in Rhys's *Lectures on Welsh Philology* (Lond. 1879), and some Ogmie forms have been used for the purposes of Celtic philology by Dr Whitley Stokes in his *Celtic Declension* (Gött. 1886). Lastly, the most important Irish tract on Ogams is to be found in the 15th-century manuscript known as the Book of Ballymote: it occupies folios 308-314 of the autotype edition (Dublin, 1887) of that extensive codex.

Ogasawara. See BONIN.

Ogden, capital of Weber county, Utah, is situated, at an elevation of 4340 feet, at the confluence of the Weber and Ogden rivers, where the former passes through the Wahsatch Mountains, 37 miles N. of Salt Lake City. It is of importance as a railway junction. The city contains flour-mills, canning-works, iron-works, and other factories, &c. Pop. (1880) 6069; (1900) 16,313; (1920) 32,804.

Ogdensburg, a port of New York, on the St Lawrence, at the mouth of the Oswegatchie, opposite Prescott, Canada. Its principal buildings are the Roman Catholic cathedral and the United States government building. The city has a large lake and river trade, and contains huge grain-elevators and manufactories of flour, lumber, and leather. A steam ferry plies to Prescott. Pop. 15,000.

Ogee, an architectural term and form of the word 'Ogive' (q.v.), applied usually to a compound curve in moulding, made up of a convex curve continued by a concave one. Ogee moulding is that also called *Cyma reversa*, illustrated at MOULDINGS.

Ogham. See OGAM.

Ogier le Danois. See CHANSONS DE GESTE.

Ogive (Fr. *ogive*, from the Spanish *auge*, and that from the Arabic *awj*, 'summit,' 'vertex') is the name given by the French to the pointed arch in architecture. As an English architectural term, ogive ribs are the main ribs which cross at the in-

tersection of the vaulting. Ogival work is common in the Decorated style (q.v., fig. 3), and may be seen in the tracery of the Flamboyant (q.v.).

Oglethorpe, JAMES EDWARD, founder of Georgia, was born in London, 21st December 1698, the son of Sir Theophilus Oglethorpe, of Godalming in Surrey. After studying awhile at Oxford he joined the Guards before he was twenty, and served on the Continent with Prince Eugene. From 1722 to 1754 he represented Haslemere in parliament. Meanwhile he projected a colony in America, where the debtors then languishing in English gaols might start life afresh, and which should be also a refuge for the persecuted German Protestants (see SALZBURG). Parliament contributed £10,000, George II. gave a grant of the necessary land, after him called Georgia; and in 1733 Oglethorpe went out with a company of 130 persons and founded Savannah. In 1735 he took out 300 more, including the two Wesleys; and in 1738 he was back again with a regiment of 600 men, raised in anticipation of a war with Spain, from whose neighbouring colony of Florida he had already received annoyance. War was declared by the mother-countries in 1739, and in 1741 Oglethorpe invaded Florida and unsuccessfully attacked St Augustine (see his own account, published 1742); the next year he repulsed a Spanish invasion of Georgia. In 1743 he left the colony for the last time, to meet and repel before a court-martial the malicious charges of one of his own officers. He was again tried and acquitted after the Forty-five for having failed, as major-general, to overtake Prince Charles's army. The charter of his colony he surrendered to the British government in 1752. His later years were spent at Cranham Hall, his seat in Essex, where he died 30th January 1785. His intimate friends included many of the most eminent men of the day. Pope's couplet is well known:

Or driven by strong benevolence of soul,
Will fly, like Oglethorpe, from pole to pole.

Dr Johnson urged him to write his life, and even offered to do it himself; and Boswell made a few, but insufficient, notes with the same object.

See *Lives* by Harris (Boston, 1841), Wright (London, 1867), Bruce (New York, 1890), and Cooper (1903).

Ogotai, son of Genghis Khan. See MONGOLS.

Ogowé, or OGOWAY, a river of West Africa, from 2° 40' S. lat., 14° 30' E. long. flows north-west, west, and finally curves round by the south so as to pour its waters into Nazareth Bay, on the north side of Cape Lopez. It forms a wide delta of some 70 sq. m. in extent. In the dry season (July to September) it shrinks to a narrow current winding between the rocky obstructions of its bed; at other times it is a deep, broad stream, navigable by boats; numerous islands and sandbanks and shallows prevent vessels of any size from ascending.

Ogy'ges, the earliest legendary king of Attica and Boeotia, in whose time a great flood took place called the Ogygian Flood.

Ogygia, a genus of Trilobita (q.v.).

O'Higgins. See CHILE.

Ohio, a river of the United States, called by the French explorers, after its Indian name, *la Belle Rivière*, next to the Missouri the largest affluent of the Mississippi, is formed by the union of the Alleghany and Monongahela at Pittsburgh, Pennsylvania, and flows west-south-west 975 miles, with a breadth of 400 to 1400 yards, draining, with its tributaries, an area of 214,000 sq. m. In its course it separates the northern states of Ohio, Indiana, and Illinois from the southern states of West Virginia and Kentucky. The principal towns upon its banks are Pittsburgh, Wheeling, Cincinnati, Louisville (where there are rapids of 22 feet

in a mile, with a steamboat canal), Evansville, New Albany, Madison, Portsmouth, Covington, and Cairo. The river's principal affluents are the Tennessee, Cumberland, Wabash, Kentucky, Great Kanawha, Green, Muskingum, and Scioto. It is usually navigable from Pittsburgh.

Ohio, fourth in population of the states of the American Union, is one of the north-central group, and from the number of its horse-chestnuts or buckeyes, is called the 'Buckeye State.' It stretches from north to south 210 miles, and from east to west 220 miles; the northern and southern and much of the eastern boundaries are irregular. Area, 41,040 sq. m., or equal to that of Ireland and Wales together. Ohio is a part of the original North-west Territory, chiefly claimed by Virginia but in part also claimed by Massachusetts, Connecticut, and New York. These states gradually yielded their claims to the general government, which thus gained its first landed possession. This was accomplished in 1785, but the territory still needed to be conquered from the powerful Indian tribes who held it. Ohio was the first state created within the territory. It is watered on the north by Lake Erie, and on much of the east and all of its southern boundary by the Ohio River, from which it derives its name.

The face of Ohio, taken as a whole, presents the appearance of an extensive, monotonous plain. It is moderately undulating, but not mountainous; in many places streams have forced a way through bold cliffs of sandstone. A low ridge enters the state near the north-east corner and crosses it in a south-westerly direction. This divide separates the waters of Lake Erie and the Ohio River, and maintains an average elevation of a little over 1300 feet above sea-level. North of this ridge the surface of the country is generally level, gently declining toward the lake. The central part of Ohio is almost a level plain, about 1000 feet above the sea, slightly inclining southward. The southern part is somewhat hilly, the valleys growing deeper as they approach the Ohio River, whose tributaries here water many extensive and fertile valleys. There are a few prairies or plains in the north-western parts of the state, but over its greater portion originally existed immense quantities of timber. The principal rivers draining southward to the Ohio are the Muskingum, Scioto, Great Miami, and Little Miami. Northward to the lake are the Tuscarawas, Cuyahoga, Sandusky, Huron, and Maumee, all but the last named being entirely in the state.

The rocks underlying Ohio belong to the Silurian, Devonian, and Carboniferous systems. The general arrangement of the geological formation shows a layer of sheets resting in the form of an arch from Lake Erie to the Ohio River. The limestone (No. 4) midway in the state is unbroken, and stretches from side to side; the Oriskany, the Corniferous, the Hamilton, and Huron formations, though generally removed from the crown of the arch, still remain over a limited area near the central portion. On the side of the great anticlinal axis the rocks dip downward into a basin, which for several hundred miles, north and south, occupies the interval between the Nashville and Cincinnati ridge and the first fold of the Alleghany Mountains. As they dip toward the centre of this trough, on the eastern and southern border of the state, the older rocks are deeply buried, and the surface is here underlain by the Alleghany coal-measures; while in the north-western part of the state the strata dip northward and pass in the same way under the Michigan coal-basin. The coalfields of Ohio cover over 12,000 sq. m., the beds estimated to average 15 feet in thickness. Immense deposits of limestone, freestone, and mill-stones abound.

Ohio ranks high among the states in mineral production. Coal, clay-products, petroleum, and natural gas, iron ore, cement, and salt are abundant. It is one of the leading manufacturing states, and stands next to Pennsylvania in production of pig-iron. Other industries are rubber, automobiles, packing and canning, pottery, lumber. In agriculture it occupies a prominent position, especially in the production of corn, wheat, and oats, and in the value of its live-stock. The wool-clip is large, and it is a leading pork-producing state.

Archæologically Ohio is the richest field in the United States. In no other state have been found so many evidences of man's antiquity, exemplified in implements of stone, bone, copper, and clay; while the most extensive and elaborate systems of earthworks in America are at Newark, near Chillicothe, and on the Miami bluffs near Waynesville. See MOUND BUILDERS.

History.—In 1787 the Ohio Company of Associates was organised in New England by those who had served in the war of the revolution, and under their auspices a large tract of land was purchased from the government in the territory north-west of the Ohio River, payment being made in 'Continental Certificates' issued to the soldiers for their services. This was the first public sale of land by the United States government. In connection with its sale the famous 'Compact' or 'Ordinance of 1787' was passed, guaranteeing for ever in the territory civil and religious freedom, the system of common schools, trial by jury, and the right of inheritance. In 1788 Marietta and Cincinnati were founded, and till 1791 settlements in the southern part of the territory increased rapidly. In that year the Indians became troublesome, owing to the continual encroachments of the whites, and an army under the governor suffered a disastrous defeat. In November 1794 a signal victory was gained by General Anthony Wayne over the Indians at 'Fallen Timbers' on the Maumee River. The year after a treaty of peace was concluded at Fort Greenville, the Indians ceding a great portion of territory, which settlers began at once to fill, and the towns of Xenia, Dayton, Hamilton, Chillicothe, Zanesville, Franklinton, and others were established. Chillicothe was made the seat of government for the territory, and a capitol erected. In 1802 a constitution was adopted for the 'Eastern Division of the Territory North-west of the Ohio,' to be known as 'Ohio,' and on 19th February 1803 Ohio was formally admitted into the Union. By 1810 its population was 230,760, and the increase from that period was rapid. As early as 1812 steam-boat navigation up and down the Ohio River was accomplished. The Mad River Railroad, begun in 1837, was opened for traffic in 1842, and completed to the lakes by 1848; some 14,000 miles of railway traverse the state.

Ohio is divided into 88 counties, and returns 2 members and 22 representatives to congress. The justices of the supreme court are elected for terms of five years by the people. There are now about 1000 high schools and large numbers of elementary ones, with academies of various kinds, professional and art schools and colleges and universities. The institutions for higher education number about 40. The ratio of illiteracy is less than the average of other states. The largest cities are Cleveland, Cincinnati, Toledo, Columbus (the capital), Akron, Dayton, Youngstown, Canton, Springfield, Lakewood, Lima, Hamilton, Lorain, Portsmouth. Pop. (1850) 1,980,329; (1870) 2,665,260; (1880) 3,198,062; (1890) 3,672,316; (1900) 4,157,545; (1910) 4,767,121; (1920) 5,759,394.

Öhlenschläger. See EHLENSCHLÄGER.

Ohligs, a town of the Rhine province of Prussia, 3 miles W. of Solingen. It has important steel manufactures, especially cutlery. Pop. 28,000.

Ohm, GEORG SIMON (1787-1854), born at Erlangen, was physicist professor at Munich. For Ohm's Law and the *ohm* as a measure of electric resistance, see ELECTRICITY.

Ohnet, GEORGES (1848-1918), a French novelist of great popularity. Born at Paris he studied law, and after practising some time as an advocate took to journalism, and later to literature proper. Under the general title (later abandoned) of *Les Batailles de la Vie* he published a series of novels dealing comprehensively with social questions. The first was *Serge Panine* (1881, crowned by the Academy), followed amongst many others by *Le maître de forges* (1882), *La grande marnière* (1885), *Dette de haine* (1891), *Le brasseur d'affaires* (1901), *La conquérante* (1905), *La route rouge* (1908), *L'aventure de Raymond Dhaute* (1910), *La serre de l'aigle* (1912). Many of his novels were successfully dramatised, and he produced several plays. In his last years he wrote a diary of the Great War.

Ohrid. See OCHRIDA.

Ohthere, a Norse maritime explorer, who between 880 and 900 undertook two voyages of trade and discovery for King Alfred, whose service he had entered about 878. In the first, having rounded the North Cape, he explored the White Sea; in the second, he voyaged by way of the fiord of Christiania to Haddeby, near Sleswick.

Oidium, or ERYSIPHE, a genus of minute fungi infesting various plants, and especially important as the cause of a ravaging disease of the vine, popularly known as vine-mildew. The disease was first observed in Kent in the spring of 1845; it spread rapidly over the English vineries, and was observed about the same time in the vineries of Paris, and soon afterwards in those of nearly all parts of France, Italy, Greece, Tyrol, and Hungary, and in a less degree in the Rhine valley. Its ravages extended to Algeria, Syria, Asia Minor, and especially to the island of Madeira, where it nearly put an end to the production of the celebrated wine. Over-cultivation and long use of the same ground are predisposing causes. Powdered sulphur has been found useful as a cure.

Oil-beetle, a name given to beetles of Meloe and allied genera, which when disturbed emit a yellowish oily liquor from the joints of their legs. Some species are used as vesicants instead of cantharides.

Oil-bird. See GUACHARO.

Oil-cake is used mainly for feeding sheep and cattle. It is made from the solid residue of oleaginous seeds (linseed, rape-seed, cotton-seed), after a large proportion of their oil has been extracted by crushing and grinding or by solution of the oil in bisulphide of carbon. By the latter means the oil may be almost completely extracted. Mustard, rape, castor-oil, undecorticated cotton-seed cake, and some others are also used as fertilisers.

Oil City, Pennsylvania, on both sides of the Alleghany River (here crossed by long railroad and passenger bridges), 133 miles by rail N. by E. of Pittsburgh, is one of the principal oil markets in the state, and the centre of a busy trade. It contains, besides oil-refineries, engine- and boiler-factories, and a huge cooperage. There were fearful inundations here in 1892. Pop. (1870) 2276; (1880) 7315; (1890) 10,932; (1900) 13,264; (1920) 21,274.

Oil-engine, Oil-fuel, Oil-gas. See INTERNAL-COMBUSTION ENGINE, MOTOR-CARS, FUEL, GAS (HEATING AND LIGHTING BY), PETROLEUM.

Oil Palm, a tropical African palm (*Elæis guineensis*) whose fruits on boiling yield palm-oil, used for railway axles. Other species of *Elæis* are found in tropical America. See PALMS.

Oil Rivers. See NIGERIA.

Oils (including Fats). The fats and fixed oils constitute an important and well-marked group of organic compounds, which exist abundantly both in the animal and in the vegetable kingdom. They are not simple organic compounds, but each of them is a mixture of several such compounds, to which the term *glycerides* is applied; they are esters of the triatomic alcohol glycerol, and the glycerides, which by their mixture in various proportions form the numerous fats and oils, are mainly those of palmitic, stearic, and oleic acids, and to a less extent those of other fatty acids, such as butyric, caproic, caprylic, and capric acids, which are obtained from butter, myristic acid, which is obtained from coconut oil, &c. The members of this group may be solid and hard, like suet; semi-solid and soft, like butter, horse-grease, and lard; or fluid, like the oils. The solid and semi-solid are, however, usually placed together and termed fats, in contradistinction to the fluid oils. The most solid fats are readily fusible, and become reduced to a fluid or oily state at a temperature lower than that of the boiling-point of water. It is not until a temperature between 500° and 600° F. is reached that they begin nearly simultaneously to boil and to undergo decomposition, giving off Acrolein (q.v.; an acrid product of the distillation of glycerine) and other compounds. In consequence of this property these oils are termed *fixed oils*, in contradistinction to a perfectly separate group of oily matters, on which the odoriferous properties of plants depend, and which, from their being able to bear distillation without change, are known as *volatile oils*. These, which are also known as *essential oils*, differ *in toto* in their chemical composition from the compounds we are now considering. All the fats and oils are lighter than water, and are perfectly insoluble in that fluid. Their specific gravity ranges from about 0.91 to 0.94. They dissolve in ether, oil of turpentine (one of the volatile oils), benzol, and to a certain extent in alcohol; while, on the other hand, they act as solvents for sulphur, phosphorus, &c. These bodies possess the property of penetrating paper and other fabrics, rendering them transparent, and producing what is well known as a greasy stain. They are not readily inflammable unless with the agency of a wick, when they burn with a bright flame. See LAMPS. In a pure and fresh state they have but little taste or odour, but on exposure to the air they become oxidised and acid, assume a deeper colour, evolve a disagreeable odour, and are acrid to the taste; or, in popular language, they become *rancid*. This is mainly brought about by an enzyme lipase. The rapidity with which this change occurs is considerably increased by the presence of mucilaginous or albuminous bodies. The rancidity may be removed by shaking the oil in hot water in which a little hydrated magnesia is suspended.

The general diffusion of fats and oils in the animal kingdom has been already described (see FATS). In the vegetable kingdom they are equally widely distributed, there being scarcely any tissue of any plant in which traces of them may not be detected; but they are specially abundant in the seeds. The seeds of the Cruciferae are remarkably rich in oil; linseed yielding fully 20 per cent., and rape-seed about 40 per cent. of oil; and some fruits, as those of the olive and oil-palm, yield an abundance of oil.

The uses of oils and fats are numerous and highly important, many being extensively em-

ployed as articles of food, as medicines, as lubricating agents, in the preparation of soaps, ointments, varnishes, pigments, for candles, lamps, and other means of illumination, and for the purpose of dressing leather, &c. In Africa, Asia, and the Pacific animal and vegetable oils and fats are much used for anointing the person and smearing the hair, thus affording a protection against heat and the attacks of insects, and checking excessive perspiration. This practice conduces to health and preserves the skin smooth and soft. Oil thrown on the sea has a remarkable effect in subduing the force of the waves. A few gallons cast upon stormy seas moderates and prevents the waves breaking with force. This practice might be adopted by lifeboats when approaching wrecks, and rescuing the crews of stranded vessels. The composition of the fine oils required for watches and sewing-machines is often carefully kept secret. Those principally used are ben, almond, olive, and neat's-foot. The oils suitable for machine-shops and general cotton and woollen machinery require a good body, rather viscid. For woollen spindles a lighter oil, and for cotton spindles, which have a speed of 4000 revolutions per minute, an oil of still lighter body. For lubricating purposes mineral oils may with advantage be mixed with animal and vegetable oils to diminish their tendency to thicken; the more fluid an oil is the less friction takes place. See LUBRICANTS.

(1) *Vegetable Fats*.—The chief solid fats of vegetable origin are coconut oil, nutmeg-butter, cocoa-butter, and palm-oil. The fluid vegetable fats or oils are divisible into the *non-drying* and the *drying oils*; the latter being distinguished from the former by their becoming dry and solid when exposed in thin layers to the air, in consequence of oxygenation. Some of the drying oils, when mixed with cotton, wool, or tow, absorb oxygen so rapidly, and consequently become so heated, as to take fire, and many cases of the spontaneous combustion of heaps of oily materials that have been employed in cleaning machinery have been recorded. The chief non-drying oils are olive-oil, almond-oil, and colza-oil; while the most important drying oils are those of linseed, hemp, poppy, and walnut; castor-oil seems to form a link between these two classes of oils, since it gradually becomes hard by long exposure to the air.

(2) *Animal Fats*.—The chief solid fats are beef and mutton suet or tallow, lard, butter, goose-grease, &c.; while among the fluids sperm-oil, ordinary whale-oil, cod-liver oil, and neat's-foot oil may be especially mentioned. In many of their characters spermaceti and beeswax resemble the solid fats. As a general rule, stearin and palmitin, both of which have comparatively high fusing-points (between 157° and 114° F.), preponderate in the solid fats; while olein, which is fluid at 32°, is the chief constituent of the oils.

When any of these bodies are heated with the hydrated alkalies they undergo a change which has long been known as Saponification, or conversion into Soap (q.v.), in which the fatty acid combines with the alkali to form a *soap*, while the sweet viscid liquid Glycerine (q.v.) is simultaneously formed. When the fatty acids are required on a large scale, as for the manufacture of the so-called stearin candles, which in reality consist mainly of stearic and palmitic acids, sulphuric acid and the oil or fat are made to act upon each other at a high temperature (see CANDLE). The fatty acids may also be procured in a very pure form by the injection of superheated steam at a temperature between 500° and 600° into heated fat. *Hardened Oils*.—Many of the liquid oils if treated with nascent hydrogen in presence of finely divided nickel take up hydrogen and form solid fats. A

complete list of even the chief fats and fixed oils would take up far more space than we can command. The more important are noticed in separate articles, such as Fixed Oil of Almonds, Castor-oil, Croton-oil, &c., and some account given of their properties and uses; or under the names of the substances from which they are procured—Linseed, Rape, Candle-nut, Coconut, Cotton (for Cotton-seed Oil), &c. Reference may also be made to the articles on Butter, Ghee, Lard, Cod-liver Oil, &c.

The *Volatile* or *Essential Oils* exist, in most instances, ready formed in plants, and are believed to constitute their odorous principles. They form an extremely numerous class, of which most of the members are fluid. Many used for flavouring are artificially compounded (see BUTYRIC ACID). Essential oils are much employed in perfumes, for flavouring liqueurs and confectionery, and for various purposes in the arts. See PERFUMERY. The *mineral oils* will be found discussed under the heads of Naphtha, Paraffin, Petroleum; and see also SHALE. For the ritual use of oils see CHRISM, CORONATION, EXTREME UNCTION.

Oil-wells. See BAKU, PENNSYLVANIA, PETROLEUM.

Oinomania. See DIPSOMANIA.

Ointments are fatty substances intended to be applied to the skin by rubbing in, and having the consistence of butter. The material employed as a basis for the ointment varies considerably, and as a rule the activity and action are entirely due to the substance incorporated with the basis. The most generally used basis is lard, either alone or mixed with wax, &c., to give it more consistence. To avoid rancidity the lard is usually melted previously with gum-benzoin, and is then known as *benzoeated lard*. Although lard is readily absorbed by the skin, yet in this respect it is surpassed by sheep's wool fat and Oleic Acid (q.v.). The former of these, when incorporated with water, forms an excellent ointment base, smooth, and in every way suitable. So also some of the unctuous oleates are used with great advantage. Soft paraffin, known in commerce under a number of names, has also been used for ointments and does not turn rancid, but on the whole its use is not extending. As nearly all substances may be made into ointments, there is no limit to their number, but perhaps the best known are Zinc Ointment (q.v.), Boracic Ointment, and the Red and White Precipitate Ointments (see PRECIPITATE OINTMENT). In all cases the greatest care is required to ensure that the active principle is rubbed perfectly smooth with a small quantity of oil or lard before adding the bulk of the ingredients, otherwise the production of a homogeneous ointment free from grit is impossible. See COLD CREAM.

Oise, a department in the north of France, separated from the English Channel by Seine-Inférieure; area, 2261 sq. m.; pop. (1881) 404,555; (1891) 401,835; (1921) 387,760. The rivers are the Oise, tributary to the Seine, 150 miles long, with the Aisne and Therain, affluents of the Oise. The soil is in general fertile, and agriculture advanced. The products are the usual grain-crops, with an immense quantity of vegetables, which are sent to the markets of the metropolis. There are extensive iron manufactures; porcelain, paper, chemicals, beet-root sugar, woollens, cottons, and lace (at Chantilly) are also made. The department is divided into the four arrondissements of Beauvais, Clermont, Compiègne, Senlis; capital, Beauvais.

Oisin. See OSSIAN.

Ojibways, a tribe of American Indians of the Algonquian stock. Formerly occupying the

lands round Lakes Huron and Superior, they are now settled in reservations in that neighbourhood.

Oka, an important navigable river of central Russia, the principal affluent of the Volga from the south, flows in a generally north-east direction, and joins the Volga at the city of Nijni-Novgorod after a course of 706 miles. Its basin comprises the richest and most fertile region of Russia. The principal towns on its banks are Orel, Bielev, Kaluga, Riazan, and Murom; the chief affluents are the Moskwa, Kliasma, and Tzna.

Okapi (*Ocapia*), a giraffe-like animal discovered by Sir H. H. Johnston (1899) in the Semliki forest in Central Africa, between Lakes Albert and Edward. Neck and legs are shorter than in the giraffe, ears larger and broader. The horns are on the frontal bone. The upper parts are a slightly purplish chocolate-brown; buttocks and upper parts of fore and hind legs have wavy black stripes on a buff ground. The living okapi, with several extinct types, is included in the family Giraffidæ (Camelopardidæ). The first okapi brought to Europe was placed in the Zoological Gardens of Antwerp in 1919. See Johnston's *Uganda Protectorate* (1902), and monographs by Jules Fraipont (Brussels, 1908) and Sir E. Ray Lankester (1910).

Okhampton, a municipal borough and market-town of Devonshire, 26 miles W. by N. of Exeter. There is a manufacture of glass. The traces of a supposed British camp are to be seen, also the remains of the Roman road from Exeter to Cornwall, and the ruins of a Norman keep. Pop. 3500.

Oken, LORENZ (1779–1851), naturalist, was born at Bohlsbach in Baden, studied at Würzburg and Göttingen, and in 1807 became a professor of Medicine at Jena. In 1816 government interference led to his resignation, but in 1828 he obtained a professorship at Munich, and in 1832 at Zurich. Oken aimed at constructing all knowledge *a priori*. His system of natural science is a nature-philosophy, which, though decried as transcendental and a deduction from foregone conclusions, was fertile in suggestive ideas. It was he who wrought out the theory, claimed by Goethe, and now exploded, that the skull is but a modified vertebra.

His principal works are his *Lehrbuch der Naturphilosophie* (1808–11; Eng. trans. 1847), his *Lehrbuch der Naturgeschichte* (3 vols. 1813–27), and *Allgemeine Naturgeschichte* (17 vols. 1833–45). See works on Oken by Ecker (1880) and Guttler (1884), and see Sir Richard Owen's article in the *Encyclopædia Britannica*.

Okhotsk, SEA OF, an extensive inlet of the North Pacific Ocean, on the east coast of Siberia, nearly enclosed by Kamchatka and the Kuriles and Sakhalin.

Okhrida. See OCHRIDA.

Oklahoma, from 1890 a territory of the United States, was in 1907 raised to the rank of a state and extended so as to include Indian Territory. The state is bounded by Colorado, Kansas, Missouri, Arkansas, Texas, and New Mexico. Area, 70,057 sq. m.; pop. (1890) Oklahoma, 78,475, Indian Territory, 180,182; (1900) 398,331 and 392,060 respectively, (1910) Oklahoma State, 1,657,155; (1920) 2,028,283, including 149,408 negroes and 57,337 Indians. To this must be added 119,481 Indians in reservations (1766 sq. m.). Oklahoma City in 1910 superseded Guthrie as capital.

The surface, which rises gradually toward the north and west, is for the most part an upland prairie. The most important elevations are the Wichita Mountains in the south. The charms of Oklahoma ('Beautiful Country') have been much overrated. It is fairly well watered by the Red and Arkansas rivers and their affluents, but many of the streams are brackish, and so saturated with

alkaline salts as to be at times unfit for drinking purposes or for irrigation. In the river-valleys and in some of the upland regions there are fertile and productive spots, but much of the region is likely to be subject to the same disappointment which prevails in western Kansas during unfavourable seasons. The climate is generally mild, but subject to sudden changes produced by the 'northerners' common in this region. There is a good yield of maize, wheat, cotton, and oats; and the raising of livestock is profitable. After 1904 Oklahoma rapidly rose to the second place as a petroleum-producing state. Natural gas and coal are also plentiful; and lead, zinc, limestone, gypsum, and other minerals are worked. Manufactures are less important but growing, refined petroleum, flour, and cotton-seed oil the chief products.

The history of Oklahoma dates from the year 1866, when the tribes to whom the lands of Indian Territory had previously been granted ceded the western portion of their domain to the United States. The land thus acquired was known as the Oklahoma district, but it was agreed that it should be used only for settlement by other Indian tribes or freedmen. Notwithstanding this stipulation western speculators claimed that the lands were the property of the government, and open, like other public lands, for settlement under the Homestead laws. In 1879 an organised effort was made to take forcible possession of the lands, and adventurers from Texas, Kansas, and Missouri, equipped and ready for permanent settlement, invaded the territory. Their action was forbidden by proclamations from President Hayes, and the intruders were finally ejected by United States troops. From this time until his death in 1884, David L. Payne, the leader of the 'boomers,' was repeatedly arrested, but he always evaded punishment and returned to the forbidden land, with the number of his followers augmented. He is said to have received more than \$100,000 in fees from persons who secured from him permission to settle in Oklahoma. After his death the invasions were continued with even greater pertinacity by his lieutenants. Although the government repeatedly proclaimed the integrity of the treaties with the Indians and enforced them by the authority of the military, negotiations were opened, as a result of which, upon the receipt of an additional sum, the Indians waived all claims to a district in the heart of Indian Territory. This unoccupied area was opened for public settlement on 22d April 1889. No one was allowed to enter the borders until noon, but between that hour and twilight the population was increased by at least 50,000. Claims were selected, town sites staked out, and portable houses erected before nightfall. At Guthrie a bank with \$50,000 capital did a prosperous business during the afternoon. The territory was regularly organised with extended boundaries on 2d May 1890. It consisted of two detached sections, separated by the Cherokee Outlet, lying between the southern border of Kansas and the parallel 36° 10' N., and extending from the vicinity of the Arkansas River to the 100th meridian. But the Cherokee Outlet was sold by the Indians in 1893, and incorporated with the territory in the same year; when, as again in 1901, new lands were thrown open to settlement. The Public Land Strip situated N. of the Texas 'pan-handle' and S. of the parallel 37° N., ceded to the United States by Texas at the time of its annexation, was by an oversight not included in any of the adjacent states or territories, and until its incorporation in Oklahoma was known as No Man's Land. The next great administrative change was the incorporation with it, raised to the rank of state, of the Indian Territory.

Oklahoma City, capital of Oklahoma, on the North Fork of the Canadian River, has cotton, corn, and machinery industries; pop. 91,000.

Okra, a name for the *Hibiscus* (q.v.) *esculentus*.

Olaf, St., born in 995, having made his name a terror in several descents on Normandy and England, succeeded, in 1015, in wresting the throne of Norway from Erik and Svend Jarl. The cruel severity with which he endeavoured to exterminate paganism by fire and sword alienated the affections of his subjects, who hastened to tender their allegiance to Cnut of Denmark on his landing in Norway in 1028. Olaf fled to the court of his brother-in-law, Jaroslav of Russia, who gave him a band of 4000 men, at the head of whom he returned, in 1030, and gave Cnut battle at Stiklestad, where Olaf was defeated by the aid of his own subjects, and slain. His body was removed to the cathedral of Trondhjem, where the fame of its miraculous power spread far and wide; and Olaf was solemnly proclaimed patron saint of Norway in the succeeding century. See *Passio et Miracula Beati Olavi*, edited by F. Metcalfe (Oxford, 1881).

Oland. See **ÖLAND**.

Olaus. For Olaus Magnus, see **MAGNUS**; for Olaus Petri, see **SWEDEN** (*Literature*).

Olbers, HEINRICH WILHELM MATTHÄUS, physician and astronomer, was born at Arbergen, a village of Bremen, October 11, 1758, studied medicine at Göttingen from 1777 till 1780, and subsequently practised at Bremen. In 1811 he was a successful competitor for the prize proposed by Napoleon for the best 'Memoir on the Croup.' He became known as an astronomer by his calculation of the orbit of the comet of 1779. He discovered the minor planets Pallas (1802) and Vesta (1807); and in 1781 he had the honour of first rediscovering the planet Uranus. He also discovered five comets in 1798, 1802, 1804, 1815, and 1821, all of which, with the exception of that of 1815 (hence called *Olbers' comet*), had been some days previously observed at Paris. His observations, calculations, and notices of various comets, which are of inestimable value to astronomers, were published in various forms. Olbers also made some important researches on the probable lunar origin of meteoric stones, and invented a method for calculating the velocity of falling stars. He died at Bremen, 2d March 1840. See *Life* by Schilling (1894, &c.).

Old Age. See **LONGEVITY**, **PENSIONS**.

Old Bailey, the court or sessions house in which the sittings of the Central Criminal Court are held monthly for the trial of offences within its jurisdiction. The judges of this court are the Lord Mayor, the Lord Chancellor, the judges, aldermen, recorder, and common serjeant of London. But of these the recorder, the serjeant, and the judge of the sheriff's court are in most cases the actually presiding judges. The judicial sittings here are of such antiquity that all record of their commencement has been lost. Crimes of all kinds, from treason to petty larceny, are tried, and the numbers in past times were enormous, but are now greatly reduced by the extended jurisdiction given to the quarter sessions, and the summary powers granted to magistrates. Here were tried in 1660, after the Restoration, the surviving judges of Charles I.; and Milton's *Eikonoklastes* and *Defensio Prima* were in the same year burned at the Old Bailey by the common hangman. The patriot Lord William Russell was tried here in 1683, Jack Sheppard in 1724, Jonathan Wild in 1725, the poet Savage in 1727, Dr Dodd in 1777, Bellingham, the assassin of the statesman Perceval, in

1812, the Cato Street conspirators in 1820. The Old Bailey dinners given by the sheriffs to the judges were long famous. However else varied, they always included beefsteaks and marrow puddings, and were served twice a day. The Old Bailey adjoins the site on which, till it was pulled down in 1903, Newgate Prison used to stand, between Holborn Viaduct and Ludgate Hill. See Charles Gordon, *The Old Bailey and Newgate* (1902).

Old Believers. See RASKOLNIK.

Oldbury, a busy manufacturing town of Worcestershire, $5\frac{1}{2}$ miles WNW. of Birmingham, stands in the midst of a rich mineral district, and has iron and steel works, besides factories for railway plant, edge-tools, chemicals, &c.; pop. 37,000.

Old Calabar. See CALABAR.

Old Castile. See CASTILE, SPAIN.

Oldcastle, SIR JOHN, once popularly known as the 'good Lord Cobham,' whose claim to distinction is that he was the first martyr among the English nobility, was born in the reign of Edward III. He acquired the title of Lord Cobham by marriage with the heiress, and signalled himself by the ardour of his attachment to the doctrines of Wyclif. At that time there was a party among the nobles sincerely, even strongly, desirous of ecclesiastical reform, led by John of Gaunt. Oldcastle was active in the same cause, and took part in the presentation of a remonstrance to the English Commons on the subject of the corruptions of the church. At his own expense he got Wyclif's works transcribed, and widely disseminated among the people, and paid a large body of preachers to propagate the views of the Reformer throughout the country. In 1411 he commanded an English army in France, and forced the Duke of Orleans to raise the siege of Paris; but in 1413 he was examined by Archbishop Arundel, and condemned as a heretic. He escaped from the Tower into Wales, but after four years' hiding was captured. He was brought to London, and—being reckoned a traitor as well as a heretic—was hung upon a gallows, and, fire being put under him, was burned, December 1417, whether alive or not is uncertain. His supposed authorship rests on no good authority. Halliwell-Phillipps first proved in 1841 that Shakespeare's Sir John Falstaff was originally Sir John Oldcastle—a view endorsed in Gairdner and Spedding's *Studies* (1881). See Barske, *Oldcastle-Falstaff in der englischen Literatur bis zu Shakespeare* (1905).

Old Catholics (Ger. *Altkatholiken*) is the title assumed by a number of Catholics, led by Döllinger and Friedrich, who at Munich protested against the new dogma of the personal infallibility of the pope in all *ex cathedra* deliverances, proclaimed by the Vatican Council in 1870. The leaders of the movement met at Nürnberg and drew up a declaration. The German bishops, though they had given warning of the dangerous consequences of the proclamation of the new dogma, submitted to the decision of the Vatican Council, and the refractory were suspended from their functions and excommunicated. Local committees in furtherance of the cause were, however, formed in towns of Bavaria and the Rhine country. At a general Old Catholic Congress, held in 1871 at Munich, it was resolved to draw the bonds of union close with the church of Utrecht (see JANSEN), which offered the possibility of priestly consecration and confirmation. The congress propounded the far-reaching principle that the decisions of an ecumenical council, to be valid, must be in agreement with the existing faith of the Catholic people and with theological science. The hope was also expressed of a reunion with the Greek Oriental Church

and a gradual understanding with the Protestants. At a second congress at Cologne, 1872, Professor Friedrich declared that the Old Catholic movement was now directed not merely against papal infallibility, but 'against the whole papal system, a system of errors during a thousand years, which had only reached its climax in the doctrine of infallibility.' Döllinger, the leader of the movement which led to the formation of the new communion, at first disapproved of the establishment of a new sect, but ultimately approved of the action of his friends. Yet till his death he never formally joined the community.

At Cologne in 1873 Professor Reinkens of Breslau was elected bishop of the Old Catholics in the ancient fashion, by 'clergy and people'—by all the Old Catholic priests and by representatives of the Old Catholic congregations. He was consecrated at Rotterdam by the bishop of Deventer, and formally acknowledged by the governments of Prussia, Baden, and Hesse. The Bavarian government declined to forbid Bishop Reinkens holding confirmations in its territory. The Old Catholics adopted the vernacular for church services, abolished auricular confession, compulsory fasting, and the celibacy of priests. After 1875 the numbers declined. The movement in France headed by Père Loyson came to little; see HYACINTHE.

See DÖLLINGER; Miss Scarth's *Story of the Old Catholic and Kindred Movements* (1883); German works by Forster (1879), Bühler (1880), Beyschlag (1882), and Reinkens (1882); *Old Catholic Missal and Ritual*, ed. A. H. Mathew (1909).

Oldenbarneveldt. See BARNEVELDT.

Oldenburg, a republic, till 1918 a grand-duchy, of northern Germany, consisting of three distinct and widely separated territories—viz. Oldenburg Proper, the former principality of Lübeck, and the former principality of Birkenfeld; total area, 2500 square miles (less than Devonshire); pop. (1919) 518,148. Oldenburg Proper, which comprises most of this area, is bounded by the German Ocean and Hanover. The principal rivers are the Weser, the Jahde, and the Haase, Vehnne, and other tributaries of the Ems. The country is flat, belonging to the great sandy plain of northern Germany, and consists for the most part of moors, heaths, marsh or fens, and sandy tracts. The occupations are mainly agricultural. The old principality of Lübeck, consisting of the secularised territories of the former bishopric of the same name, does not contain the city, whose territory bounds it to the south, as does Holstein on other sides. Its area is about 200 sq. m. The territory of Birkenfeld (q.v.) lies among the Hunsrück Mountains, in the very south of Rheinland, by which it is surrounded; its area is 192 square miles.

Oldenburg, like the other German states, became a republic at the revolution of November 1918. A constitution was adopted in June 1919. A diet (Landtag) of forty-eight deputies is elected for three years by universal, equal, secret, direct vote. The system of proportional representation is in use.

Oldenburg became an independent state in 1180. The family that then established its power continued to rule until the monarchy came to an end, giving, moreover, new dynasties to Denmark, Russia, Sweden, Greece, and Norway. On the death, in 1667, of Count Anton Günther, the wisest and best of the Oldenburg rulers, his dominions fell to the Danish reigning family, and continued for a century to be ruled by viceroys nominated by the kings of Denmark. This union was, however, severed in 1773, when by a family compact Christian VII. made over his Oldenburg territories to the Grand-duke Paul of Russia, who represented the Holstein-Gottorp branch of the family. Paul

having given up Oldenburg to his cousin, Frederick-Augustus, of the younger line of the House of Oldenburg, the emperor raised the united Oldenburg territories to the rank of a duchy. For a time the duchy was a member of Napoleon's Rhenish Confederation. The Lübeck territories were added in 1803; Birkenfeld at the Congress of Vienna, when Oldenburg became a grand-duchy. The grand-duchy concluded in 1866 a treaty with Prussia, by which the grand-duke renounced his claims to the Holstein succession. See SLESWICK-HOLSTEIN.

The capital, OLDENBURG, is pleasantly situated on the banks of the Hunte, 30 miles WNW. of Bremen by rail. It is the focus of the commercial activity of the country, and has a public library, a picture-gallery, museum, &c. The palace is worthy of note for its fine gardens, its art collections, and its library. The principal church, St Lambert's (1270), contains the burying-vaults of the late reigning family. Oldenburg is the seat of an active river-trade, and is noted for its great cattle and horse fairs. Pop. 30,000. See Runde's *Oldenburgische Chronik* (3d ed. 1863), and books by Kollmann.

Oldenburg, HENRY, a native of Bremen, born in 1626, was consul for his native city in London during the period of the Long Parliament and the protectorship of Cromwell. Besides being tutor to Lord Henry O'Brien and Lord William Cavendish, he was elected one of the very first members of the Royal Society, and, as assistant-secretary, edited its *Transactions* from 1664 to 1677, maintaining an extensive correspondence with Spinoza, Leibniz, Bayle, and many other learned men of the age. Milton also knew him, and addressed him in the *Epistole Familiares*. Oldenburg died at Charlton, near Greenwich, in August 1678.

Old English. See ENGLISH LANGUAGE.

Old Faithful. See GEYSER.

Oldfield, ANNE (1683-1730), actress, born in London, made her début in 1700, and stood high in public favour both in comedy and in tragedy. See Robins, *Palmy Days of Nance Oldfield* (1898).

Oldham, JOHN (1653-83), a heavy and uncouth Juvenalian satirist, son of a nonconformist minister at Shipton-Moyne, Gloucestershire, studied at Oxford, taught at Croydon, and became a private tutor. His vigorous satires (against the Jesuits, &c.) are largely translation and paraphrase, from Horace, George Buchanan, Ben Jonson, and others. He also wrote odes.

Oldham, a parliamentary, municipal, and county borough of Lancashire, on the Medlock, 7 miles NE. of Manchester, 5 SSE. of Rochdale, and 38 ENE. of Liverpool. It has grown since 1760 from a small village, such growth being due to its proximity to the Lancashire coalfields and to the marvellous extension of its cotton manufactures. It has hundreds of mills. Other manufactures include fustians, velvets, silks, machinery, &c. Hat-making was once a leading industry. The town-hall (1841) is a good Grecian edifice; and there are the lyceum (1854-80), a school of science and art (1865), public baths (1854), an infirmary (1870-77), and the Alexandra Park of 72 acres (1865). Oldham received its charter of incorporation in 1849. It was enfranchised by the Reform Bill of 1832, and returns two members. Pop. (1801) 12,024; (1841) 42,595; (1881) 111,343; (1891) 130,463; (1911) 147,483; (1921, in holiday season) 144,983.

Oldhamia, a genus of fossils of unknown affinities met with in the Cambrian system. Oldhamia assumes various forms, sometimes consisting of short radiating branches or umbels, which spring at regular intervals from a central thread-

like axis; at other times the branches radiate in all directions from a central point. Some palæontologists have supposed the fossil to be a Serpularian zoophyte; others have referred it to the polyzoa; while yet others think it may be a seaweed. Possibly it is not a fossil at all, but merely an inorganic structure.

Oldhaven Beds. See EOCENE SYSTEM.

Oldmixon, JOHN (1673-1742), author of dull histories of England, Scotland, Ireland, and America, and of works on logic and rhetoric, is known chiefly as one of the heroes of Pope's *Dunciad*.

Old Mortality. See PATERSON (ROBERT).

Old Point Comfort, a village and watering-place of Virginia, at the mouth of James River, on Hampton Roads, is the site of Fortress Monroe.

Old Red Sandstone and Devonian System, the name given to certain series of strata that are intermediate in age between the Silurian and Carboniferous systems. These, known respectively as 'Old Red Sandstone' and 'Devonian,' are nowhere seen together, but they are believed to be contemporaneous.

Old Red Sandstone.—This series, which underlies the Carboniferous system, was so called to distinguish it from another set of red sandstones which rests upon the Carboniferous strata, and was formerly known as the *New Red Sandstone* (see PERMIAN, and TRIASSIC). In Scotland the Old Red Sandstone comprises three groups of strata—Lower, Middle, and Upper. The Lower Old Red Sandstone attains its greatest thickness (18,000 feet) in the Midland Valley; it is also found in the Cheviot region and in Argyll. It consists of coarse conglomerates, red, gray, brown and purplish sandstones, and gray flagstones, with occasional beds of nodular limestones or 'cornstones.' Associated with these are great accumulations of interbedded tuffs and lavas (rhyolites, trachytes, andesites, and basalts). The igneous rocks attain a vast thickness in the Cheviot Hills, the Pentlands, the Ochils, the Sidlaws, in Ayrshire, and in the country around Ben Nevis and Glen Coe. At Stonehaven the Lower Old Red Sandstone passes conformably into the Downtonian, the highest division of the Silurian system; elsewhere in Scotland it rests unconformably on older strata. The Middle Old Red Sandstone is known to occur only north of the Grampians, occupying detached areas in Aberdeenshire, along the shores of the Moray and Dornoch Firths, in Caithness, and in the Orkneys and Shetland Isles. It has not been found superposed on the lower group, in which it was formerly included, but the nature of its fossils has led palæontologists to regard it as younger than the latter. The sediments of this middle group again include conglomerates, sandstones and cornstones, but the dominating rocks are flagstones, often calcareous and bituminous. Contemporaneous volcanic rocks are here much less in evidence, but lavas and tuffs of types similar to those found in the lower group occur in Aberdeenshire and Banffshire and in the Shetlands. The Middle Old Red Sandstone attains a thickness of about 18,000 feet. The Upper Old Red Sandstone strata consist mainly of sandstones, often with the grains well rounded by the action of wind and probably formed under arid conditions. These are associated with marls, cornstones, and conglomerates. Interbedded volcanic rocks are absent, except in the Orkneys, where lavas and tuffs are found near the base of the series. There is everywhere a strong unconformability between the Upper Old Red Sandstone and the rocks of the lower and middle groups, and a conformable passage upwards into the Carboniferous system.

The Old Red Sandstone of South Wales and the bordering counties of England gives evidence of continuous sedimentation throughout the period. Contemporaneous volcanic rocks are not known to occur. The Old Red Sandstone of Ireland has been divided into two groups separated by a strong unconformity.

Devonian.—In Devon and Cornwall we meet with a very different series of strata occupying the same stratigraphical position as the Old Red Sandstone. The Devonian strata pass up conformably into the Carboniferous system, but the base of the series is not seen, so that the relation of the strata to the Silurian is not known. The English Devonian probably does not exceed 10,000 or 12,000 feet in thickness. It consists of three groups (Lower, Middle, and Upper), the rocks being principally gray and brown slates, brown, yellow, red, and purple sandstones, grits, conglomerates, calcareous slates, and limestones. The calcareous members of the series are generally well charged with fossils of marine types, and are developed chiefly in the middle group.

Devonian rocks occupy wide areas at the surface on the Continent. They appear in the north of France, and extend from the Boulonnais eastwards through Belgium to Westphalia. In northern Russia they extend over more than 7000 miles, and crop up along the flanks of the Urals. But the areas exposed to view probably bear but a small proportion to those which lie buried underneath later formations. In central Europe the strata have the general aspect of the English Devonian, and contain relics of the same marine fauna. In Russia the strata are remarkable for showing alternations of calcareous and arenaceous rocks—the former of which contain an assemblage of fossils of a Devonian facies, while the latter are charged with the remains of a fish fauna resembling that of the Scottish Old Red Sandstone. It may be noted that volcanic rocks are here and there associated with the Devonian strata of central Europe. In North America both types of strata appear; the arenaceous type occurring in Nova Scotia and New Brunswick, while the Devonian type is met with in New York State and the Appalachian region, and is largely developed in the Mississippi basin.

Life of the Period.—The discovery at Rhynie in central Aberdeenshire a few years ago of a silicified peat-bog of Middle Old Red Sandstone age has opened a new chapter in palæobotany. The genera of vascular plants found there, *Rhynia*, *Hornea*, and *Asteroxylon*, belong to an entirely new class of plants and to the earliest known flora in which detailed internal characters can be determined. Other plants, known only from impressions, include *Parka* and *Psilophyton* from the lower and the fern-like *Palaeopteris* from the upper division. Among the lower forms of life that swarmed in the seas of the period were rugose and tabulate corals. Of the former the most characteristic were Cyathophyllum, Cystiphyllum, Calceola, &c., while the honeycomb corals (Favosites) are the most common of the tabulate forms. Echinoderms abounded, especially crinoids (Cupressocrinus, Cyathocrinus) and pentremites. Trilobites, which formed so marked a feature in the life of the Silurian seas, were now reduced in number and variety—among the more notable forms being Phacops, Homalonotus, and Bronteus. Some of the eurypterids (most of which are small) attained a large size, one of these (Pterygotus) being 5 or 6 feet long. They occur chiefly in the Old Red Sandstone. From the same strata in North America have come the remains of insects—neuropteroid and orthopteroid wings of ancestral forms of May-fly, &c. Myriopods have also been recognised. Brachiopods are among the most common

Devonian fossils, although they were not quite so numerous as in the seas of the preceding Silurian period. Very characteristic forms are Uncites, Stringocephalus, and Rensseleria. Lamellibranchs were well represented, some of the notable genera being Pterinea, Megalodon, Cucullæa, Avicula. The earliest fresh-water lamellibranch, *Ammigenia* (*Archonodon*) *Jukesii*, occurs in the Upper Old Red Sandstone. The marine gasteropods call for no particular mention, for they belong chiefly to types which had come down from earlier Palæozoic times. The straight Orthoceras and other old genera of cephalopods continued to flourish, but coiled forms (Clymenia, Goniatites) began to predominate in Devonian times. From the Old Red Sandstone chiefly come the remains of numerous ganoid fishes—a group feebly represented in existing waters. Among these are the Ostracodermus, Cephalaspis, Pteraspis, Pterichthys, and Coccoosteus, and the true ganoids Osteolepis, Diplopterus, Holoptychius, Cheirolepis, &c. Coccoosteus and the gigantic Dinichthys of North America, now placed in the sub-class Arthrodira, have affinities with the Dipnoi. According to Dr Newberry, the latter was probably not less than 15 feet long, 'encased in armour, and provided with formidable jaws, which would have severed the body of a man as easily as he bites off a radish.' Other forms (such as Dipterus, and possibly Phaneropleuron) appear to have relations with the modern Ceratodus and are classed as Dipnoi.

It is obvious that in the Old Red Sandstone and Devonian we have two distinct types of sedimentation; the two series must have accumulated under different physical conditions. The Devonian strata are unquestionably of marine origin, while the Old Red Sandstone beds are believed to have been deposited under continental conditions. Hence we meet with the latter in a few more or less isolated basins, while the former extends over enormous regions. From the geographical distribution of the marine Devonian in Europe we gather that during the period in question the sea covered the south of England and the north-east of France, whence it extended eastwards, occupying the major portion of central Europe, and sweeping north-east through Russia, and how much farther we cannot tell. North of that sea stretched a wide land surface, in the hollows of which lay great lakes and inland seas, which seem now and again to have communicated with the ocean. It was in these broad sheets of water that the Old Red Sandstone strata were accumulated. Several of these old lakes in Scotland were traversed by lines of volcanoes, the relics of which are seen in many of the hill-ranges of the central and southern regions of that country. Volcanic action also at the same time manifested itself in some parts of Germany, but on a smaller scale apparently than in the Scottish area. The land, as we have seen, was clothed for the most part with a monotonous flowerless vegetation, but pine-like Cordaitales grew on the drier uplands, whence they were occasionally carried down by rivers to the lakes and seas. Very little is known of the terrestrial animal life of the period; most of the fossils met with in the lacustrine sediments of the period consisting of the remarkable ganoids and eurypterids already referred to. These (the fishes especially) appear to have abounded in the lakes, whence, however, they now and again descended by the rivers to the sea. The general facies and the geographical distribution of the life of the Devonian and Old Red Sandstone are suggestive of genial climatic conditions. Some geologists, however, have thought that the coarse breccias and conglomerates which occur in the Old Red Sandstone may be indicative of somewhat cold conditions; for these masses have often quite the aspect

of morainic accumulations. It is possible, therefore, either that local glaciers may have existed in certain regions, or that the temperature may have been lowered for some time over wider areas. However that may be, the presence of the Devonian fauna in the Arctic regions seems to show that the temperature of the ocean must have been more equable in Devonian times than it is now.

Old Sarum. See SALISBURY.

Old Style. See CALENDAR.

Old Testament. See BIBLE, BIBLICAL CRITICISM, APOCRYPHA, GENESIS, &c.

Oldys, WILLIAM, an industrious bibliographer, a natural son of Dr Oldys, Chancellor of Lincoln, was born in 1696. Most of his life was spent as bookworm and bookseller's hack. He suffered by the South Sea Bubble, and lost the property left by his father. For about ten years he was librarian to the Earl of Oxford, whose valuable collection of books and MSS. he arranged and catalogued; and by the Duke of Norfolk he was appointed Norroy King-of-arms. He died 15th April 1761. His chief works are *The British Librarian* (1737, anonymously); a *Life of Sir Walter Raleigh*, prefixed to Raleigh's *History of the World* (1738); *The Harleian Miscellany* (8 vols. 1753); besides many miscellaneous literary and bibliographical articles.

Oleaceæ, a family of dicotyledons, consisting of trees and shrubs, with opposite leaves, and flowers in racemes or panicles. About 500 species are known, mostly natives of temperate countries, especially in Asia. Among them are the olive, lilac, privet, ash, jasmine, &c. Between some of these there is a great dissimilarity, so that this family is apt to be regarded as a very heterogeneous group; but the real affinity of the species composing it is manifested by the fact that even those which seem most unlike can be grafted one upon another, as the lilac on the olive. Bitter, astringent, and tonic properties are prevalent in this family.

Oleander (*Nerium*), a genus of plants of the natural order Apocynaceæ. The species are evergreen shrubs with leathery leaves, which are opposite or in threes; the flowers in false umbels, terminal or axillary. The Common Oleander (*N. Oleander*), a native of the south of Europe, the



Common Oleander (*Nerium Oleander*).

north of Africa, and many of the warmer temperate parts of Asia, is frequently planted in temperate countries as an ornamental shrub, and is not uncommon in Britain as a window-plant. It has

beautiful red, or sometimes white flowers. The English call it Rose Bay, and the French Rose Laurel (*Laurier Rose*). It attains a height of eight or ten feet. It delights in moist situations, and stream-courses can be traced for long distances by the glow of its flowers. All parts of it contain a bitter and narcotic-acrid juice, poisonous to men and cattle, which flows out as a white milk when young twigs are broken off. Cases of poisoning have occurred by children eating its flowers, and even by the use of the wood for spits or skewers in roasting meat. Its exhalations are injurious to those who remain long under their influence. A decoction of the leaves or bark is much used in the south of France as a wash to cure cutaneous maladies. *N. odorum*, an Indian species, has larger flowers, which are very fragrant.

Oleaster, a name belonging properly to the true wild olive, has been transferred to *Elæagnus*, also misnamed wild olive. The plants are botanically remote. See ELÆAGNACEÆ, OLIVE.

Olefiant Gas, or ETHYLENE, C_2H_4 , is the most abundant illuminating constituent in coal-gas. It may be obtained by the destructive distillation of coal, but more readily by the action of sulphuric acid on alcohol. It is a colourless gas with a faint odour, but little soluble in water or alcohol. It may be liquefied by cold and pressure. With air it forms a powerfully explosive mixture, which, on being burned, yields water and carbonic acid gas. When mixed with an equal volume of chlorine, and kept cool and in the dark, the two gases unite, with the production of drops of an oily liquid called Dutch Liquid (q.v.).

Olefines. See HYDROCARBONS.

Oleic Acid is one of the acids present in olive, almond, and other oils, in which it is united to glyceryl. At temperatures above $14^{\circ}C$. it exists as a colourless limpid fluid, of an oily consistence, devoid of smell and taste, and (if it has not been exposed to air) exerting no action on vegetable colours. At $4^{\circ}C$. it solidifies into a firm, white, crystalline mass, and in this state it undergoes no change in the air; but when fluid it readily absorbs oxygen, becomes yellow and rancid, and exhibits a strong acid reaction with litmus paper. It is very difficult to obtain the acid in a state of purity, in consequence of the readiness with which it oxidises. It is obtained in a crude form, as a secondary product, in the manufacture of stearin candles; but when the pure acid is required a lengthy process, starting with almond oil, must be adopted. Oleic acid forms normal (or neutral) and acid salts; but the first compounds of this class that require notice are the normal salts of the alkalies. These are all soluble, and by the evaporation of their aqueous solution form soaps. Oleate of potash forms a soft soap, which is the chief ingredient in Naples soap; while oleate of soda is a hard soap, which enters largely into the composition of Marseilles soap. Of recent years a large number of oleates have come into use in medicine, which depend for their activity on the remarkable ease with which they are absorbed by the skin. Such are the oleates of zinc, mercury, lead, tin, morphia, &c., which, in this form, produce more rapid results than when applied as ointments.

Olein is a compound of oleic acid with glyceryl, and constitutes the bulk of olive-oil. Along with it are associated stearin and palmitin, similar compounds of stearic and palmitic acids. See FATS.

Olenellus, a genus of trilobites characteristic of the Lower Cambrian.

Olenus, a genus of Cambrian trilobites highly characteristic of the upper members of the system.

Oleograph, a name given to an ordinary chromo-lithograph which has been 'roughed' after printing, mounted on canvas, and varnished so as to imitate an oil-painting. See LITHOGRAPHY.

Oleomargarine. See BUTTER, MARGARINE.

Oleometer, or ELAÏOMETER, an areometer or balance for ascertaining the densities of fixed oils. It consists of a very delicate thermometer-tube, the bulb being large in proportion to the stem, so weighted and graduated as to adapt it to the densities of the leading fixed oils. On the scale are marked the principal oils of commerce, with their specific gravity opposite. The standard temperature of the oleometer is 59° F.

Oléron (anc. *Uliarus*), an island lying 2 to 10 miles off the west coast of France, and forming part of the department of Charente-Inférieure. It is 19 miles long by about 5 broad, and is unusually fertile. The people are mostly Protestants. On Oléron are the port of Le Château, and the small towns of St Pierre d'Oléron and St Georges d'Oléron.

The *Laws or Judgments of Oléron* were a code of maritime law compiled at the instance of Eleanor of Guienne before she married Henry II. of England, modelled on the *Book of the Consulate of the Sea* (a maritime code regulating commerce in the Levant), but drawn from the decisions of the maritime court of Oléron, in the duchy of Guienne. It was intended for the use of mariners in the Atlantic waters, was introduced into England in the end of the 12th century and into Flanders in the 13th. The usages and decisions upon which it was based were those observed in the wine and oil trade between Guienne and the ports of England, Normandy, and Flanders. An English translation was published as *Rutter of the Sea*, by T. Petyt in 1536. See INTERNATIONAL LAW.

Olga, St, a saint of the Russian Church, wife of the Scandinavian (Varangian) Duke Igor of Kieff, who, after her husband's death (946), governed during the minority of her son, till 955. Thereafter she repaired to Constantinople, and was baptised, assuming the name of Helena. Returning to Russia, she laboured with much zeal for the propagation of her new creed. After her death (968) she was canonised, and is now held in high veneration in the Russian Church. Her festival is held on July 21.

Olgerd, or OLGIERD, prince of Lithuania (q.v.) from 1345 to 1377, and ancestor of the Jagellons (q.v.).

Olhão, a seaport of southern Portugal, 4 miles E. of Faro, engaged in sardine and tunny fishing; pop. 10,000.

Olibanum, a gum-resin which flows from incisions in several species of *Boswellia* (q.v.), growing on bare limestone rocks in the mountains of Somaliland and the south of Arabia. These trees send their roots to a great depth into the crevices of the rock. Olibanum is the *lebonah* of the Hebrews, *libanos* or *libanotos* of the Greeks, *thus* or *tus* of the Romans, of all which terms the ordinary English translation is Frankincense (q.v.). The true frankincense seems to come from *Boswellia socotrana*. It occurs in commerce in semi-transparent yellowish tears and masses; has a bitter nauseous taste; is hard, brittle, and capable of being pulverised; and diffuses a strong aromatic odour when burned. It was formerly used in medicine, chiefly to restrain excessive mucous discharges; but its use for such purposes is now rare. It sometimes enters as an ingredient into stimulating plasters. It is chiefly employed for fumigation, and is used as incense in Roman Catholic churches and Indian temples. Its odour is obnoxious to mosquitoes and other

insects. Aden is the great port where it is chiefly received. Besides ordinary olibanum, there is a kind termed Mayeti, from the name of the port in Somaliland from which it is received. This is the produce of *B. Frereana*, and resembles Tacamahac. The inner layers of the bast of *B. Frereana* are transparent, resembling oiled paper, and are used by the natives for writing on. Much olibanum is used in India. Some is sent to China, and some comes to England.

Olifant River, a forked stream of South Africa, rises in the mountains north-east of Capetown, and, after a north-westerly course of 150 miles, enters the Atlantic. Area of drainage basin, 13,000 sq. m.—Another stream bearing the same name rises in the Transvaal, and goes east to join the Limpopo.

Oligarchy (*oligos*, 'few,' and *archō*, 'I govern'), a term applied by Greek political writers to that perversion of an aristocracy in which the efforts of the dominant and ruling party are chiefly devoted to their own aggrandisement and the extension of their power and privileges. Thus it bears the same relation to aristocracy that despotism does to monarchy and ochlocracy to democracy.

Oligocene System. The British strata belonging to this system occur only in Hampshire, the Isle of Wight, and Devonshire. The series is as follows:

4. HAMSTEAD BEDS: fresh-water marls and clays overlaid by marine septarian clays. About 260 feet.
3. BEMBRIDGE BEDS: marls and limestone; fresh-water below, estuarine above. About 110 feet.
2. OSBORNE BEDS: fresh-water clays, marls, sands, and limestone. About 100 feet.
1. HEADON BEDS: variable series of clays, marls, sands, and limestones. The lower division is of fresh- and brackish-water origin; the middle partly marine, partly fresh-water; the upper fresh-water. About 150 feet.

Usually included as Oligocene are the lacustrine beds of Bovey Tracey in Devonshire, consisting of sands and clays with lignites. Between the lowest basalts composing the denuded plateaus of Antrim and the Inner Hebrides (Mull, &c.) occur thin layers of clay and lignite—the so-called *leaf-beds*—formerly regarded as Oligocene, now as Eocene.

Foreign Equivalents.—Oligocene strata, chiefly of fresh- and brackish-water origin, but containing intercalations of marine beds, overlie the Eocene of the Paris basin and that of Belgium. They likewise appear in Germany, where they form the oldest Tertiary deposits—no Eocene having yet been detected in that region. The German Oligocene is mainly of fresh-water origin in its lower and upper portions, while marine deposits predominate in the middle of the series. It is noted for its beds of lignite or brown coal. In Switzerland the Oligocene attains a thickness of several thousand feet, chiefly conglomerates and sandstones, known as *Molasse*, and mostly of fresh-water origin; the basal portions, however, are marine and brackish-water. Other areas of fresh-water Oligocene more or less notable are met with in Alsace, Breisgau, and Württemberg. In Auvergne, central France, lacustrine deposits of the same age are well developed, and, like most of the Oligocene strata, have yielded great numbers of organic remains.

Life of the Period.—The flora of Oligocene times was abundant and varied. Palm-trees (*Sabal*, *Flabellaria*), both large and small, seem to have grown over all Europe. Amongst conifers were various American types (*Libocedrus*, *Chamaecyparis*, *Sequoia*, *Taxodium*) and other forms, such as *Glyptostrobus*, like *G. heterophyllus* of China, *Widdringtonia*, a genus now found only in South Africa and Madagascar. There were also proteaceous plants (*Dryandra*) of Australian affinities, and species of custard-apple, gum-tree, spindle-tree, maple, acacia, mimosa, lotus, aralia,

camphor-tree, cinnamon-tree, evergreen oak, laurel, &c., besides such familiar forms as birch, hornbeam, elder, elm, poplar, walnut, &c. Evergreens were the prevalent forms. The invertebrate fauna needs but little notice. Amongst notable molluscs were volutes, cowries, olives, cones, spindle-shells, &c. Cerithium was particularly plentiful in the estuaries of the period; while lamellibranchs were well represented by modern types of marine and fresh-water habitats. Amongst the birds common in Europe were paroquets, trogons, marabouts, cranes, flamingoes, ibises, pelicans, eagles, secretary-birds, sand-grouse, &c. At the beginning of the period many mammals of extinct types lived in Europe, such as Palæotherium and Anchitherium, survivals from the Eocene; certain transitional forms of ungulates, such as Cainotherium (a small animal somewhat resembling the living chevrotains in outward appearance), Xiphodon (a slenderly built deer-like animal), and Anoplotherium (a long-tailed animal about the size of an ass, with two toes on each foot); various tapiroid animals, small rhinoceroses, Hyænodon (a carnivore), also forms of squirrel, civet, martin, mole, musk-rat, &c.

Physical Conditions.—During Oligocene times a wide land surface appears to have extended over all the British area. In the region lying between what is now Antrim and the west coast of Scotland the great fissure-eruptions, begun in the Eocene, gave rise to a succession of basaltic lavas which built up broad plateaus extending northwards beyond Skye. In the intervals between successive eruptions these plateaus became clothed with vegetation, the debris of which has been here and there preserved in the deposits of shallow lakes that dotted the surface of the volcanic country. It is probable that at this time there was land-connection between Europe and North America by way of the Faroe Islands and Iceland, in both of which tracts similar basaltic plateaus occur, containing intercalated layers of lignite, &c. like those of Antrim and the Western Islands of Scotland. The Oligocene strata of the south of England and the Franco-Belgian area are evidence that the sea or estuarine waters which occupied that region in Eocene times (see EOCENE SYSTEM) were gradually silted up. In Germany there existed great fresh-water lakes, fringed by wide marsh-lands and by dense forests of a subtropical character. As the lakes became partially silted or dried up vegetation encroached upon their deserted beds, only to be buried under fresh accumulations of sand and mud when the water had again risen. That these lakes were now and again in direct communication with the sea is shown by the occurrence of thick layers of marine origin intercalated amongst the fresh-water beds. For some time, indeed, the lacustrine areas were entirely usurped by the sea, which may have entered them from submerged regions in the east of Europe. In Switzerland, in like manner, we have evidence of changing conditions. At first the sea covered a considerable portion of the country, but eventually it disappeared, and its place was taken by a series of brackish-water lagoons and fresh-water lakes. The deposits accumulated in those lakes now form considerable mountains at the base of the Alps (Rigi, Rossberg). In central France, as in Germany, lacustrine conditions were characteristic of the period, one or more great lakes having occupied a considerable area in Auvergne. In southern Europe the Mediterranean had withdrawn from wide regions which were deeply submerged by it in Eocene times, but it still covered a more extensive area than at present. The climate of the Oligocene period was uniformly genial, but hardly so tropical as that of the preceding period.

Oligochæta. See CHETOPODS.

Oligoclase. See FELSPAR.

Olinda, an archiepiscopal city and seaside resort of Brazil, 4 miles N. of Pernambuco; pop. 10,000.

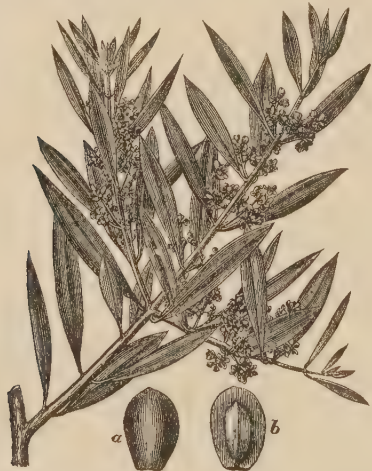
Oliphant, LAURENCE, traveller, novelist, and mystic, was born in 1829, son of Sir Anthony Oliphant, afterwards Chief-justice of Ceylon. In early youth he travelled with Jung Bahadur to Nepal, and after his return was admitted to the Scottish bar, and later to the English bar at Lincoln's Inn. His first work, *A Journey to Khatmandu* (1852), was followed by *The Russian Shores of the Black Sea* (1853), the fruit of his travels in Russia in 1852. He next became private secretary to the Earl of Elgin, Governor-general of Canada, whom later he accompanied on his special embassy to China, thus finding material for his books *Minnesota and the Far West* (1855) and *A Narrative of the Earl of Elgin's Mission to China and Japan in 1857-59* (1860). In 1861, while acting as Chargé d'Affaires in Japan, he was severely wounded by assassins, and consequently resigned his post. From 1865 to 1867 he sat in parliament for Stirling burghs. Profoundly influenced by certain peculiar religious opinions, he renounced London society, joined for a time the community of T. L. Harris (q.v.) in the United States, and finally settled at Haifa (q.v.) in Palestine. He died at Twickenham, 23d December 1888. The religious opinions of his later years he gave to the world in *Sympneumata* (1886) and *Scientific Religion* (1888), as well as in his novel *Masollam* (1886), while they already formed the background of his earlier novel, *Altiora Peto* (1883). His *Piccadilly* (1870) was a book of altogether exceptional promise, bright with wit, delicate irony, and, above all, individuality; but its promise was never fulfilled. See Life by Mrs Oliphant.

Oliphant, MRS MARGARET, novelist, was born (Margaret Wilson) in 1828 at Wallyford, near Musselburgh, Midlothian. In 1849 she published her first work, *Passages in the Life of Mrs Margaret Maitland*, which instantly won attention and approval. Its most distinctive charm is the tender humour and insight which regulate its exquisite delineation of Scottish life and character at once in their higher and lower levels. The novels of the next few years, some of which appeared in *Blackwood's Magazine*, are of somewhat various merit, but in all of them the peculiar talent of the writer is marked. They are rich in minute detail; have nice and subtle insights into character, a flavour of quiet humour, and frequent traits of delicacy and pathos in the treatment of the gentler emotions. It was, however, by the *Chronicles of Carlingford* (first published in *Blackwood's*, 1861-64) that her reputation as a novelist was first secured. In the first of the series, *The Doctor's Family*, the character of little Netty, the heroine, vivifies the whole work, and may rank as an original creation. The next in the series, *Salem Chapel*, perhaps indicates a wider and more vigorous grasp than is to be found in any other of her works. Certain of the unlovelier features of English dissent, as exhibited in a small provincial community, are here graphically sketched, and adapted with admirable skill to the purposes of fiction. After more than forty years of novel-writing Mrs Oliphant's powers showed no decadence. She died 27th June 1897. Besides numerous novels, she wrote many historical, biographical, and other works, including an Autobiography (1899).

Olivarez, GASPARO DE GUZMAN, COUNT OF, Duke of San Lucar, was born 6th January 1587, at Rome, where his father was ambassador. He became the friend of Philip IV., his confidant in his amours,

and afterwards his prime-minister, in which capacity he exercised almost unlimited power for twenty-two years. Olivarez showed ability for government; but his constant endeavour was to wring money from the country that he might carry on wars against Portugal, France, and the Netherlands. His attempts to rob the people of their time-honoured privileges provoked insurrections in Catalonia and Andalusia, and roused the Portuguese to shake off the Spanish yoke in 1640. But the continued ill-success of the arms of Spain at length thoroughly roused the nation, and the king was obliged to dismiss his favourite in 1643. He was ordered to retire to Toro (Zamora), and died there, 22d July 1645. See De la Rocca, *Histoire du Ministère du Comte-Duc d'Olivares* (1673).

Olive (*Olea*), a genus of trees and shrubs of the natural order Oleaceæ, having opposite, evergreen, leathery leaves, which are generally entire, smooth, and minutely scaly. The general character of the genus is well illustrated by the accompanying cut. It is widely distributed in the warmer temperate parts of the eastern hemisphere. The Common Olive (*O. europæa*), a native of southern Europe, northern Africa, and western Asia, is in its wild state a thorny shrub or small tree, but through cultivation becomes a tree of 20 to 30 feet high, destitute of spines. It attains a prodigious age; some plantations, as those at Terni, in Italy, are



Common Olive (*Olea europæa*), Branch in Flower :
a, ripe fruit ; b, section of same showing stone.
(Bentley and Trimen.)

supposed to have existed from the time of Pliny. Some trees have been credited with an age of 1200 years or more. There are two principal varieties of the common olive, one having narrow, willow-like leaves, gray-green above and silvery below. In the other the leaves are similar in all respects, only much broader. The latter has also much the larger fruit of the two, but the oil it yields is rank and coarse to the palate, and is rarely used on the Continent out of Spain, in which country it is the variety chiefly cultivated. The narrow-leaved variety is preferred by the French and Italian olive-growers, the more bland and agreeable oil from which is better appreciated, especially by the British. Olive-oil may be said to form the cream and the butter of Spain, Italy, and some other countries, as it takes the place of both in cookery and table use. Highly nutritious, it is thought more wholesome than animal fats in warm climates. The finest quality is got from Tuscany. The oil is contained in the fleshy part of the fruit—not

in the stone—from which it is extracted by pressure. The ripe fruit is crushed to a paste, put into woollen bags, and subjected to moderate pressure. Thus is obtained in considerable quantity the finest quality of oil, which is named 'Virgin Oil.' The pulp is then moistened with water and again pressed, the result being an oil of inferior quality, yet quite fit for table purposes. A further residue of oil is extracted from the pulp after it has been steeped in water; but it is only fit for soap-making and other manufacturing purposes. The refuse forms olive-cake. Olive-oil is often adulterated with cotton-seed, walnut, sesamum, arachis, and other oils. Unripe olives are pickled both for home consumption and for export. They are eaten before meals as a whet to the appetite. Dried olives are used for the same purposes as pickled olives. The wood is much prized by cabinet-makers, being beautiful in colour and grain, and capable of taking a fine polish; that of the root is, most in demand for the making of snuff-boxes and ornaments.

The olive has been cultivated in the East from the remotest times, is associated with much mythical lore, and has been regarded in all ages as the bounteous gift of heaven, as the emblem of peace and plenty, and the highest reward that could be given to the honourable and the brave. As Athena's gift to Athens, it was valued above the horse which was offered by Poseidon. It is largely cultivated in Greece, Anatolia, and the Levant, in Morocco and Tripoli, as well as Spain, France, and Italy; and attention is paid to its culture in South Australia, Queensland, and South Africa. It grows luxuriantly in Chile, whither it was brought by the Spaniards. Jesuit missionaries introduced it into Mexico in the 17th century, and into California, where it grows freely. It has also been grown in Florida and other southern states. The culture of the olive has been attempted in England, but without success. Against south walls it lives, with slight protection in winter, in the neighbourhood of London, and in the same way it produces fruit in exceptionally favourable seasons in Devonshire; but it is generally unsuited to the British climate. Even in those countries in which its culture may be profitably pursued the tree is somewhat fastidious as to soil, aspect, and position. It does not succeed well in elevated situations, prefers sloping ground facing and not far removed from the sea, and thrives best in calcareous soil. It is very generally propagated by suckers, but where great care is bestowed on it inarching is practised. It bears an abundant crop only once in several years. There are other species of *Olea* more remarkable for the hardness and usefulness of their timber than for their fruits. *O. verrucosa*, *O. capensis*, and *O. laurifolia*, natives of the Cape of Good Hope, are small trees or shrubs with wood of such density and toughness as to rival in strength and durability iron itself, and they are all named Ironwood. The timber is used for wagon and carriage building. The fruit of some of these is eatable, as is also that of *O. americana*. The Fragrant Olive of Japan and China—*O. (Osmanthus)* of some *fragrans*—is a handsome shrub with sweet-scented flowers, which are said to be used by the Chinese for flavouring some kinds of tea. The genus is found also in New Zealand and Polynesia.

Olive, PRINCESS, the title assumed in 1820 by an impudent pretender, Mrs Olivia Serres, who claimed to have been born at Warwick on 3d April 1772, the granddaughter of the Rev. Dr Wilnot, her mother being his only daughter, her father Henry Frederick, Duke of Cumberland, the youngest brother of George III. In 1791 she had married John Thomas Serres, painter, but had separated

from him in 1803; and between 1805 and 1819 she had published ten trashy volumes of poetry and fiction. She resembled the royal family, and found some people ready to believe her to be really Princess of Cumberland and Duchess of Lancaster; but she died in poverty, within the 'rules' of the King's Bench, in November 1834. Lavinia, the elder of two daughters by her husband (there seems to have been at least one son by someone else), married Anthony Thomas Ryves, the adopted son of William Combe ('Dr Syntax'), only, however, also to separate. She died 7th December 1871, five years after a jury, in Ryves and Ryves v. the Attorney-general, had decided that Olive Serres was *not* the legitimate daughter of the Duke of Cumberland, and that eighty-two documents produced in evidence were forgeries.

See the *Life of John Thomas Serres* (1826); *Notes and Queries*, *passim*; and an article by E. Walford in the *Gentleman's Magazine* for August 1873.

Olivenite, a mineral, consisting of hydrous copper arsenate. The name was given in allusion to the colour, which is typically some shade of olive-green, less frequently wood-brown or yellow. It is found along with different ores of copper in Cornwall and elsewhere. It is often crystallised in oblique four-sided prisms, of which the extremities are acutely bevelled, and the obtuse lateral edges sometimes truncated, or in acute double four-sided pyramids; it is sometimes also spherical, kidney-shaped, columnar, or fibrous, which latter variety is known as *wood-arsenate*, and is greenish gray in colour.

Olivenza, a fortified town of Spain, near the Portuguese frontier, 20 miles SSW. of Badajoz, is claimed by Portugal; pop. 12,000.

Oliver, the comrade in arms of Roland (q.v.).

Olives, MOUNT OF, called also MOUNT OLIVET, a limestone ridge, lying north and south on the east side of Jerusalem (q.v.), from which it is separated only by the narrow Valley of Jehosaphat. It is called by the modern Arabs Jebel-al-Tôr, and takes its familiar name from a magnificent grove of olive-trees which once stood on its western flank, but has now in great part disappeared. The road to Mount Olivet is through St Stephen's Gate. Immediately beyond, at the foot of the bridge over the brook Kedron, lies the Garden of Gethsemane; and the road here parts into two branches, northwards to Galilee, and eastwards to Jericho. The ridge rises in three principal summits, that to the north being 361 feet above Jerusalem (2725 above the sea), the central summit, crowned with a village (Olivet proper), 286, and the third summit on the south 46 feet. David fled from Absalom by way of the Mount of Olives, which was also the scene of the idolatrous worship established by Solomon. The northern peak is the supposed scene of the appearance of the angels to the disciples after the resurrection, and is remarkable in Jewish history as the place on which Titus formed his encampment in the expedition against the fated city of Jerusalem. But it is around the central peak, which is the Mount of Olives properly so called, that all the most sacred associations of Christian history converge. On the summit stands the Church of the Ascension, on the site of a church built by St Helena; and near it are shown the various places where, according to tradition, our Lord wept over Jerusalem, where the apostles composed the apostles' creed, where our Lord taught them the Lord's Prayer, &c. Near the Church of the Ascension are a mosque and the tomb of a Mohammedan saint.

Olivetans, a religious order of the Roman Catholic Church, whose full title is the Congregation of Our Lady of Mount Olivet. They are an

offshoot of the Benedictine Order (q.v.), and were founded in 1313 by Giovanni Tolomei, a native of Siena, and professor of Philosophy in the university of that city, who believed himself to have been miraculously cured of blindness. The order was confirmed by pope John XXII., and Tolomei was chosen the first general.

Olivine. See CHRYSOLITE, IGNEOUS ROCKS.

Olla Podrida (lit., 'putrid pot'), a Spanish national dish, consisting of flesh, fresh and salted, poultry, vegetables, &c., well seasoned with pepper and garlic, and stewed together in a closed pot. The term is applied figuratively to literary productions of very miscellaneous contents. The French equivalent is *pot-pourri*, and the Scots *hotch-potch*, both of which, but especially the former, are also employed in a figurative sense.

Ollendorf, HEINRICH GOTTFRIED (1803-65), born at Rawitsch, in Posen, became a teacher in Paris, and developed a simplified 'method' for learning modern languages which became very popular, familiarity being gained by the multiplication of progressive examples and exercises.

Ollivier, OLIVIER ÉMILE (1825-1913), French statesman, was born at Marseilles, and, having studied law at Paris, began to practise as an advocate in that city. By clever pleading he established a reputation at the bar, and after 1864 acquired influence as a member of the Legislative Assembly. In 1865 the viceroy of Egypt appointed him to a high juridical office in that country. But he still took an active interest in French politics, and in January 1870 Napoleon III. charged him to form a constitutional ministry. But the real authority of the ministers was practically *nil*. Ollivier was an unsuspecting tool in the hands of the Imperialists. 'With a light heart' he rushed his country into the war with Germany, himself to be overthrown, after the first battles, on 9th August. He withdrew to Italy for a time. He wrote books on *Lamartine* (1874) and *Thiers* (1879), and *L'Église et l'État au Concile du Vatican* (2 vols. 1879), *Principes et Conduite* (1875), *Nouveau Manuel de Droit Ecclésiastique Français* (1885); and his *L'Empire Libéral* (16 vols. 1894-1912) was an apology for his administration, and an attempt to throw the blame of the war wholly on Germany.

Olmütz (Czech *Olomouc* or *Holomauc*), a town of Czechoslovakia, in Moravia, on the March, 129 miles NNE. of Vienna. Notable are the 14th-century cathedral (restored 1887); the church of St Maurice (1472), whose organ has 48 stops and 2342 pipes; the noble town-hall, with a steeple 255 feet high; the archiepiscopal palace; and the lofty Trinity column on the Oberring. The former university (1581-1855) is reduced to a theological faculty, with a valuable library. Olmütz was formerly strongly fortified. The trade is more important than the manufactures. Pop. 57,000. Olmütz, which in 1640 was superseded by Brünn as the capital of Moravia, suffered severely in both the Thirty and the Seven Years' War. In 1848 Ferdinand I. signed his abdication here. See the local history by W. Müller (Vienna, 1895).

Olney, a pleasant little town of Buckinghamshire, on the Ouse, 11 miles W. by N. of Bedford and 10 SE. of Northampton. At the corner of the market-place still stands the house where Cowper (q.v.) lived from 1767 to 1786, writing with John Newton the *Olney Hymns* (1779). The place besides has memories of Scott the commentator, William Carey, and many more missionaries. Brewing and bootmaking are industries.

Olomouc. See OLMÜTZ.

Olonetz, a former government of Russia, adjoining Finland. The western part, with Petro-

savodsk, the capital, is included in the autonomous Karelian republic.

Oloron, a town in the French department of Basses-Pyrénées, on the Gave d'Oloron, 14 miles SW. of Pau. It has two interesting Romanesque churches. Pop. 10,000.

Olshausen, HERMANN, theologian, was born at Oldeslohe in Holstein, 31st August 1796, studied at Kiel and at Berlin under Neander, and became professor at Berlin (1821), Königsberg (1827), and Erlangen (1834). He died 4th September 1839. His principal work was a complete commentary on the New Testament, completed by Ebrard and Wiesinger (1830 *et seq.*; Eng. trans. 4 vols. 1847-49; rev. ed. 6 vols. New York, 1856-58). His younger brother Justus (1800-82) was a distinguished Orientalist; and Theodore (1802-69) took a prominent part in the Sleswick-Holstein rising, 1848.

Olympia, the scene of the celebrated Olympic games, is a beautiful valley in Elis, in the Peloponnesus, through which runs the river Alpheus. As a national sanctuary of the Greeks, Olympia contained, within a small space, many of the choicest treasures of Greek art belonging to all periods and states, such as temples, monuments, altars, theatres, and multitudes of images, statues, and votive-offerings of brass and marble. In the time of the elder Pliny there still stood here about 3000 statues. The Sacred Grove (called the *Altis*) of Olympia enclosed a level space about 660 feet long by nearly 580 broad, containing the sanctuaries connected with the games. It was finely wooded, and in its centre stood a clump of sycamores. The *Altis* was crossed from west to east by a road called the 'Pompic Way,' along which all the processions passed. The Alpheus bounded it on the south, the Cladeus, a tributary of the former, on the west, and rocky but gently swelling hills on the north; westward it looked towards the Ionian Sea. The most celebrated building was the *Olympieion*, or *Olympium*, dedicated to Olympian Zeus. It was designed by the architect Libon of Elis in the 6th century B.C., but was not completed for more than a century. It contained a colossal statue of the god, the masterpiece of the sculptor Phidias, and many other splendid figures; its paintings were the work of Panæus, a relative of Phidias. Next to the *Olympieion* ranked the *Heræum*, dedicated to Hera, the wife of Zeus and Queen of Heaven, containing the table on which were placed the garlands prepared for the victors in the games. The *Pelopium*, the *Metroum*, the ten *Thesauri* or Treasuries, built for the reception of the dedicatory offerings of the Greek cities, the temples of Eileithyia and Aphrodite also deserve mention. The *Stadium* and the *Hippodrome*, where the contests took place, stood outside and east of the *Altis*; the *Gymnasium* and *Palæstra* were also outside and to the west. Explorations were carried on in 1875-81 by the German government at a total expense of £40,000, and threw much light on the plans of the buildings. Many valuable sculptures, bronzes, coins, and other objects were discovered. The greatest find was the Hermes of Praxiteles, a most beautiful and marvellous piece of sculpture. The results of these excavations have been published officially in *Die Ausgrabungen zu Olympia* (5 vols. 1875-81, with 118 plates).

Olympic games were the most splendid national festival of the ancient Greeks, and were celebrated every fifth year in honour of Zeus, the father of the gods, on the plain of Olympia. Their origin goes back far beyond 776 B.C., the year in which the custom of reckoning time by Olympiads (q.v.) began. We may, however, believe that the games became a truly national festival for the first time

in that year. At first, it is conjectured, only Peloponnesians resorted to the Olympic games, but gradually the other Greek states were attracted to them, and the festival became *Pan-Hellenic*. Originally, and for a long time, none were allowed to contend except those of pure Hellenic blood; but after the conquest of Greece by the Romans the latter sought and obtained this honour, and both Tiberius and Nero figure in the list of Roman victors. Women—with one exception, the priestess of Demeter Chamyne—were forbidden to be present, on pain of being thrown headlong from the Typæan Rock. The games were held at the first full moon of the summer solstice, when first throughout Elis, and then throughout the rest of Greece, heralds proclaimed the cessation of all intestine hostilities; while the territory of Elis itself was declared inviolable. The competitors were required to undergo a preparatory training for ten months in the gymnasium at Elis, and during the last of these months the gymnasium was almost as numerously attended as the games themselves. Much uncertainty prevails as to the manner in which the contests were distributed over the different days. Krause (*Olympia*, p. 106) suggests the following order: On the first day the great initiatory sacrifices were offered, after which the competitors were properly classed and arranged by the judges, and the contests of the trumpeters took place; the second day was set apart for the boys who competed with each other in foot-races, wrestling, boxing, the pentathlon, the pankration, horse-races; the third and principal day was devoted to the contests of men in foot-races of different kinds (as, for example, the simple race, once over the course; the *diavulos*, in which the competitors had to run the distance twice; and the *dolichos*, in which they had to run it seven or twelve times), wrestling, boxing, the *pankration* (in which all the powers and skill of the combatants were exhibited), and the race of *hoplites*, or men in heavy armour; on the fourth day came off the *pentathlon* (contest of five games—viz. leaping, running, throwing the discus, throwing the spear, and wrestling), the chariot and horse races, and perhaps the contests of the heralds; the fifth day was set apart for processions, sacrifices, and banquets to the victors (called *Olympionikoi*), who were crowned with a garland of wild olive-twigs cut from a sacred tree which grew in the *Altis*, and presented to the assembled people, each with a palm branch in his hand, while the heralds proclaimed his name, and that of his father and country. On his return home he was received with extraordinary distinction: songs were sung in his praise (14 of Pindar's extant lyrics are devoted to *Olympionikoi*); statues were erected to him, both in the *Altis* and in his native city; a place of honour was given him at all public spectacles; he was in general exempted from public taxes, and at Athens was boarded at the expense of the state in the *Prytaneion*. The regulation of the games belonged to the Eleans, from whom were chosen the *hellenodikai*, or judges, at first two in number, but latterly ten or twelve. Theodosius I. prohibited the games in 394 A.D. Theodosius II. ordered the buildings, which had suffered at the hands of the Romans and of various Byzantine Emperors, as they afterwards did from Goths and Slavs, to be burnt. Olympic games (including bicycle races, and no longer exclusively Greek) were in a fashion revived at Athens in 1896, and continued (at intervals of four years) at Paris, &c.

See Krause's *Olympia* (1838); Bötticher's *Olympia* (1882); Baumeister's *Denkmäler*; Frazer's *Pausanias* (1898); Gardner's *New Chapter in Greek History* (1892); and Curtius and Adler, *Olympia* (5 vols. 1891-97).

Olympia, capital of Washington state, on a peninsula at the south end of Puget's Sound, some 65 miles from the Pacific Ocean, and 121 miles by rail N. of Portland, Oregon. The Des Chutes River, which enters the sound here, provides abundant water-power, and the town has lumber industries, &c. Pop. 8000.

Olympiad, the period of four years between two successive celebrations of the Olympic games, a mode of reckoning among the Greeks apparently first employed systematically by Alexandrian writers in the 3d century B.C. It is used only by writers, and is never found on coins and very seldom on inscriptions. The first recorded olympiad dates from the 21st or 22d of July 776 B.C., and is frequently referred to as the Olympiad of Corœbus; for historians, instead of referring to the olympiad by its number, frequently designate it by the name of the winner of the foot-race in the Olympic games belonging to that period. The first year of our present era (1 A.D.) corresponded to the last half of the fourth year of the 194th with the first half of the first year of the 195th olympiad. See CHRONOLOGY.

Olympias, the wife of Philip II., king of Macedonia, and mother of Alexander the Great. She was the daughter of Neoptolemus I., king of Epirus. She was a woman of great vigour and capacity, but was passionate, jealous, and ambitious. When Philip married Cleopatra, niece of Attalus, she left Macedonia, and she was believed to have instigated his assassination by Pausanias (337 B.C.). On the accession of Alexander she returned to Macedonia, and brought about the murder of Cleopatra and her daughter. Alexander treated her with respect, but he never allowed her to meddle with his political schemes. After his death she obtained the support of Polyperchon, and in 317 the pair defeated and put to death Philip Arrhidæus, the weak-minded step-brother and successor of Alexander, together with his wife Eurydice. Her cruelties soon alienated the minds of the people, whereupon Cassander besieged her in Pydna, and on its surrender put her to death, 316 B.C.

Olympiodorus, one of the latest of the Alexandrian Neoplatonists, flourished in the first half of the 6th century after Christ, during the reign of the Emperor Justinian. Regarding his life nothing is known. Of his writings we possess a *Life of Plato*, with commentaries or scholia on the *Gorgias*, *Philebus*, *Phædo*, and *Alcibiades I*. In these he appears as an acute and vigorous thinker and as a man of great erudition.—Another Olympiodorus, of the Peripatetic school, flourished in Alexandria in the 5th century B.C., and was the teacher of Proclus (q.v.).—A third Olympiodorus, from Thebes in Egypt, wrote in Greek a history of the western empire from 407 to 425 A.D., abridged by Photius.

Olympus, the ancient name of several mountains or chains of mountains—e.g. in Mysia, Cyprus, Lycia, Elis, Laconia, Arcadia, and one, the most famous of all, between Thessaly and Macedonia. Its eastern side, which fronts the sea, shows a line of vast precipices, cleft by ravines filled with forest trees. Oak, chestnut, beech, and plane trees are scattered along its base, and higher up grow forests of pine, as in the days of the old poets of Greece and Rome. Its highest peak is 9750 feet above the sea. It was regarded by the ancient Greeks as the chief abode of the gods, and the palace of Zeus was supposed to stand upon its broad summit. According to Greek legend it was formerly connected with Ossa, but was separated from it by an earthquake, allowing a passage for the Peneus through the narrow vale of Tempe to

the sea. The philosophers afterwards transferred the abode of the gods to the planetary spheres.

Om is a Sanskrit word which, on account of the mystical notions that even at an early date of Hindu civilisation were connected with it, acquired much importance in the development of Hindu religion. Its original sense is that of emphatic or solemn affirmation or assent. Later it became the auspicious word with which the spiritual teacher had to begin, and the pupil had to end, each lesson of his reading of the Veda. In the Upanishads it appears as a symbol of the absolute and the object of meditation, and ultimately (as equal to *Aum*) it came to be regarded as an abbreviated method of naming the Hindu Trinity, Vishnu, Siva, and Brahmā. In the Lamaist form of Buddhism the 'formula of six syllables,' *Om mani-padme hūm*, which is variously interpreted, is the most solemn and sacred of invocations, the first thing taught to Tibetan and Mongolian children, the last prayer breathed by the dying man. It is found engraved on rocks, flags, and praying-wheels, and is looked on as the essence of religion and wisdom, and the means of attaining eternal bliss.

Omagh (Gael. *Oigh magh*, 'seat of the chiefs'), the county city of Tyrone, on the Strule, 34 miles S. of Londonderry and 110 NNW. of Dublin. It grew up around an abbey founded in 792, but is first heard of as a fortress in the end of the 15th century, when it was forced to surrender to the English. It formed part of James I.'s 'Plantation' grants, and was strongly garrisoned by Mountjoy. On its being evacuated by the troops of James II. in 1689 it was partially burned, and a second fire in 1743 completed its destruction. But it has been well rebuilt, and is now a neat and prosperous town. Pop. 4800.

O'maha, the chief city of Nebraska, is on the right bank of the Missouri, about 440 miles W. by S. of Chicago and 460 NW. of St Louis. It is the terminus of many important railways, and the Missouri is spanned by three great bridges (two railway) to Council Bluffs, Iowa, where a number of others start. It is especially important as being practically the eastern terminus of the Union Pacific, and so the gate of the West. The city is built on a plateau 80 feet above the river, and on hills behind it, and has wide streets. A belt line of railway encircles it. There are numerous large buildings, including the city hall, United States courthouse, federal building, and high schools; the city has also the University of Omaha, the Creighton University, medical and theological colleges, a large public library, and public parks of great extent. The manufactures include the making of linseed-oil, white-lead, bricks, machinery, &c.; there is a large grain trade; above all, Omaha possesses large lead-smelting works (said to be the largest in the country), railway works, one of the largest meat-packing businesses in the United States, and an enormous trade, due to its extensive facilities for transportation. There are numerous daily and weekly newspapers published in English, German, Swedish, Danish, and Czech. Omaha is the headquarters of a military corps area. The city was founded in 1854. Pop. (1860) 1912; (1870) 16,083; (1880) 30,518; (1900) 102,555; (1920) 191,601. South Omaha is now included.

Omahas, a tribe of American Indians, of the Dakota stock, settled in northern Nebraska.

Oman, the most easterly portion of Arabia, a strip of maritime territory, extending between the Strait of Ormuz and Ras-el-Had, and bounded on the SW. by the deserts of the interior. At a distance of from 20 to 45 miles inland a chain of mountains runs parallel to the coast, reaching 6000 feet in Jebel Akhdar. There are some richly fertile

tracts in this region, especially where water exists for irrigation, but no roads except camel and donkey tracks. The coast is hot and not very healthy. The country is in disorder. The area of the sultanate is about 82,000 sq. m. Pop. (estimated) 500,000—chiefly Arabs, with many negroes and Baluchis; capital, Maskat or Muscat (q.v.). Zanzibar (q.v.) was once part of the sultan's dominions.

Omar. See KHALIF.

Omar Khayyám, the astronomer-poet of Persia, was born at Nishapur, the capital of Khorasan, about the middle of the 11th century, and took his *takhallus* or poetical name, 'Khayyám,' from his father's calling of tent-maker. He was brought up under the great Sunni teacher, Imám Muaffik, and formed a close friendship with two of his fellow-pupils, Nizám-ul-Mulk and Hassan-ibn-Sabbah, of whom the one became vizier to the sultan Alp-Arslan, and the other founded the sect of the Assassins. Omar himself had an offer from his old friend of a place at court, but accepted instead a yearly pension of 1200 gold pieces. He, however, obeyed the summons of Malik Shah to Merv, and during his sultanate helped to reform the calendar. The result was the *Jalálí* era—a computation of time, says Gibbon, 'which surpasses the Julian, and approaches the accuracy of the Gregorian style.' To appease the *odium theologium* that he had roused against himself he is said to have made the pilgrimage to Mecca; and he died in 1122 at Nishapur.

Of some mathematical treatises by him in Arabic, one on algebra has been edited and translated by Woepke (Paris, 1851); and it was almost solely as a mathematician that he was known to the western world, until in 1859 Edward FitzGerald (q.v.) published his 'translation' of seventy-five of his *Rubáiyát* or quatrains. The poet of Agnosticism, such was Omar Khayyám, though some in his poetry see nothing save the wine-cup and roses, and others read into it that Sufi mysticism with which, indeed, it was largely adulterated long after Omar's death. He was a true poet; yet FitzGerald's translation is so much finer that the value of the original is such mainly as attaches to Chaucer's or Shakespeare's prototypes.

There are editions of the *Rubáiyát* by Nicolas (464 quatrains; Paris, 1867), Monbir Muhammad Sadik Ali (nearly 800 quatrains; Lucknow, 1878), and Whinfield (500 quatrains, 1883; 3d ed. 1902), with a metrical translation. Payne's (1898) verse translation is more important than the partial ones by Johnson, J. H. McCarthy, and Le Gallienne. Heron-Allen published a fac-simile of the text with a literal translation (1899), J. Pollen, a literal translation (158 quatrains) in 1915. There is an issue of FitzGerald's translation, with a commentary by Batson and others (New York, 1900); and there is a vast bibliography by Dele (Boston, 1896). Doubt has been cast on the authenticity of many of the quatrains; the work, in fact, is regarded as an anthology of which little or nothing may be by Omar. See vol. iii. of FitzGerald's *Letters and Literary Remains* (1889).

Omar Pasha (1806-71), Turkish general, was born at Plaski, in Croatia. His real name was Michael Lattas; he was educated for the Austrian army at the military school of Thurn, near Carlstadt. Having by a breach of discipline rendered himself liable to punishment he fled to Bosnia, and, embracing Mohammedanism, became writing-master to Abdul-Medjid. On his pupil's accession to the Ottoman throne in 1839 he was made colonel, and in 1842 military governor of the Lebanon. He suppressed insurrections in Albania, Bosnia, and Kurdistan. On the invasion of the Danubian Principalities by the Russians in 1853, Omar Pasha with 60,000 men crossed the Danube in presence of the enemy, intrenched himself, and defeated the Russians. In 1855 he repulsed the Russians at

Eupatoria. He was sent too late to relieve Kars. In 1861 he again pacified Bosnia and Herzegovina, and overran Montenegro in 1862.

Ombre (through the Fr. from Span. *hombre*, 'man'), a game of cards borrowed from the Spaniards, and usually played by three persons, though sometimes by two and by five. The game is played with 40 cards (the eights, nines, and tens having been removed), and each player receives nine cards, three by three.

Omdurman. See KHARTUM, MAHDI.

O'Meara, BARRY EDWARD (1786-1836), physician to Napoleon on St Helena, was born in Ireland. He served as surgeon in the army, but was dismissed the service in 1808 for a discreditable share in a duel at Messina. Later he entered the naval service, was on the *Bellerophon* when Napoleon came on board, and went with him as his private physician to St Helena. He took part with Napoleon in his squabbles with the governor, Sir Hudson Lowe, and was imprisoned and compelled to resign his post in 1818. On his return to England he was dismissed for asserting in a letter to the Admiralty that Sir Hudson Lowe had dark designs against his captive's life. His *Napoleon in Exile* (1822) made a great sensation, and is still valuable if read with caution.

Omen (perhaps originally *osmen*, for *ausmen*; root, *audio*, 'I hear'); also **PRODIGY** (Lat. *prodigium* for *prodicium*, from *prodico*), names given by the Romans to signs by which approaching good or bad fortune was supposed to be indicated. The former applied particularly to signs received by the ear and spoken words; the latter, to phenomena and occurrences, such as monstrous births, the appearance of snakes, the striking of the foot against a stone, the breaking of a shoe-tie, sneezing, and the like. It was supposed that evil indicated as approaching might be averted by various means, as by sacrifices, or by the utterance of certain magic formulas; or by an extempore felicity of interpretation, as when Cæsar, having fallen upon the ground on landing in Africa, exclaimed: 'I take possession of thee, Africa.' Occasionally we read of a reckless disregard of omens; as, for example, when P. Claudius in the first Punic war caused the sacred chickens, which refused to leave their cage, to be pitched into the sea, saying: 'If they won't eat, let them drink.' The belief in omens in one form or other has existed in all ages and countries, and traces of it linger in the folklore of all countries. And, indeed, there is no little philosophy in the Scots proverb: 'Them that follow freits, freits follow.' See AGURIES, DIVINATION, and FOLKLORE.

Omentum. See PERTONEUM.

Omichand (properly Amin Chand). See CLIVE.

Ommiades. See KHALIF.

Omnibuses, vehicles 'for all,' the well-known public conveyances. In 1662 Blaise Pascal (q.v.), assisted by some noblemen, obtained a patent from the French king for the privilege of running public coaches, containing six persons, each along certain streets of Paris, and preserving its own route, for five sous per passenger. For two years the scheme proved a great success, but the death of Pascal and other causes occasioned its disuse. The first omnibus, built in Paris in 1820, was drawn by three horses, and soon became popular. In England at the beginning of the 19th century stage-coaches were used by business men to reach London from its suburbs. These were succeeded by the omnibuses started in London, July 1829, by Mr Shillibeer, formerly a coachmaker in Paris, drawn by three horses, conveying twenty-two persons inside. Smaller and more convenient buses were introduced

in 1849, which conveyed twelve inside and two out. Outside seats along the centre of the roof followed in 1857, and the vehicle was subsequently much improved by Mr Miller of Hammersmith. Many improvements were made in the arrangement of seats outside facing forward, the greater accommodation of the interior, and the lightness of the vehicle. The London General Omnibus Company, founded in 1855, took over 580 omnibuses, and in 1903 had about 1400 running. After that date a rapid development of motor omnibuses took place in the streets of London and elsewhere, and they soon superseded horse-drawn vehicles.

Omnium, JACOB. See HIGGINS.

Omphacite (Gr. *omphaka*, 'unripe grape'), a grass-green granular variety of Pyroxene (q.v.), one of the constituents of Eclogite (q.v.).

Omphale. See HERCULES.

Omphalos (Gr., 'navel'), a sacred stone at Delphi (q.v.), supposed to mark the centre of the world. The actual stone (as is supposed) was discovered in 1915.

Omsk, an important town of Siberia, at the confluence of the Om with the Irtysh, 1800 miles E. of Moscow. It was built in 1716 as a defence against the Kirghiz, but is now of no importance as a fortress. It has a Greek and a Roman Catholic cathedral, a museum, governor's palace, &c. It is a considerable river-port. Seat of Koltchak's government, Omsk fell to the Bolsheviks, 15th November 1919. Pop. 140,000.

On. See HELIOPOLIS.

Onager. See ASS, BALLISTA.

Onagraceæ, ONAGRARIÆ, or ÆNOTHERACEÆ, a family of dicotyledons, consisting chiefly of herbaceous plants, but including also a few shrubs, with simple leaves and axillary or terminal flowers. There are about 500 known species, natives chiefly of temperate climates, among which are some much cultivated for the beauty of their flowers, particularly those of the genera *Fuchsia*, *Ænothera* (Evening Primrose), *Clarkia*, and *Godetia*. The British genera are *Epilobium* (Willowherb), *Circæa* (Enchanter's Nightshade), *Ænothera*, and *Ludwigia*. A few produce edible berries, and the roots of one or two are eatable; but none are of economic importance. The root of *Ludwigia alternifolia*, found in the marshes of Carolina, and called *Bouman's Root*, is emetic. Some species of *Jussiaea* are used in dyeing in Brazil.

Oncidium. See ORCHIDS.

Onega, a small seaport in the north of Russia, at the point where the river Onega empties into the White Sea, 87 miles SW. of Archangel.

Onega, LAKE, in the north of Russia, after Ladoga, to the north-east of which it lies, the largest lake in Europe, is 50 miles in greatest breadth, 146 miles in length, and 400 feet in depth in parts. Area, 3764 sq. m. It is fed by numerous rivers, and finds an outlet by the river Swir, which flows south-west into Lake Ladoga. The northern end is studded with islands and deeply indented with bays. The shores in other parts are flat and regular. Although the water is ice-bound generally for 156 days in the year, the lake is the scene of busy traffic at other seasons. Communication is promoted by a canal cut parallel to the southern shore. Fish abound. Mirages are frequent.

Oneglia, a town on the Gulf of Genoa, 3 miles NE. of Porto Maurizio by rail; pop. 12,000.

Oneida. See PERFECTIONISTS, IROQUOIS.

O'Neill. See TYRONE, IRELAND.

O'Neill, EUGENE, an American dramatist born in 1888. Before turning to writing he was a gold prospector, an actor, a journalist, and for two

years an able seaman. His time at sea had a great influence on him. *Thirst* (1914) was followed by *In the Zone* (1917), and *Moon of the Caribbees* (a series of seven small pieces dealing with the sea, 1919); *Beyond the Horizon* (1919) and *Diff'rent* (1920) reveal great dramatic gifts, but are on the same lines as many other conventional plays. 1920, however, saw the appearance of *The Emperor Jones*, a wonderful study of negro temperament. It is in eight short scenes; is practically a monologue, and creates an amazing effect when acted. *Gold* (1921) and *Anna Christie* (1923) carry on what may be called his more ordinary work, while *The Hairy Ape* (1923) shows much of that originality and force which made *The Emperor Jones* so striking a production. Without question Eugene O'Neill may be considered the greatest figure in modern American dramatic art.

Onion (Fr. *oignon*; Lat. *unio*, 'a pearl'), the name given to a few species of the genus *Allium* (q.v.), and particularly to *A. Cepa* (Lat. *cepa*), a biennial bulbous plant. The bulb is simple, and in the common variety is solitary, showing little tendency to produce lateral bulbs. The native country of the onion is shrouded in obscurity. It is supposed to be indigenous to India, whence it passed into Egypt, where it was cultivated 2000 years before the Christian era. Thence probably it was transmitted to Greece and Italy, and gradually spread over Europe, in most countries of which it has been cultivated from time immemorial. The onion contains a white acrid volatile oil, holding sulphur in solution, albumen, uncrystallisable sugar and mucilage, phosphoric acid, both free and combined with lime, acetic acid, citrate of lime, and lignin. The acrid qualities, while present in every part of the plant, are most concentrated in the bulb. When it is cultivated in warm countries the acidity decreases, while the saccharine qualities increase; hence the comparative mildness of Spanish and Portuguese onions. It is very nutritious and easily digested, yet does not agree with all stomachs when cooked otherwise than boiled. In boiling, the essential oil is dissipated and the onion thereby rendered more agreeable to delicate stomachs. The onion is stimulant, diuretic, expectorant, and rubefacient. The acid of the juice has the reputation of dissolving calculus in the bladder. The pulp of the bulb by fermentation is converted into vinegar, and with the addition of dregs of beer yields by distillation an alcoholic liquor. The pulp of roasted onion with olive-oil forms an excellent anodyne and emollient poultice to suppurating tumours. There are many varieties of the onion in cultivation in Britain, which have been obtained by natural seminal variation and by careful selection; some under good cultivation surpass even the large Spanish onion of the shops in size, but they lack its delicate flavour. Varieties with small compact bulbs keep best and longest. By a proper selection of sorts home-grown onions may be had either green or matured all the year round. The onion delights in rich, moist soil deeply trenched; when very large bulbs are desired it is hardly possible to overdo manuring. When the crop ripens, which is known by the central leaves ceasing to grow and the lower ones going to decay, the bulbs are taken up and spread out thinly on a dry surface in the open air till they are quite dry; they are then stored in a loft where, in mild weather, they may have plenty of air but be protected from frost and damp.—The potato-onion, so called because it reproduces itself underground by division of the bulb, is a perennial variety of the onion which also bears the names Egyptian and Ground Onion. It is much favoured by cottagers, in Scotland particularly. A legend that it was first brought to Britain by the British army

from Egypt in 1805 is without foundation, as it was cultivated long before that time in the country. Pickling onions are usually obtained by sowing the small silver-skinned variety on poor soil in spring. The Tree-onion, in which, instead of producing seeds after flowering, the ovaries develop viviparous bulbs by which the plant is propagated, is rarely cultivated except as a curiosity. The so-called Welsh Onion, or Cibol (*A. fistulosum*), produces no bulb, but merely a fleshy stem like the leek. It is a native of Siberia, and, being very hardy, was formerly grown in gardens to supply green onion-tops in spring for salads and the flavouring of soups and sauces. Being rather coarse in flavour, however, it has been superseded by the milder-flavoured kinds, which are sown in August. It is the true *syboe* of the Scots, although the term has come to be applied to green or young onions of whatsoever kind.

Onkelos, the reputed author of an Aramaic Targum of the Pentateuch. See TARGUM.

Onnes, HEIKE KAMERLINGH, born at Groningen, 21st September 1853, became professor of physics at Leyden. He obtained liquid helium, and discovered that the electrical resistance of metals cooled to near absolute zero practically disappears. See ELECTRICITY, p. 266.

Onobrychis. See SAINFOIN.

Onomacritus, a religious poet of ancient Greece, lived at Athens in the time of the Pisistratidæ. He exercised great influence on the development of the Orphic mysteries, and collected the prophecies or oracles of Musæus (q.v.), but was banished by Hipparchus for falsifying them. He followed the Pisistratidæ into Persia, and was by them induced to repeat to Xerxes all the ancient sayings that seemed to favour his invasion of Greece. He helped to arrange the Homeric poems, and is suspected of having introduced interpolations into the text of them.

Onomatopœia, a term used in Philology (q.v.) to denote the formation of words in imitation of natural sounds, as in *cuckoo*, *pee-wit*, and the like.

Onondagas. See IROQUOIS.

Ononis. See REST-HARROW.

Onopordon, or COTTON-THISTLE. See THISTLE.

Ontario, the easternmost and smallest (7540 sq. m.) of the five great lakes of North America, receives at its south-west corner the waters of the upper lakes by the Niagara River, and at its north-east corner it discharges into the St Lawrence. Its surface, which is subject to periodical variations (4 to 7 years) of about $3\frac{1}{2}$ feet, which it is attempted to explain on the supposition of there being a subterranean river out of the lake, is 326 feet below the surface of Lake Erie and 246 feet above the ocean-level. Its mean depth is about 300, its maximum depth 738, feet. It is 180 miles long, 53 wide in its widest part, and over 500 in circumference. It has many thriving ports, of which the chief are Kingston, Coburg, Port Hope, Toronto, and Hamilton on the Canadian shore, and Sackett's Harbor, Oswego, and Charlotte in the United States. It is connected with Lake Erie by the Welland Canal, with the Erie Canal and river Hudson by the Oswego Canal, and by the Rideau Canal with the Ottawa River. There is a complete system of lighthouses. Lake Ontario is subject to violent storms, and it is probably owing chiefly to the constant agitation of its waters that it freezes only for a few miles from the shore. It is entered by numerous rivers, the largest being the Genesee, Oswego, and Black. The shores are generally very flat, but the Bay of Quinte, near Kingston, a long, crooked arm of the lake, which

stretches about 50 miles, possesses some attractive scenery.

Ontario, the most populous and wealthy province of the Dominion of Canada, is bounded E. by Quebec; SE., S., and SW. by the St Lawrence and the great lakes; N. by James Bay and Hudson Bay; and NW. and W. by Manitoba. Area, 407,262 sq. m. (including 41,382 sq. m. of water); pop. (1881) 1,926,922; (1891) 2,114,321; (1901) 2,182,947; (1911) 2,523,274; (1921) 2,933,662. The surface is generally undulating, and there are no elevations of any considerable height. The Laurentian Hills run westward from the Thousand Islands near Kingston, and extend north of Lake Simcoe, forming the coasts of Georgian Bay and Lake Huron. In the middle of Eastern Ontario the high land forms a watershed, separating the rivers flowing into the great lakes from those entering the Ottawa and the St Lawrence. Further to the north is the east and west divide between the river systems flowing into James Bay and Hudson Bay and those emptying into Lakes Huron and Superior. The Ottawa forms the north-eastern boundary of the province, and the St Lawrence divides the eastern portion from the United States. It is bounded on the south by the great lakes, and among the smaller lakes are Simcoe, Nipissing, Nipigon, and many others.

Ontario is largely an agricultural country, and its resources are very great. Farming, stock-raising, dairy-farming, and fruit-growing are important industries. Immense crops are raised of all the products of a temperate climate; in Southern Ontario Indian corn is a regular crop, and grapes, peaches, and tomatoes ripen in the open air in perfection and in great quantities.

In minerals the country is also very rich. Iron is found in many parts; copper, lead, cobalt, plumbago, apatite, mica, corundum, felspar, talc, arsenic, gypsum, marble, and building-stone are abundant; there are also gold and silver deposits, the latter very extensive. The mines at Cobalt have yielded in some years about one-eighth of the world's production of silver. The nickel deposits at Sudbury are probably the most extensive in the world. There are petroleum-wells in the south-west part of the province, and the salt-wells on the shores of Lake Huron contain apparently inexhaustible supplies. Coal is brought mainly from Pennsylvania by the lakes. There are numerous waterfalls from which power can be generated on a large scale, notably at the Falls of Niagara, the extensive development of which will very favourably affect manufactures. A very extensive transmission line system, constructed by the Ontario government, conveys power to Western Ontario.

There are numerous manufactures and industries. The principal are lumber, iron and steel, cement, implements, wagons and carriages, railway rolling-stock (including locomotives), motor-cars, electrical and heating apparatus, cottons, woollens, leather, furniture, musical instruments, paints and oils, iron and hardware, wood-pulp and paper, soap, wooden-ware, canned goods, flavours.

There is only one large city, Toronto, which has over half a million inhabitants; but smaller cities and towns—Ottawa, Hamilton, London—are scattered all over the southern half of the province, and are usually manufacturing or agricultural centres. The farms in these districts are well cultivated and fenced, with houses as a rule superior to those found in Great Britain.

The southerly or well-settled portion of Ontario has a perfect network of steam railways, which has proved of great advantage in the development of its manufacturing and agricultural industries. The transcontinental routes, of course, pass from end to end of the province. (See CANADA.)

The inland navigation is very important. The

route from Montreal to Port Arthur by way of the St Lawrence River, Lake Ontario, Welland Canal, Lake Erie, the St Clair River, Lake Huron, Sault Ste Marie Canal, and Lake Superior embraces 1230 miles of continuous navigation. This system has a minimum depth of water of 14 feet. The Great Lakes Waterway Scheme, involving the improvement of the upper St Lawrence, the avoidance of its rapids by canals, and the enlargement of the Welland Canal, would put the ports of Ontario in direct communication with the ocean. Toronto and Port Arthur therefore see it in a different light from Montreal. The Rideau Canal from Ottawa to Kingston (126 miles), the Ottawa River, the Trent Valley Canal, and many similar systems carry on a large local trade.

By far the larger proportion of the imports comes from the United States. The exports, mostly to Great Britain, include agricultural products, animals and their products, minerals and manufactured goods, and timber.

The school system of Ontario is admirable, and is under the control of a Minister of Education. The schools are supported by a tax on property, with state grants, and are free to all. Roman Catholics may, if they wish, establish separate schools, and are then exempted from supporting the public schools, receiving a separate grant from the government. The principal institutions for higher education are the University of Toronto; Queen's University, Kingston; Ottawa University, Ottawa; Western University, London; McMaster University, Toronto; Trinity and Victoria Universities (affiliated with the University of Toronto); Knox College, Wycliff College, St Michael's College, and others in affiliation with the University of Toronto. There is a notable College of Agriculture at Guelph. In Ontario the Protestant religious bodies predominate; the Methodists are the most numerous, followed by the Church of England, then by the Presbyterians. The Roman Catholics are about 19 per cent. of the population.

Public affairs are administered by a lieutenant-governor, a cabinet, and a Legislative Assembly of 111 members, elected every four years. In the Dominion parliament the province is represented by twenty-four members in the Senate, and eighty-two members in the House of Commons. The municipal system is one of the most perfect in the world, and affords a pattern which has been followed in many other countries.

History.—Ontario was largely founded by immigration of United Empire Loyalists into Canada after the achievement of independence by the United States in 1783. It was made into a separate province and called Upper Canada in 1791 (see CANADA). The two provinces were reunited in 1840 as the result of the disturbances in 1837 and 1838, and remained in that position until confederation in the year 1867, when the province received the name of Ontario. Since that time it has undergone rapid development. The great northern forests have been opened up during the first decades of the 20th century by several new railways. That region has already given ample proof of possessing great mineral wealth and great agricultural resources. The area was much increased in 1912 by the addition of about 146,000 sq. m. north of the Albany River, between the borders of Manitoba as then extended and Hudson Bay.

Ontology. See METAPHYSICS, PHILOSOPHY.

Onus Probandi, i.e. the burden of proof, is often a difficult question in litigation; but as a rule the plaintiff who institutes the suit is bound to give proof of the allegations on which he relies.

Onyx, an agate formed of alternating white and black, or white and dark-brown, stripes of chalced-

ony. More rarely a third colour of stripes occurs. The finest specimens are brought from India. Onyx is in much esteem for ornamental purposes. The ancients valued it very highly, and used it much for cameos. Many of the finest cameos in existence are of onyx. The name onyx, however, appears to have been applied by the ancients more extensively than it now is, and even to striped calcareous alabaster, such as is now called Onyx Marble. The *Sardonyx* of the ancients is a variety of onyx in which white stripes alternate with stripes of a dark-red variety of carnelian, called *sard* or *sarda*. It is one of the rarest and most beautiful kinds of onyx, and is more valued than carnelian.

Oodeypore. See UDAIPUR.

Oojein. See UJJAIN.

Oolachan. See CANDLE-FISH.

Oolite (Gr., 'egg-stone'), a variety of limestone, composed of spherical granules of calcium carbonate, which have a concentric and often a fibrous radiating structure. In many cases these granules contain a nucleus or kernel of some foreign substance, such as a grain of sand, round which the successive layers or encrusting coats of calcium carbonate have been formed. Sometimes their origin is mechanical, the layers having been deposited round a nucleus from a saturated solution; often, however, tubular structures indicative of the former presence of organisms are observed in microscopic sections of the older oolites, and in the Sprudelstein of Carlsbad and the oolitic sands of the Great Salt Lake, modern equivalents of oolitic limestones, it has been proved that calcareous algæ are active agents in the formation of the granules. The coarser varieties of oolite are termed *Peastone* or *Pisolite*.—For Oolite as the name for a group of strata, see JURASSIC SYSTEM.

Oonalashka. See ALEUTIAN ISLANDS.

Oosterzee, JAN JAKOB VAN, theologian, was born in 1817 at Rotterdam, studied at Utrecht, was a pastor in Rotterdam, and in 1862 became a theological professor at Utrecht, being the leader of the Evangelical school in Holland. He died 29th July 1882. He wrote many works, amongst them a *Life of Christ*, a *Christology*, a work on John's Gospel (in German), commentaries on Luke and the Pastoral Epistles in Lange's Commentary; also a *Theology of the New Testament* (1867; Eng. trans. 1870, 4th ed. 1882); *Christian Dogmatics* (1872; trans. 1874); *Moses* (trans. 1876); *Practical Theology* (trans. 1878).

Ootacamund, or UTAKAMAND, the chief town in the Neilgherry (q.v.) Hills, the principal sanatorium of the Madras Presidency, and the summer headquarters of the governor of Madras. It stands on a plateau, in an amphitheatre surrounded by hills, 7228 feet above the sea, 350 miles from Madras city, and since 1899 has railway connection with Madras. There are a public library (1859), the Lawrence Asylum (1858) for the children of British soldiers, and botanical gardens. The mean annual temperature is 58° F. The first house was built in 1821. Pop. 20,000.

Ooze, a term technically applied to some kinds of deposits found covering the bottom of the deeper parts of the sea. It is not only the depth of the water but the distance from the land which determines the occurrence of ooze. As we pass from the shore out to sea we find a succession of deposits, shingle, sandy mud, mud—all derived from the land; but at a distance varying from 60 to 300 nautical miles from the shore, and at a depth of 2000 feet or more, lie the various oozes, which consist of the remains of numerous small organisms, but especially of the shells of Foraminifera. A whitish deposit, containing enormous numbers

of Globigerina shells, which in dying have sunk from the surface, is very widely distributed till depths of about 2000 fathoms are approached. There the Globigerina ooze wanes away, and is replaced in the deeper regions by so-called 'red clay.' At the surface above there are of course here as elsewhere abundant Foraminifera which still doubtless sink, but the physical conditions of the great depths are such that their shells are dissolved in falling. But in certain of the deepest parts—e.g. at 4575 fathoms—the *Challenger* explorers found another kind of ooze, composed of the flint shells of Radiolarians. Besides this, in other regions the shells of Pteropods and Diatoms are abundant enough to form a characteristic ooze.

It is to be understood, however, that the various oozes (Globigerina, Radiolarian, Pteropod, Diatom, &c.) pass into one another, and that the names usually express simply the predominance of one or other kind of shell, and also that the colours—white, yellow, brown, and red—mainly denote the proportion in which the 'red clay' is present. The latter owes its colour to the oxides of iron and manganese, and is composed of disintegrated materials of volcanic origin, such as pumice, and also of meteoric dust. These, after being carried by winds and floated on ocean currents, sink and are distributed at the bottom. But as to the ooze in the strict sense, it ought also to be noted that the dead or dying organic material, which the rain of these organisms brings to the bottom, serves as the fundamental food-supply of deep-sea animals, while the shells not only accumulate as ooze, but aid in the elevation of submarine volcano-tops to the level at which corals can grow. Finally, the results of the ooze of incalculably distant ages are seen in chalk, which is composed almost entirely of Foraminifera, or in such Radiolarian deposits as Barbados Earth. See CHALK, DIATOM, FORAMINIFERA, GLOBIGERINA, PTEROPOD, RADIO-LARIA, SEA, and the concluding volume of the *Challenger* Reports by Murray and Renard.

O.P., that is, 'Old Prices,' was the war-cry of the O.P. riots. Covent Garden Theatre was burned to the ground 20th September 1808, rebuilt, and opened 18th September 1809 with a performance of *Macbeth*, the cast including John Philip Kemble (manager and part-proprietor) and Mrs Siddons. An increase in prices had been announced, and the play was performed in pantomime amid uproar. For the next three months or so O.P. badges and placards were seen everywhere, and the issue was fought in the press and the law-courts as well as the theatre, where the introduction of prize-fighters friendly to the management failed to gain a hearing for the stage. A compromise was at last agreed to.

Opacite, name given by petrologists to minute black, opaque, amorphous aggregates, grains, and patches of indeterminate mineral matter, which are seen in many igneous rocks when these are viewed in thin slices under the microscope. Opacite is probably in most cases hematite, limonite, magnetite, or other iron oxide, and is a product of the chemical alteration of one or other of the original mineral constituents of the rock in which it occurs.

Opah, or KING-FISH (*Lampris luna*), the sole representative of the family Lampridæ, the affinities of which are uncertain. The body is deep and laterally compressed, sometimes reaching a length of 4 feet. It shows minute scales and vivid colours. The back is bluish gray; the sides violet, becoming red underneath; there are scattered spots of silver; the fins and tail are deep scarlet. The mouth-opening is narrow, and there are no teeth. Little is known of the opah's habits;

it seems to feed on open-sea fishes and on cuttle-fish. Its distribution is wide—e.g. North Atlantic, Pacific, and Mediterranean. Occasional specimens are caught off British coasts. The rich palatable flesh is reddish or yellowish in colour,



Opah (*Lampris luna*).

intermediate between that of the salmon and that of the tunny. The opah is also called sea-perl, carl, and Jerusalem haddock, and again a sun-fish—a name likewise given to *Orthogoriscus* (see SUNFISH) and to the basking shark (see SHARK)—because it comes to the surface in calm weather.

Opal, a mineral which differs from quartz in containing generally 3 to 10—in some cases only 1, in others as much as 21—per cent. of water, its only other essential constituent being silica, although a little alumina, oxide of iron, &c. is often present. The water is readily driven off on the application of heat, and some opals contain so small a proportion of water that they might be described simply as jelliform quartz. Not infrequently minute scales or plates of tridymite (a crystallised variety of silica) are present in opal. The latter is never found crystallised, and does not exhibit a crystalline structure like quartz. It has a conchoidal fracture, and is very easily broken. There are many varieties, which pass into one another, so that their precise limits cannot be defined, from which has arisen no little confusion of names. The finest kind is called *Precious Opal* or *Noble Opal*, and sometimes *Oriental Opal*. It is semi-transparent or translucent, usually of a bluish or yellowish-white colour, yellow by transmitted light. Its brilliant play of colour is due to refraction of light in curving layers of varying composition. It is much valued for setting in rings, brooches, &c., and is polished with a convex surface, never cut into facets, both because of its brittleness and because its play of colours is thus best exhibited. The ancients valued opals very highly. The Roman senator Nonius preferred exile to giving up an opal to Mark Antony. This opal was still to be seen in the days of Pliny, who ascribes to it a value equal to more than £20,000 sterling. The imperial cabinet of Vienna contained the most celebrated opal now known to exist. It is 5 inches by 2½ inches. The finest opals were formerly all brought from Czerwenitz, between Eperies and Kassa, in Slovakia, where they are found disseminated as alteration-products in andesitic breccia. They are mostly very small, but even a very small opal, if really beautiful, is worth four or five pounds; and the price increases very rapidly with increase of size. Precious opal is found also in Queensland, New South Wales, &c. When the colours are not equally diffused, but in detached spots, jewellers call it *Harlequin Opal*. There is a dark or blackish variety, apparently tinged by oxide of iron, which occasionally exhibits very beautiful reflections, and is then much prized. *Girasol* (q.v.) and *Cacholong* (q.v.) are varieties of opal. What lapidaries call *Prime d'Opal* is porphyrite or other igneous rock, containing many small amygdulæ of opal. It is

cut into slabs, and made into boxes and other ornamental articles; the stone which contains the opals being often artificially blackened by boiling in oil, and afterwards exposing to a moderate heat. — *Common Opal* is semi-transparent, white, yellow, green, red, or brown, and does not exhibit any play of colours. It is not a rare mineral, and is chiefly found in veins and cavities or diffused (as an alteration-product) through the mass of various igneous rocks. *Semi-opal* is more opaque. *Wood Opal* is a petrification, and exhibits the form and structure of wood, the place of which has been taken by the siliceous mineral. *Hyalite* and *Menilite* are varieties of opal.

Opatija, Slovenian name of Abbazia (q.v.).

Opava. See OPPAU.

Opera is a drama which is sung throughout to the accompaniment of a full orchestra. The various forms of aria or song, recitative or declamation, duet, trio, &c., concerted piece or instrumental interlude, are used as the exigencies of the situation demand. The whole is usually introduced by an introduction, *vorspiel*, or Overture (q.v.), and often one of the acts contains a ballet or pantomimic dance. It is a direct development from the discovery by the Florence Academy (see MUSIC) of Monody or the musical expression of a single individuality by a single voice. As every country, every school since 1600 has felt the fascination of the art problem, and nearly every great composer has been ambitious to solve it, the opera is a universal possession, and its range is almost as wide and varied as the history of music itself. *Italian Opera* is marked by its spontaneity and melodious character, and even more by the honour of priority; *German Opera* is the product of greater geniuses than any other can boast, but lacks the continuity which makes the *French* school so interesting to the student.

Italian School.—The experiments in scena-writing (1582-90) culminated at Florence in the first real opera, *Dafne* (1594), by Peri and Caccini, the more successful *Euridice* (1600), and the very advanced work of Monteverde. The new departure in music soon spread its influence beyond Florence to Venice, where Monteverde spent the last thirty years of his life, and to Naples, where Alessandro Scarlatti (1659-1725) took up the work and founded the Neapolitan or 'beautiful' school. Scarlatti, by the prominence he gave to melody, may be said to be the founder of Italian opera, which to this day is noted for so-called melody in profusion, and the comparative indifference to other as important qualities, such as harmony, orchestration, and dramatic unity. No Italian work of the 18th century has survived save Cimarosa's *Il Matrimonio Segreto* (1792), which, very similar in style to Mozart's greater works, has been overshadowed by these. The most famous modern Italian composer is Rossini, a brilliant vocal writer, whose charming *Barber of Seville* (1816) is a model of *opera buffa*, and whose serious opera, *William Tell* (1829), also keeps a place in the repertoire of the European stage. Bellini's *Norma*, *La Sonnambula*, *Puritani*, and Donizetti's *Lucia di Lammermoor* and *Lucrezia Borgia* still survive out of more than 100 melodious works. The earlier operas of Verdi are quite Italian in style (*Trovatore*, 1851; *Traviata*, 1853, &c.). *Aida* (1871) shows a leaning to, and *Otello* (1887) complete adhesion to the modern music drama. To Verdi succeeded Mascagni (*Cavalleria Rusticana*, 1890), Leoncavallo (*Pagliacci*, 1892), and Puccini (*La Bohème*, 1896; *La Tosca*, 1900; *Madame Butterfly*, 1904; *Gianni Schicchi*, 1918).

German Opera.—During the 17th and early part of the 18th century the opera in southern Germany

was purely Italian. Dresden, where Hasse reigned supreme, and Vienna were the two centres. It was in Hamburg that the National school was founded by Keyser, who wrote (1694-1734) over 100 operas in which a high dramatic ideal is apparent. Gluck, though a German, belongs more to the school of French Grand Opera. Mozart, after beating the Italians on their own melodic ground in *Idomeneo*, *Die Entführung*, *Figaro*, and *Don Giovanni* (1781-87), wrote the first national romantic opera, *The Magic Flute* (1791). Beethoven, desiring nobler plots of a more serious and moral character than had satisfied the light-hearted Mozart, chose Bouilly's *Léonore* as the foundation of his single opera *Fidelio* (produced 1805, rewritten 1814). The operas of Weber were deeply imbued with the romanticism of the early 19th century, and in *Der Freischütz* (1821) he uses the national folklore with immense effect. To this new Romantic school also belong the operas of Marschner and of Spohr, the beauty of whose music is buried, like Weber's *Euryanthe* and Schubert's *Rosamunde*, under absurd libretti.

Melodrama in opera is an effective device which originated in Germany. The singer recites his part in an ordinary speaking voice accompanied by orchestral music, which seeks to convey the meaning of the situation and scene to the audience. Benda first used it (*Ariadne*, 1774), and Mozart, who heard it in 1778, was much impressed by its possibilities. The most successful example is the grave-digging scene in Beethoven's *Fidelio*; Weber in *Der Freischütz* and Mendelssohn in *A Midsummer Night's Dream* have also used it with happy effect.

The *French Grand Opera School* is extremely important, not only on account of its continuity and consistence, but because at various times, and for various reasons, great men were attracted from foreign countries to it as a centre. It was founded by the Florentine Lully, reformed by the German Gluck; and Italians like Cherubini, Spontini, Rossini, Belgians like Grétry, Germans like Meyerbeer and Wagner have both learned from it and contributed to its various stages of development. Lully (born 1633) arrived in Paris a boy of thirteen in the train of the Chevalier de Guise, and by his diplomatic and social, no less than by his musical talents, he gradually pushed his way to the very summit of musical success, and lived in great favour with King Louis XIV. In 1672 he obtained a patent conferring the sole right of producing operas in Paris, and this monopoly he held till his death in 1687. Musical Paris was sharply divided between his followers and those of Rameau (1683-1764), until the arrival of an Italian company made them unite their ranks in opposition to the foreigners. The characteristic of this French school from its beginning was its attention to rhetoric and dramatic requirements. The treatment of recitative in particular has always been a feature since Lully's time, and he it was also who invented the overture. Gluck arrived in Paris in 1774, and produced his *Iphigénie en Aulide* and *Iphigénie en Tauride* there; and the ideal expressed by Peri and Monteverde, embodied to a considerable extent in these and other works (see GLUCK), has at last found its goal in the music drama of Wagner. Cherubini's seriousness and nobility of style (*Les Deux Journées*, 1800), Méhul's fine ear for effect (*Joseph*, 1807), Spontini's magnificence of conception (*Vestale*, 1805), and Halévy's dramatic truth (*Juive*, 1835) were all ranged under Gluck's banner, and the roll of French grand opera is brought to a gorgeous close with the name of Wagner's predecessor, Meyerbeer (*Robert le Diable*, 1831, *Huguenots*, 1836, *Le Prophète*, 1843). The new blood he brought with him from the schools of Germany and Italy invigorated it, and the time

was ripe when the experiment of *Rienzi* was made in 1842. Other important contributions to grand opera were Auber's *Masaniello* (or *Muette de Portici*, 1828) and Rossini's *Guillaume Tell* (1829).

Opéra Comique (by no means comic opera) is a title applied to all works which, on account of spoken dialogue, were not eligible for performance at the Grand Opéra. Grétry's *Cœur de Lion* (1784), Méhul's *Joseph*, Boieldieu's *La Dame Blanche* (1825), Hérold's *Pré aux Clercs* (1832), and Auber's *Le Maçon*, *Les Diamants de la Couronne*, &c. are the most famous. This *Opéra Comique*, so purely French, had a large share in the development of the modern lyric opera, of which Gounod's *Faust* (1859), Thomas's *Mignon* (1871), and Bizet's *Carmen* (1875) are good examples.

The *Ballet* (entirely pantomimic) attained a very high pitch of development in Paris, where Delibes (1836-91) produced his charming *Coppélia* and *Sylvia*.

Comic opera proper (*Opera Buffa*) is represented in Italy by Rossini's *Barbiere*, Donizetti's *Figlia del Reggimento* (1840), and Verdi's last great work, *Falstaff* (1893); in Germany by Flotow's *Martha* (1847), Nicolai's *Merry Wives* (1849); in France (*Opéra Bouffe*) by Offenbach's *Orphée aux Enfers* (1858), *Grande Duchesse* (1867), &c., Le-cocq's *Madame Angot* (1873), &c., and numberless other bright works; and in England worthily by the charming Gilbert-Sullivan series (*Pinafore*, 1878; *Patience*, 1881; *Mikado*, 1885).

Music Drama is the ideal which Wagner has sought to embody in *Tristan und Isolde* (1865), *Meistersinger* (1868), *Ring des Nibelungen* (1876), and *Parsifal* (1882). *Rienzi* (produced in Dresden in 1842) establishes his connection with the Grand Opéra of Meyerbeer, and in the *Flying Dutchman* (1843), *Tannhäuser* (1845), and *Lohengrin* (1849) the growth of his method is distinctly seen, as well as his indebtedness to many predecessors, especially, in orchestration, to Berlioz. Wagner seeks to make the 'Art Work of the Future,' as he calls it, equally dependent on music, drama, and scenic art—the requirements of none being sacrificed to the demands of the other, but all contributing to one perfect unity. His influence is clearly traceable in all modern operas—e.g. Goldmark's *Queen of Sheba*, *Merlin*, Boito's *Mefistofele*, Ponchielli's *Gioconda*, Verdi's *Otello*, Humperdinck's *Hänsel und Gretel*.

English Opera.—Purcell's early work, *Dido and Æneas*, written at the age of seventeen, his chef d'œuvre *King Arthur* (1691), and other works gave promise of such an English school of opera as the 'Masques' of Lawes and others had suggested (1613-75), but no one was ready to carry on the work after his early death in 1695 (aged thirty-seven). Dr Arne's *Artaxerxes* (1762), out of thirty-four operas, is the only other English opera which calls for mention. Italian opera became the fashion in London (Handel wrote forty-four, 1710-39), and England's attention was divided between that school and the highly inæsthetic and, from an operatic point of view, worthless form of *Ballad Opera*, founded by Dr Pepusch (*Beggar's Opera*, 1728), until late in the 19th century, when Mac-kenzie's *Colomba* (1883), Villiers Stanford's *Canterbury Pilgrims* (1884), Goring Thomas's *Esmeralda* (1883), Sullivan's *Ivanhoe* (1891), and works by Cowen, MacCunn, and others sought to win recognition for English opera. The development has been carried on by Ethel Smyth, Granville Bantock, Rutland Boughton, Gustav Holst, Vaughan Williams, &c.

Russian Opera comes to the world's notice with Glinka's *A Life for the Tsar* (1836) and *Russian and Liudmila* (1842). Mussorgski's *Boris Godunov* was produced in 1874. His *Khovantchina* (1880),

like Borodin's *Prince Igor*, was completed by Rimski-Korsakov, himself well known as a composer of operas (*The Golden Cockerel*, &c.). Tschai-kowsky's best-known opera is *Eugen Onegin* (1879).

New tendencies are seen in Germany in Strauss's *Salome* (1905), *Elektra* (1909), *Rosenkavalier*, *Die Frau ohne Schatten* (1919), and in France in Debussy's *Pelléas et Mélisande* (1902).

See histories of opera by Elson (1901), Apthorp (1901), and Streatfeild (1896; new ed. 1925); and the articles on GLUCK, MOZART, WEBER, and WAGNER in this work.

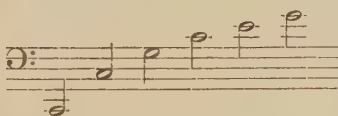
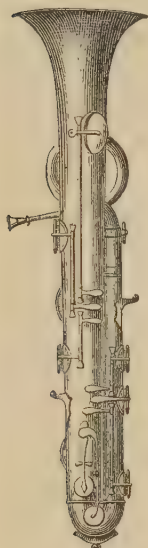
Opera-glass, a double telescope, used for looking at objects that require to be clearly seen rather than greatly magnified, such as adjoining scenery and buildings, the performers at a theatre or opera, &c. The opera-glass is short and light, and can be easily managed with one hand. Its small magnifying power (from two to three at the most), and the large amount of light admitted by the ample object-glass, enable it to present a bright and pleasant picture, so that the eye is not strained to make out details, as in telescopes of greater power, which generally show a highly-magnified but faint picture. It allows the use of both eyes, which gives to the spectator the double advantage, not possessed by single telescopes, of not requiring to keep one eye shut (a somewhat unnatural way of looking), and of seeing things stand out stereoscopically as in ordinary vision.

The opera-glass is the same in principle as the telescope invented by Galileo. It consists of two lenses, an object-lens and an eye-lens. The object-lens is convex, and the eye-lens concave. They are placed nearly at the distance of the difference of their focal lengths from one another (see TELESCOPE). The opera-glass need not be set to a precise point, as is necessary with ordinary terrestrial telescopes, for the lengthening or shortening of the instrument does not produce so decided an effect on the divergence of the light; the change of divergence caused by screwing the opera-glass out or in is so slight as not much to overstep the power of adjustment of the eye, so that an object does not lose all its distinctness at any point within the range of the instrument. There is, however, a particular length at which an object at a certain distance is most easily looked at. The two telescopes of the opera-glass are identical in construction, and are placed parallel to each other. The blending of the two images is easily effected by the eyes, as in ordinary vision. Opera-glasses form an important article of manufacture, of which Paris is the great seat. The cheapest opera-glasses consist of single lenses; those of the better class have compound achromatic lenses. A very ordinary construction for a medium price is to have an achromatic object-glass, consisting of two lenses, and a single eye-lens. In the finest class of opera-glasses, which are called *field-glasses*, both eye-lenses and object-lenses are achromatic. Plössl's celebrated field-glasses (Ger. *Feldstecher*) have twelve lenses, each object-lens and eye-lens being composed of three separate lenses.

Of late years attention has been paid to prismatic binoculars, the principle of which is simply that the two tubes instead of being straight and parallel are given a  form and are fitted with

total reflexion prisms at the angles. The effective tube-length is thus increased and the instrument somewhat widened; and, the object-lenses being farther apart than the two eyes, a somewhat exaggerated sense of perspective is induced, which conduces to accurate focussing. The virtually lengthened tube also lends itself to higher magnifications.

Ophicleide (Gr. *ophis*, 'serpent,' and *kleis*, 'key'), a brass bass wind-instrument, was developed from improvements on the Serpent (q.v.) about the beginning of the 19th century. It consists of a conical tube having a bell like that of the horn, a cup mouthpiece, and usually eleven holes stopped by keys like the old Kent bugle. It has the usual harmonic (see HARMONICS) open notes of all brass instruments, its fundamental, never used, being an octave lower. By means of its keys it has a range, including all the semitones, of a little over three octaves, and its music is written in the



bass clef. Alto and double-bass ophicleides have also been made, but not much used. It is much to be regretted that an instrument of such a characteristically rich tone, and capable of intonation so accurate as the ophicleide, has been allowed to fall completely out of use. It has been superseded by the simpler three-valved instruments of the Saxhorn (q.v.) type.

Ophidia. See SNAKES.

Ophicleide.

Ophioglossaceæ, a family of Filices or Ferns (q.v.), consisting of a few rather elegant little plants with an erect or pendulous stem, which has a cavity instead of pith, leaves

with netted veins, and the spore-cases (*thece*) collected into a spike whose morphology is doubtful, 2-valved, and without any trace of an elastic ring. They are found in warm and temperate countries, but abound most of all in the islands of tropical Asia. Several species are European, and two are British, the *Botrychium Lunaria*, or Moonwort (q.v.), and the Common Adder's-tongue (*Ophioglossum vulgatum*), which was at one time supposed to possess magical virtues, and was also used as a vulnerary, although it seems to possess only a mucilaginous quality—on account of which some of the other species have been employed in broths. It is a very common plant in England, its abundance in some places much injuring pastures.



Adder's-tongue
(*Ophioglossum vulgatum*).

Ophir, a region, frequently mentioned in the Old Testament, from which the ships of Solomon, fitted

out in the harbours of Edom, brought gold, precious stones, sandalwood, &c. The voyage occupied three years. Where Ophir was situated has been a much-disputed question. Arias Montanus fixed on Pern, Raleigh on the Moluccas, and Calmet on Armenia. Probably, however, Ophir was either

on the east coast of Africa about Sofala, or in Arabia, or in India, but in which of the three countries is disputed. On the whole, the balance is strongly in favour of Arabia.

Ophites (Gr. *ophitai*, from *ophis*, 'a serpent'), a class of Gnostics, who, while they shared the general belief in dualism, the conflict of matter and spirit, the emanations, and the Demiurgos, were distinguished by giving a prominent place in their systems to the serpent. Some of their divisions were the Sethiani, the Naaseni (Heb. *nahash*, 'serpent') in Phrygia, and the Peratæ, who honoured the serpent which tempted Eve, as having introduced knowledge and revolt against the bondage of the Archon. We owe our knowledge of them mainly to Irenæus, Clement, Origen, and Hippolytus: the last also contains an account of two other Ophite systems, that of the Sethians and of Justinus. Already in his day the sect was fast dying out, although Theodoret mentions serpent-worship as still existing in the 5th century.

See GNOSTICISM, and the books named there; also Lipsius in the *Zeitschr. für Wissenschaftl. Theol.* (1863); Gruber, *Die Ophiten* (1864); King, *The Gnostics, their Remains* (1887); Adolph Hönig, *Die Ophiten* (1889); and E. F. Scott's article in *Hastings's Ency. of Rel. and Ethics*.

Ophitic Structure, a name given by petrologists to a structure seen in various crystalline igneous rocks, in which large plates of pyroxene are penetrated and divided, as it were, into small portions, by crystals of felspar. The separated portions of the pyroxene, however, are in crystalline continuity, since they all possess the same optic orientation.

Ophiuroidea. See BRITTLE-STARs.

Ophthalmia was originally and still is sometimes used to denote inflammation of the eye generally; but it is at the present time usually restricted to inflammations of the conjunctiva or mucous coat of the eye (*conjunctivitis*); and to sympathetic inflammation or ophthalmia (see under EYE). *Ophthalmia neonatorum* is a serious form of conjunctivitis found in new-born infants, which is apt, if untreated, to result in blindness.

Ophthalmoscope, an instrument by which the interior of the eye can be examined. It was first invented in 1847 by Charles Babbage (q.v.); but, as unfortunately the ophthalmic surgeon to whom he showed it did not recognise its importance, he laid it aside without making it generally known; and its principle had to be rediscovered by Professor Helmholtz, to whom belongs the credit of bringing it before the medical and scientific world in 1851. The value of the instrument depends on the circumstance that by illuminating and examining an eye in the same direction its deeper parts can be rendered visible. All forms of ophthalmoscope are adaptations of this principle. The form now generally in use resembles more that of Babbage than that of Helmholtz. It consists of a concave mirror of about 10 inches focus, $\frac{1}{2}$ to $1\frac{1}{2}$ inches in diameter, with a small hole in the centre, and certain lenses to use with it, the most important of them a separate convex lens of $2\frac{1}{2}$ inches focus, and $1\frac{1}{2}$ to $2\frac{1}{2}$ inches in diameter. Examination is facilitated by dilating the pupil of the observed eye with atropine; and for a complete examination this is often indispensable. The person whose eye is to be examined is seated in a darkened room, with a bright light—e.g. a good gas-burner—on a level with his eye by the side of his head. The observer sits opposite him, and, placing the mirror close to his own eye, and about 18 inches from the eye to be examined, reflects the light upon the latter, while he looks at it through the hole. The pupil in a healthy eye appears of a bright red or orange instead of its usual deep black. In short-sighted

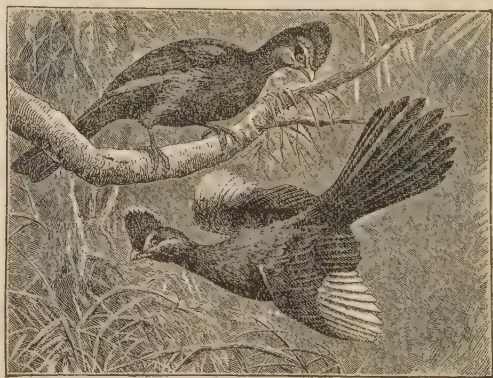
and long-sighted eyes, but not in normal ones, the vessels of the retina, the entrance of the optic nerve, &c. can be more or less distinctly seen, and by their movements the deviation from the normal refraction can roughly be estimated. Opacities in the lens (Cataract, q.v.) or vitreous humour appear black, and are discovered by this method more certainly and easily than by any other. The details of the retina, choroid, &c. (or *fundus*) can be seen in two different ways. In the *indirect method* the observer, seated as above described, holds the 2½-inch convex lens about 3 inches from the eye under examination, between it and his own, when a clear real image of part of the fundus, inverted and magnified about four diameters, appears in the red light of the pupil. In the *direct method* the observing eye must be placed as close to the observed as the intervention of the mirror will allow, when a virtual image of a smaller part of the fundus is seen, but erect and magnified about fourteen diameters. The fundus appears of an orange or red colour, varying much in different individuals; the blood-vessels of the retina are seen as darker red lines coursing over it. The entrance of the optic nerve, commonly called the *disc*, from which these vessels diverge, appears as a round area of a much paler colour. An *electric ophthalmoscope* carrying a dry cell and minute lamp is also used by the direct method, and dispenses with a separate light. The ophthalmoscope has revolutionised the examination of the optic nerve, choroid, and retina. Some deep-seated affections have, moreover, important relations to general diseases—e.g. Bright's disease, diabetes, syphilis, diseases of the brain and spinal cord—and general medicine has benefited accordingly. The ophthalmoscope has also much facilitated the discovery and correction of errors of refraction (short- and long-sightedness, Astigmatism, q.v.; see under EYE).

Opie, AMELIA, daughter of a Norwich physician, Dr Alderson, was born in 1769, and while very young wrote songs and tragedies, and was acquainted with Godwin, Mrs Inchbald, Mrs Siddons, and much of the literary society of the time. She married the painter Opie (q.v.) in 1798. In 1801 her first novel, *Father and Daughter*, appeared; the following year, a volume of poems. *Adeline Mowbray* and *Simple Tales* were her next works. On her husband's death she returned to Norwich, and published his lectures with a memoir prefixed. She wrote also *Temper*, *Tales of Real Life*, *Valentine's Eve*, *Tales of the Heart*, and *Madeline*. Having been long acquainted with the Gurneys, Mrs Opie became a Quaker in 1825, and afterwards published *Illustrations in Lying, Detraction Displayed*, and articles in periodicals, but no more novels. She died at Norwich, 2d December 1853. See her *Memoirs* by Miss Brightwell (1854), and Lady Richmond Ritchie's *Book of Sibyls* (1883).

Opie, JOHN, R.A., was born at the village of St Agnes, 7 miles from Truro, Cornwall, in May 1761. His father, a master-carpenter, wished him to follow the same trade, but his bias for art was strong; and his attempts at portrait-painting secured the friendly help of Dr Wolcot ('Peter Pindar'). In 1780 he was taken to London by Dr Wolcot, and immediately came to be acknowledged by the fashionable world as the 'Cornish Wonder.' This tide of good-fortune soon ebbed, but not before Opie had realised a moderate competency. The loss of popular favour, however, only served to bring out Opie's manly independence and strong love of art, and he calmly entered on that department of painting which was then regarded as the only style of high art, namely, historical or scriptural subjects, executed on a large scale. His pencil was employed by Boydell

in his well-meant and magnificent scheme to elevate British art; he also painted a number of works in the illustration of Bowyer's English History, Macklin's Poets and Biblical Gallery, and other similar undertakings. His pictures of the 'Murder of James I. of Scotland,' 'The Slaughter of Rizzio,' 'Jephtha's Vow,' 'Presentation in the Temple,' 'Arthur and Hubert,' 'Belisarius,' and 'Juliet in the Garden' are his most noted works. Opie was elected an Associate of the Royal Academy in 1786, and Academician in the following year. He wrote the 'Life of Reynolds' in Dr Wolcot's edition of Pilkington's *Dictionary of Painters*, and *An Inquiry into the Requisite Cultivation of the Fine Arts in Britain*; and delivered lectures on Art at the Royal Institution. Opie was twice married. He obtained a divorce from his first wife; his second was the novelist, Amelia Opie (q.v.). He died 9th April 1807. See A. Earland's *Opie and his Circle* (1911).

Opisthocomus, or HOATZIN (*O. hoazin*), perhaps the most remarkable living bird, inhabiting the banks of the Amazon and some other South American rivers. It is the only representative of its order, and has a very isolated position, though affinities with rails and with cuckoos have been suggested. It is about the size of a pigeon. The crop, unequally muscular and glandular, is extraordinarily enlarged, and this is associated with remarkable peculiarities in the breast-bone and pectoral girdle. The food consists of leaves and fruit. The wings are large, but the flight is laboured and short. A conspicuous, loose, twig-nest, with softer lining, is placed on a branch overhanging the water, and the precocious rail-like nestlings dive and swim off when molested. They



Hoatzin (*Opisthocomus hoazin* or *cristatus*).

creep about in a reptilian fashion on the branches, using not only their bill and feet, but well-developed claws on the thumb and first finger. The adult plumage is olive above with white marking, dull rufous below; the crest and the tip of the tail are yellowish. A musky odour accounts for the name 'Stinking Pheasants.' The sharp, shrill note is described as a hissing screech. A fine account is given in C. W. Beebe's *Jungle Peace* (1918).

Opitz, MARTIN, German poet, born on 23d December 1597, at Bunzlau on the Bober, in Silesia, for a century or more after his death was extravagantly praised as the 'Swan of Bober,' the 'Swan of Silesia,' the 'Father and Regenerator of German poetry.' This inflated reputation he had earned by toadying to the princes of Germany, by writing adulatory poems in their honour, by praising third and fourth rate poetasters, who recompensed him in kind. Although himself a

Protestant, he worked and wrote for one Count Hannibal von Dohna, a cruel persecutor of the Protestants; but then Count Dohna helped him to get (1628) from the emperor a patent of nobility, and Ferdinand II. had with his imperial hand previously (1625) crowned him with the laurel crown of the poet—recognitions of his talent that Opitz valued above all things. He was summoned (1622) by Bethlen Gabor, Prince of Transylvania, to fill the chair of Philosophy and Polite Literature at Weissenburg; but at the year's end was so homesick, so wearied of the rude, martial people, and so famished through lack of the kind words of his friends, that he returned to Germany. Then he curried favour successively with the Duke of Liegnitz (1624), Count von Dohna (1626), and King Ladislaus IV. of Poland (1634), who made him his secretary and historiographer of Poland. But fate was against him: in 1620 he had fled from Heidelberg to Holland to escape war and the plague; now in Danzig, where he was living, he caught the plague from a beggar, to whom he gave a coin in the street, and died 20th August 1639. The poems Opitz wrote are like his ordering of his life, calculated: they owe their origin to the understanding, have no imagination, and little feeling, and are cold, formal, pedantic. The fact is, Opitz, originally a schoolmaster, schoolmastered poetry into lifeless imitation of pseudo-classic models. Poetry must, he propounded, in his most original work, *Buch von der deutschen Poeterei* (1624; new ed. 1876), teach and instruct as well as please. Hence his favourite pieces are purely didactic—*Trostgedicht in Widerwärtigkeit des Kriegs*, *Zlatna oder von der Ruhe des Gemüths*, *Vielgut oder vom wahren Glück*, *Vesuvius*, and others—such as the 'good boy' writes who wishes to please a pedantic master. Yet Opitz is entitled to the credit of having championed the use of his mother-tongue as against Latin, and of having actually used it. He also insisted upon the difference between the classical prosody of feet and quantity and the modern prosody of accent and rhyme, emphasising the use of the last for German poetry, and recommending the Alexandrine form of verse as that best suited to the genius of his native tongue. His works include translations from classic authors (Sophocles and Seneca, whom he puts on exactly the same rank as dramatists), the Dutchmen Heinsius and Grotius (whom he sets up as models of style), and from the Bible. Through the men who swore by him—the so-called first Silesian school—Opitz reigned for nearly a century as a sort of posthumous literary dictator, a worthy rival of Gottsched.

Opium, one of the most valuable of medicines, is the dried juice of the unripe capsules of *Papaver somniferum*, a species of Poppy (q.v.), of which several varieties are cultivated, the most usual being the variety *album*. As a commercial article opium is of great importance, exceeding indeed that of any other drug in use. The opium poppy is cultivated not merely for its yield of opium, but also for its seed or oil and other properties, concerning which see POPPY.

Papaver somniferum requires for its profitable cultivation a rich and well-manured soil, which ought to be fine and loose when the seed is sown. Subsequent cultivation consists chiefly in thinning and weeding. Irrigation is practised. Mild moist weather, with night-dews, is deemed most favourable during the time of the collection of the opium. Very dry weather diminishes the flow of the juice, and much rain is injurious. In different countries, of course, different methods of production are adopted. The general nature of these methods can, however, be gathered from an outline of the course of procedure in India.

There the seed is sown in the beginning of November; it flowers in the end of January, or a little later; and in three or four weeks' time the capsules or poppy-heads are about the size of hens' eggs, and are ready for operating upon. The collectors each take a little instrument (fig. 1),



Fig. 1.

made of three or more small knives tied together, the blades appearing like the teeth of a comb; with these they wound each half-ripe poppy-head (fig. 2) as they make their way through the field. This is always done in the afternoon, and on the following morning the milky sap is scraped off with a scoop, and transferred to an earthen vessel. When this is full it is carried home and placed in a shallow open earthenware dish, and left for a time tilted on its side, so that any watery fluid may drain out; this watery fluid is very detrimental to the opium unless removed. The opium now requires daily attention, and has to be turned frequently, so that the air may dry it equally, until it acquires a tolerable consistency, three or four weeks being necessary; it is then packed in small earthen jars, and taken to the factories, where the contents of each jar are turned out and carefully weighed, tested, valued, and credited to the cultivator. The opium is then thrown into vast vats, which hold the accumulations of entire districts, and the mass being kneaded is again taken out and made into balls or cakes. After being fully dried these balls are packed in chests for the market.

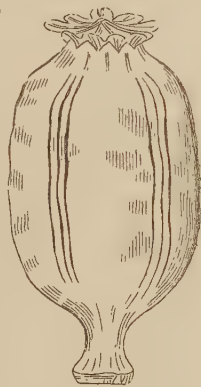


Fig. 2.

India ranks as one of the world's chief opium producers. The area of cultivation, which varies from year to year, is practically confined to the United Provinces, and to certain of the Indian states of Rājputāna and of Central India. In the United Provinces cultivation is only permitted under licence, and there is a government monopoly in manufacture, cultivators being obliged to sell their opium exclusively and at a fixed price to a government agent. There is a central factory at Ghazipur. That at Patna was closed in 1911. In the Indian states production was formerly quite unfettered, but a heavy duty was imposed on all opium exported into or through British territory. This duty has now been abolished, following an agreement by the Indian states to conform to British regulations relating to the production of opium. The opium produced in the United Provinces is known as Bengal opium, that in the Indian states as Malwa opium. Within India itself large quantities of the drug are consumed, but only medicinally, for except in Burma the smoking of opium is counted bad form. The great bulk of opium produced in India is exported, mostly from Bombay. China was for long the greatest market. In 1908, however, the British government offered on certain conditions to co-operate with China in her attempt, inaugurated by various edicts in 1906, to suppress the opium traffic. The export of Indian opium was to be diminished annually by one-tenth till export had completely ceased. In 1911 an acceleration of this

rate of cessation was agreed on, while in 1912-13 certain stringent anti-opium measures adopted in China led to an almost entire suspension of sales of Indian opium destined for the markets of China. In 1913-14 the export of opium from India to China altogether ceased, though an illicit trade of considerable dimensions arose. Export proper now takes place mainly to various countries in the Far East. To the governments of the Straits Settlements, the Dutch East Indies, and Hong-kong, opium is sold direct on public account, but on private account to Indo-China, Java, Siam, &c. At one time Indian opium was hardly ever seen in the West. During the Great War, however, India became the sole source almost for the Western supply of morphine and other drugs, with the result that a very large export trade in opium for medicinal purposes arose between India and Europe and America. But with the return to conditions of peace the trade was not fully maintained. Formerly opium provided one of the chief sources of Indian revenue, but with the discontinuance of the China trade returns under this head were greatly reduced.

Outside India, Turkey, Macedonia, Persia, and China are notable as opium producers. In Turkey about three-quarters of the opium prepared is produced in Anatolia. It is exported in large quantities by way of Smyrna, mostly for medicinal purposes. In Macedonia, where a very pure opium is produced, the industry centres principally at Štip and the surrounding districts of Kotchava, Strumica, Tikvish, and Veles. In Persia, where the trade is greatly increasing, opium is most largely produced in the districts of Isfahān, Shiraz, Yezd, and Khonsar, and to a less extent in those of Khorasan, Kermanshah, and Fars. It is of good quality, and exported chiefly from Bushire and Bandar-Abbas in the Persian Gulf. In China opium has always been largely produced. Even when the Indian trade was at its height the native production of opium was held to be quite as large as the whole amount of any foreign import. The total abolition of opium-growing within a period of ten years was part of the anti-opium policy adopted by the Chinese government in 1906. For several years considerable reductions were effected, but from 1912 onwards the growth of the opium poppy has again been very greatly extending.

In Europe (apart from Macedonia) opium has been produced in England, France, Italy, Switzerland, Greece, Bulgaria, Spain, Germany, Sweden; and in North America, in Virginia, Tennessee, California. Neither in Europe, however, nor in North America has production been on a large or remunerative scale. Attempts at cultivation have also been made in Australia and in Africa. The use of opium in Europe is mainly for medicinal purposes, and large quantities of it undergo further manufacture, in order to separate from it the active principles morphine, codeine, narcotine, &c. In Great Britain the chief manufacture of these salts of opium is carried on in Edinburgh.

Chemical Properties, &c.—All kinds of opium have a bitter, nauseous taste, and a peculiar narcotic, heavy odour. Chemically it is a gum-resin containing a very large number of alkaloids, meconic and other acids, and the ordinary constituents of a plant juice. Its exact composition varies greatly, but is somewhat as follows: *Alkaloids*—morphine (4-15 per cent.), narcotine (2.5-9 or more per cent.), thebaine, codeine, narceine, pavarine (of each from about $\frac{1}{2}$ to 4 per cent.), cryptopine, rheadine, laudanine, laudanosine, pseudomorphine, codamine, meconine, protopine, lanthopine, papaveramine, oxynarcotine, hydrocotarnine, gnoscopine, tritopine, and others, all in very small amount. They exist free or in combination with

meconic, lactic, sulphuric, and phosphoric acids. There is about 8 per cent. of saccharine matter, about 35 per cent. of gum, resin, fat, albumen, &c., various inorganic bases, and a variable amount of water. It may be adulterated with sugar, gum, or molasses, and sometimes contains nails, lead, or stones in the centre of the mass.

The chief and most easily applied chemical test for opium depends on the presence of meconic acid, which is an organic acid peculiar to it. A watery or alcoholic solution turns blood-red in colour on the addition of a solution of perchloride of iron, and this colour is discharged by a solution of protochloride of tin. Its smell and taste are also very characteristic. Turkey opium is generally considered the best, and in the British Pharmacopœia it alone was formerly directed to be used for making the official pharmaceutical preparations. Now, however, Persian opium is also widely employed, and the use of Indian opium is considerable. A method of assaying the amount of morphine in opium is given with great detail in the British Pharmacopœia.

Action and Medicinal Uses.—The action of opium depends on its alkaloids, and is chiefly determined by the morphine present in it. Ordinary medicinal doses ($\frac{1}{4}$ to 3 grains) depress the activity of the brain and cause deep sleep with contracted pupils, slow respiration, and insensibility to pain. On awakening there are usually disagreeable after-effects, such as loss of appetite, slight nausea, constipation, mental fatigue, and headache. When minute doses are taken there ensue symptoms of excitement and stimulation, as shown by increased mental and bodily activity, restlessness and sleeplessness. The imagination is more active, and mental work can be accomplished with greater ease and celerity. It is disputed whether these effects are due to actual stimulation of the brain, or whether the higher centres are blunted, and thus allow the imaginative faculties to have fuller play. Most probably the latter is the case. Self-consciousness and self-criticism are lulled, the judgment is less controlled by the higher centres and by impressions from without, and left to itself part of the brain lapses into uncontrolled activity. It is for these reasons that opium is habitually used by some brain-workers. Individual susceptibility and race influence its effects very largely. The Teutonic races and phlegmatic people in general tend to sleep after it, while Easterns and persons of highly nervous temperament tend to become excited. Man, owing to the greater development of his brain, is somewhat differently affected from the lower animals. Frogs, after a primary stage of narcosis, pass into a condition of exquisite tetanic spasm from stimulation of the spinal cord, and the lower mammalia exhibit the same condition to a lesser degree. In adult man tetanic convulsions are rarely seen, and only occasionally after enormous doses; but in children convulsions are not infrequent, the explanation given being that in them the spinal cord is relatively largely developed in proportion to the brain. Opium diminishes all the secretions except the sweat, and thus causes constipation. It does not materially affect the heart or circulation in medicinal doses.

When opium is used habitually a tolerance for it becomes established, and enormous doses may be taken without any special effects. In medicine it is used chiefly to procure sleep and relieve pain. For these purposes it has no equal. It is also employed to arrest secretions, to allay irritation, and in diarrhoea. In diabetes, heart disease, hæmoptysis, and many other conditions it is given with great advantage. Probably no remedy has such wide and universal applications.

It must be given with great caution to young

children, but many other factors, such as pain, habit, idiosyncrasy, and various diseases influence its action and dosage.

Poisoning.—About half the deaths from poison which occur in the United Kingdom are due to opium or its preparations. When the effects of a large dose become fully developed the person lies in deep coma and in a state of complete insensibility. Respiration is slow, noisy, and stertorous, the pupil is contracted to a 'pin-point,' and insensible to light, the pulse is rapid and weak, or sometimes full and slow, the face and skin generally are pale and livid, and covered with cold perspiration. Constant stimulation may rouse the patient partially, but he always tends to relapse into stupor. Death is due to paralysis of the respiratory centres in the brain, but may be due to apoplexy or collapse. Such are the usual symptoms, but many cases present peculiar features, such as convulsions, vomiting, diarrhoea, delirium, dilated pupils, and other anomalous symptoms. The *post-mortem* appearances are not characteristic, but the cerebral blood-vessels are usually very full, and there may be effusion of serum into the ventricles. The smallest fatal dose recorded for an adult is four grains, but enormous quantities are often taken without serious symptoms. In infants very minute doses ($\frac{1}{8}$ to $\frac{1}{4}$ grain) may prove fatal. Death may occur in about two hours or even less; few cases are prolonged beyond twenty-four hours.

The treatment consists in making the patient vomit, and in washing out the stomach with large quantities of water. Owing to the state of insensibility emetics sometimes fail to act. Atropine is often given subcutaneously, while coffee or tea or caffeine may be also freely given. The patient may be further aroused by keeping him moving; about supported by attendants, by cold cloths applied to the chest, and by electric stimulation. Any violence or measures which tend to exhaust the patient should be carefully avoided.

Opium-eating.—The habitual consumption of opium or any of its preparations by persons otherwise in good health is known as opium-eating, the opium habit, morphine habit, or morphinism. Opium, laudanum, chlorodyne, black drop, nepenthe, morphine, and other forms are all used. They are most commonly taken by the mouth, the subcutaneous injection of Morphine (q.v.) being almost entirely confined to the more cultured and educated classes. Its habitual use is usually begun to relieve pain or sleeplessness, and one month's constant use is said to be sufficient in many cases to confirm the habit. The amount consumed by different individuals varies greatly. Of morphine most habitués take about three grains daily, some five or six grains, while a few go much higher. De Quincey says that at one time of his life he consumed 8000 drops of laudanum daily, but his ration was very excessive. The immediate effects are a feeling of stimulation and well-being, but as soon as these have passed off there ensues a state of despondency, to banish which a fresh dose is taken. It is a craving brought on by indulgence, and is to be ranked with such habits as drinking, smoking, gambling, &c. Many persons indulge this craving during their whole life, and do their daily work well. Such persons do not, however, go to any great excess, although they may have the craving as markedly as others who suffer intensely from well-developed symptoms of chronic opium poisoning. The typical opium-eater is lean and pale, with dull, glazy eyes; he suffers from chronic dyspepsia, from nervous irritability, and disturbances of the circulation. Albuminuria, glycosuria, and various other disorders are sometimes present. Sudden deprivation causes severe nervous disturbances and not seldom alarming collapse. For successful treat-

ment of the opium craving the patient had better be removed from his own home and friends to some institution where he can be under strict and constant medical supervision. There is a difference of opinion as to whether the opium should be abruptly or gradually withdrawn. Recovery is generally complete in a few weeks, but relapses into the habit are exceedingly apt to occur.

Opium-smoking.—The smoking of opium as a stimulant-narcotic is practised chiefly in China and the Far East. In China opium-smoking began in the 17th century. The habit, however, developed very rapidly, and soon became a national evil. Historically, many attempts have been made to stop the practice, but always without success. Fines, penalties, and even death, have all proved equally ineffective. A determined attempt at suppression was made in 1906, when opium-smokers were registered and their supplies limited, and restrictions were placed on opium cultivation and import. The early success of these measures, however, proved to be only temporary, and opium-smoking as a habit would appear to be increasing rather than decreasing.

Opium prepared for smoking is called *chandu*, which is simply a watery extract, about twice the strength of the original drug. A special form of pipe is used, and a piece of prepared opium about the size of a pea is placed, by means of a small flattened iron pen, into a small cup at one end; this is ignited and the smoke inhaled, and then slowly exhaled through the nostrils. As a result, Easterns experience mental and physical excitement, followed by a pleasant sense of well-being and content, and then by narcosis. Europeans, as a rule, are not affected by it to any appreciable extent. In the pipe the opium is destructively distilled, and chiefly the products of destructive distillation come over in the smoke—pyridine, collidine, and similar bases. There is probably scarcely a trace of morphine. The flavour of the smoke is mild and aromatic. There is great difference of opinion regarding the hurtfulness of the habit. Some authorities hold that in moderation it is not more hurtful than tobacco, while missionaries and others maintain that the habit is fraught with moral, social, and individual degradation. This seems to depend largely on the extent to which it is carried, and the question is probably on all-fours with that of alcohol. Many Chinese smoke opium all their lives in strict moderation without apparent harm, while others have excessive debauches lasting a week or more, and often become confirmed in its excessive use. The latter without doubt wreck their constitutions, and suffer in much the same way as confirmed alcoholics do.

In Japan the importation and transportation of opium were forbidden in 1858, its use, sale, and distribution after 1868, in consequence of which, and other regulations, the opium evil ceased to exist; and in her possessions, notably in Formosa, Japanese policy, carried out with success, has been totally to prohibit opium-smoking except in the case of existing addicts, the ultimate aim being complete suppression. In the Philippine Islands, where the habit of opium-smoking rapidly extended from the Chinese to the Filipinos, the reformatory policy of the United States has been modelled on that of Japan in Formosa.

From time to time the opium evil has been the subject of international action. At the instigation of the United States of America an international commission met in 1909 at Shanghai. This was followed by the Opium Convention of 1912, and the preparation of a special protocol, to be signed by the Third International Conference at The Hague in 1914. The intervention of the Great War, however, prevented further action till the inclusion in the

Treaty of Versailles of certain provisions restricting the trade in opium. The enforcing of these provisions is in the hands of the League of Nations (q.v.); speaking generally, the limitation of the world-production of opium to an amount equal to the world's medical and scientific needs is aimed at. The solution of the opium problem has always been complicated by various economic and other considerations, especially by the unwillingness of governments to sacrifice their opium revenues.

See the articles LAUDANUM, MORPHINE, POISONS; the reports of various commissions, especially that of the Opium Convention (1912), the relevant publications of the League of Nations; and Gavit, *Opium* (1925). For the Opium Wars, see CHINA.

Opodeldoc is a popular synonym for soap *liniment* (q.v.). The origin of the term, which was apparently applied by Paracelsus to various forms of liniments or local applications, is not known. The *opo* is the same as the *opo* of *opopanax*, *opobalsamum*, &c., and is doubtless derived from the Greek *opos*, 'juice.' See *Notes and Queries*, October 1888, p. 316.

Opo'panax, a gum-resin obtained in Persia, which comes to Europe at rare intervals. It has an unpleasant odour resembling bruised ivy leaves. Holmes suggests that it may be the produce of some Araliaceous plant, but nothing is known of its botanical origin. The ancient physicians attached great importance to it as an antispasmodic medicine; Hippocrates, Theophrastus, and Dioscorides have each left descriptions of it. The plant (*Opopanax Chironium*), from which it was supposed to be obtained, grows generally throughout southern Europe. The perfume known as opopanax is not derived from this gum-resin. There is a commercial opopanax, a kind of perfumed myrrh, obtained from a Commiphora, largely imported into Germany, where an essential oil is distilled from it.

Oporto (Port. *O porto*, 'the port'), the second city of Portugal, stands on the steep, rocky, right bank of the Douro, high above its waters, which reach the sea 3 miles to the west. 'The houses, as they rise confusedly from the river's edge, some painted in strong reds, blues, or greens, some left whitewashed, and the majority retaining the granite gray of the stone they are built with, make up a very strange and beautiful panorama, ringed as the city is by the encircling pine-covered mountains' (Oswald Crawford); and many of these houses stand embowered in the greenery of gardens. One of the crags overlooking the river is crowned with a Crystal Palace (1865), surrounded by gardens. Many of the former monasteries are still standing, though put to other uses: one is a citadel, another the Exchange, with splendid marquetry of wood in floor and walls, a third barracks, and so on. There are seven principal churches, including the cathedral (built by Henry the Navigator), the old Gothic church of Cedofeita (originally founded in 559), and the Church dos Clerigos, with a tower 213 feet high. The English factory (1785), the bishop's palace, and the hospital of St Antony are the most noticeable amongst the secular buildings. Oporto possesses a polytechnic academy, with observatory, scientific collections, &c., a medical school, a fine art academy, a commercial museum, an industrial institution, a library and picture-galleries. On the south side of the river, immediately opposite Oporto, and connected with it by a lofty bridge, is the suburb of Villa Nova de Gaia, with extensive wine-cellars. The railway to Lisbon (209 miles) crosses the river a little higher up, on a very fine steel arch bridge; the arch spans a horizontal distance of 549 feet, and its centre is 203 feet above the river. Pop. (1878)

105,838; (1900) 172,421; (1911) 194,009; (1920) 203,981, who are chiefly engaged in the manufacture of cloth and silks, hats, porcelain, ribbons, tobacco, soap, and candles, in metal-casting, tanning, brewing, distilling, cork-cutting, sugar-refining, and brick-making, and in commerce and shipping. Oporto is the principal place of export for Port Wine (q.v., and see also PORTUGAL). The remaining exports of moment are cattle, oranges and other fruits, cork, copper, onions, meat, hides, and wool. The imports consist chiefly of corn and flour, cod-fish, metals, machinery, textiles, rice, raw sugar, coal, and timber. Leixões, its seaport, is 3 miles N. of the Douro's mouth.

Originally the *Portus Cale* of the Romans (whence Portugal), this city was the stronghold of the Christians in the north-west of the Iberian peninsula against the attacks of the Moors, and more than once changed hands between the 8th and the 12th century. The people are noted for their sturdy patriotism and liberal sentiments; in 1808 they were especially hostile to the French; they stoutly opposed the usurper Miguel (1828), who in revenge executed great numbers of them, but without breaking their spirit, for they supported Pedro of Brazil, and withstood the besieging troops of Miguel thirteen months (1832-33). Oporto was the scene of frequent riots in the republican movement that culminated in 1910. See C. Sellers, *Oporto Old and New* (1900).

Opossum (*Didelphys*), a genus of Marsupialia, having ten incisors in the upper jaw, and eight in the lower, one canine tooth on each side in each jaw, three compressed premolars, and four sharply-tuberculated molars on each side—fifty teeth in all; the tail generally very long, prehensile, and



Virginian Opossum (*Didelphys virginiana*).

in part scaly; the feet plantigrade; five toes on each foot, their claws long and sharp; but the inner toe of the hind foot converted into a thumb, destitute of a claw, and opposable to the other digits. The pouch, so characteristic of marsupials, is generally absent, sometimes rudimentary, rarely complete. The unwebbed feet and non-aquatic habits distinguish this genus from Cheironectes (see YAPOCK), also belonging to the family Didelphidae. The name opossum has also been applied to certain Australian forms. Except *Cænolestes*, the Didelphidae are the only marsupials found in America. They range from the United States to Argentina. There are numerous species, sometimes assigned to several genera, with a considerable range in size, varying from that of a large cat to that of a mouse. The best known is the Virginian Opossum (*D. virginiana*). Among the marsupials they are nearest allied to the Dasyuridae, from which they are doubtfully separable; if it were not for their geographical range, they would undoubtedly be placed in the same family. Although there are

now no opossums found anywhere but in America, they existed formerly in Europe, as is shown by their fossil remains. The opossums are all carnivorous, one species, the Crab-eating Opossum, feeding—as its name denotes—upon crabs; in order to capture its prey it frequents marshy places. It is a native of tropical America. Merian's Opossum (*D. dorsigerus*) is remarkable for the fact that it carries its young on its back, their tails being twined round the tail of the mother; many other species carry the young on the back; this is due in many cases to the fact already mentioned—that there is no pouch. The Virginian Opossum is a foe to poultry-yards in the United States; but it can put up with frogs if there is nothing better to be had. The opossums, like other marsupials, have a lowly organised brain; but they are remarkably cunning in robbing poultry-yards; on the other hand, their stupidity in walking straight into the simplest and most obvious trap is more in accord with their brain structure. Hunting the opossum with dogs by night is a favourite sport in the southern states, especially in autumn, when the body has a thick layer of fat all over. The animal takes refuge in a tree, and is either shaken down or shot as it hangs by the tail. The expression 'playing possum' refers to the opossum's habit of feigning death when caught. At such times, though usually very timid, it will endure almost any amount of torture, and give no sign of its suffering. See PHALANGER.

Oppeln, or **OPPOLIE**, a town in Upper Silesia (Prussia), on the Oder, 51 miles SE. of Breslau. Since 1816, when it was erected into a seat of government for Upper Silesia, the town has been much beautified both with new edifices and with parks and gardens. Its church of St Adalbert was founded in 995; and there is an old castle on an island in the Oder. The manufactures include chemicals, pottery, cigars, cement, beer, leather, &c., and there is a considerable trade in grain and cattle. Pop. (1875) 12,498; (1885) 15,975; (1919) 35,483.

Oppenheim, a town of Hesse, on the left bank of the Rhine, 20 miles SSE. of Mainz by rail, with fine vineyards. On the site of the Roman castle of Bauconica, Oppenheim became a free city of the empire, and was repeatedly besieged, especially in the Thirty Years' War. Pop. 4000.

Oppert, **JULIUS** (1825–1905), orientalist, was born at Hamburg, and studied at Heidelberg and Bonn. In 1847 he settled in France as a teacher of German, and remained there till his death. In 1852 he joined Fresnel's archaeological expedition to Mesopotamia. He became professor of Sanskrit in 1857, and of Assyrian philology and archæology in 1869. Oppert was a voluminous writer, producing many works on Assyrian mythology and jurisprudence, and other subjects connected with the ancient civilisations of the East.

Oppolie. See **OPPELN**.

Opportunists, in French politics, are those who, like Gambetta, Ferry, and others like-minded, oppose doctrinaire as well as extreme views, accommodate themselves in great measure to the circumstances of the hour, and aim only at what can obviously be carried through.

Opsonins, a bacteriological term denoting constituents of the blood serum (see **BLOOD**), which act upon bacteria, and make them more susceptible to the destructive action of the phagocytes. By comparing the number of bacteria ingested by the phagocytes in different conditions, what is called the opsonic index is obtained.

Optical Illusion. An object appears large or small, near or distant, according as the rays

from its opposite borders meeting at the eye form a large or a small angle: when the angle is large, the object is either large or near; when small, the object must be small or distant. Experience alone enables us to decide whether an object of large apparent size is so on account of its real size, or of its proximity; and our decision is arrived at by a comparison of the object *in position* with other common objects, such as trees, houses, &c., which may chance to be near it, and of which we have by experience come to form a correct idea. The same is, of course, true of apparently small objects. But when all means for comparison are removed our judgment is at fault. Similarly, we erroneously infer spherical solids at a distance to be flat discs; and, by reason of Irradiation (q.v.) in the eye, the sun appears larger than he would if illumined by a fainter light, and a man in a white habit seems larger than he would if he wore a dark dress. Illusions are also produced by external causes; and instances of this sort are given under **MIRAGE**, **REFLECTION**, and **REFRACTION**.

The persistence of impressions on the retina for about one-sixth of a second after the object which produced the impression has been removed produces another class of illusions. Common examples of this are the illuminated circle formed by the rapid revolution of an ignited carbon point, piece of red-hot iron, or other luminous body, and the fiery curve produced by a red-hot shot projected from a cannon.

Another form of illusion is produced to a person who is seated in a vehicle in motion; and it is very deceptive when the motion is so equable as not to be felt by the person himself. The illusion is most complete when the attention is riveted on an object several yards off; this object then appears to be a centre round which all the other objects revolve, those between the observer and the object moving backwards, and those beyond the object moving forwards. This illusion occurs on a large scale in the apparent motion of the heavenly bodies. Other illusions arise from a disordered state of the organs of vision: e.g. the seeing of things double or movable, or of a colour different from the true one (see **COLOUR-BLINDNESS**); the appearance as of insects crawling over a body at which the eye is directed, &c.

Optic Nerve. See **EYE**.

Optics is the science of the phenomena of light. This science is usually treated under two heads: (1) Physical Optics, which treats of the nature of Light (q.v., as also **MAGNETISM** and **UNDULATORY THEORY**), and explains the phenomena of Colour, Reflection, Refraction, Interference and its consequences, such as the colours of thin plates and films, Diffraction, Dispersion, the Spectrum, Polarisation and the properties of polarised light, for which see separate articles; and (2) Geometrical or Mathematical Optics. The leading idea in physical optics is to trace the progress of an alternating or oscillatory disturbance in the Ether (q.v.); this disturbance, which may be termed a wave, has an advancing wave-front; the direction along which this wave-front advances through a given point is a geometrical conception, which, so long as the disturbance travels in homogeneous media, it is convenient to use in diagrams, more convenient than it would be to draw a series of successive wave-fronts; this direction of propagation through any given point is called a ray; and geometrical optics traces, by mathematical reasoning, the course of a given set of 'rays' under specified conditions, particularly under those which have reference to Reflection and Refraction (q.v.). The part of geometrical optics which deals with reflection of light is often called **Catoptrics** (based

on such laws as that the angle of reflection is equal to the angle of incidence); that which deals with refraction is called Dioptrics. For these see the articles REFLECTION and REFRACTION respectively.

Though the Greeks and their disciples the Arabs had made some progress in mathematical optics, their knowledge was confined to the law of reflection and its more immediate consequences. Euclid, Aristotle, Archimedes, Hero, and Ptolemy were acquainted with the fact that light is transmitted in straight lines; but, with the important exception of Aristotle and some of his followers, the ancient philosophers believed that rays proceeded from the eye to the object, instead of in the contrary direction. Ptolemy was well acquainted with atmospheric refraction. Alhacen (1070) and Vitellio the Pole (1260) were almost the only cultivators of this science during the middle ages, and their additions to it were unimportant. The lens, though known from early antiquity, was not applied as an aid to defective eyesight till after the time of Roger Bacon. Jansen, Metius, and Galileo separately invented the telescope about the beginning of the 17th century; and the last-mentioned philosopher by its means made various important astronomical discoveries. Kepler, a short time after, gave the true theory of the telescope, explained the method of finding the focal length of lenses, and applied it to find the magnifying power of the telescope, besides pointing out the mode of constructing an instrument better adapted for astronomical purposes than that of Galileo; he also made some useful experiments on the nature of colours, and showed that images formed on the retina of the eye are inverted, a fact previously discovered by Maurolycus of Messina. From this period the science of optics steadily advanced, and its treasury of facts received numerous additions through the labours of De Dominis, Snell (the discoverer of the law of refraction in 1621), Descartes, Fermat, Barrow, Mariotte, and Boyle. Up to the time of Newton it was generally believed that colour was produced by refraction, but that philosopher showed by a beautiful series of experiments that refraction only separates the colours already existing in white light. There is, however, as is now known, no proper sense in which it can be said that the various colours pre-exist in white light, which is due to extremely irregular disturbances, analysed by the prism into rhythmical components of all frequencies, and therefore capable of producing a continuous Spectrum (q.v.) on the screen. In Newton's hands the theory and construction of the telescope underwent many valuable improvements, and in 1672 the description of his reflecting telescope was submitted to the Royal Society. Gregory had constructed an instrument on similar principles some years before. About the same time Grimaldi made his interesting series of experiments on the effects of diffraction, and noticed the remarkable fact of the interference of one pencil of light with the action of another. The theory of the rainbow, with an elegant analysis of the colours of thin plates, and the hypothesis concerning the nature and propagation of light, now known as the 'corpuscular' theory (see LIGHT), completed Newton's contributions to the science. The important services of the ingenious but eccentric Hooke cannot be easily stated in a brief abstract, as he discovered a little of everything, completed nothing, and occupied himself to a large extent in combating faulty points in the theories of his contemporaries. It must not, however, be forgotten that he has as much right as Huygens to the credit of originating the undulatory theory. The double refraction of Iceland spar was discovered (1669) by Bartholin, and fully explained in 1690 by Huygens, the propounder of the undulatory theory, who also

aided the progress of mathematical optics to a considerable extent. The velocity of light was discovered by Römer (1675), and in 1720 the aberration of the fixed stars and its cause were made known by Bradley, who likewise determined with accuracy the amount of atmospheric refraction. Bouguer, Porterfield, Euler, and Lambert rendered essential service to physical optics; the same was done for the mathematical theory by Dollond (the inventor of the achromatic telescope), Clairaut, D'Alembert, Boscovich, &c.; while in later times the experiments of Delaval on the colours produced by reflection and refraction; the discussion of the phenomena arising from unusual reflection or refraction carried on by Vince, Wollaston, Biot, Monge, and others; the discovery of polarisation of light by Malus (1808), and its investigation by Brewster, Biot, and Seebeck; of depolarisation by Arago (1811), and of the optical properties as connected with the axes of crystals (1818) by Brewster; and the explanation of these and other optical phenomena in accordance with the undulatory hypothesis by Young—the discoverer of the *Interference* (q.v.) of rays—and Fresnel, went far to give optics a width of scope and a symmetry which are possessed by few other sciences. The development of the undulatory theory and of optical science generally has been carried on to the nineteenth and twentieth centuries by Lloyd, Airy, Cauchy, Clerk-Maxwell, Hertz, Rayleigh, and others.

See Preston's *Theory of Light* (4th ed. 1912); Schuster's *Theory of Optics* (1904); R. W. Wood's *Physical Optics* (2d ed. 1911); Southall's *Geometrical Optics* (1911); Drude's *Theory of Optics* (1902); Curry's *Electromagnetic Theory of Light* (pt. i. 1905); the articles LENSES, MICROSCOPE, TELESCOPE, PHOTOGRAPHY, &c., and the works mentioned there and under LIGHT.

Optimism (Lat. *optimus*, 'best'), the doctrine that the existing order of things, whatever may be its seeming imperfections of detail, is nevertheless, as a whole, the most perfect or the best which could have been created, or of which it is possible to conceive. Some of the advocates of optimism content themselves with maintaining the absolute position, that, although God was not by any means bound to create the most perfect order of things, yet the existing order is *de facto* the best; others contend that the perfection and wisdom of Almighty God necessarily require that his creation should be the most perfect which it is possible to conceive. The philosophical discussions of which this controversy is the development are as old as philosophy itself, and are dealt with in the article on the origin of Evil (q.v.). But the full development of the optimistic theory as a philosophical system was reserved for Leibniz (q.v.), in his *Théodicée*, the main thesis of which is that, among all the systems which presented themselves to the infinite intelligence of God as possible, God selected and created in the existing universe the best and most perfect, physically as well as morally, regard being had to the universe as a whole. The *Théodicée* was designed to meet the sceptical theories of Bayle, and its theories were ridiculed in Voltaire's *Candide*. Modern discussion on this question usually assumes the form of assertion or denial of the opposite doctrine of Pessimism (q.v.).

Optophone, an instrument invented in 1914 by Dr Fournier d'Albe, enabling the blind to read ordinary printed matter. It depends on the fact that the electric conductivity of selenium is greater in light than in darkness. By directing a number of rays upon different points of the paper, and interrupting each in the manner of a siren, different sounds can be got by means of a telephone-receiver, according to the pattern of black and white given by the letter on which the rays fall.

Opuntia. See PRICKLY PEAR.

Opus Operatum (Lat., literally 'the work wrought') is the phrase employed in the Catholic theological schools to describe the manner of operation of the sacramental rites in the production of grace. It is intended to imply that the ministration of the rite (*opus*) is in itself, through the institution of Christ, an efficient cause of grace, and that, although its operation is not infallible, but requires and presupposes certain dispositions on the part of the recipient, yet these dispositions are but *conditiones sine qua non*, and do not of themselves produce the grace. Hence, when the sacraments are administered to dying persons in a state of apparent insensibility, this is done in the hope and on the presumption that the dying person may, though seemingly unconscious, be nevertheless really disposed to receive the sacrament; but it is by no means held that if these dispositions be wanting the sacrament will itself justify him.—The phrase *Opus Operantis* is frequently used as denoting that the effect of a particular ministration or rite is primarily and directly due, not to the rite itself (*opus*), but to the dispositions of the recipient (*operans*). Thus, in the act of kissing or praying before a crucifix, of sprinkling one's self with holy water, of telling the prayers of the rosary upon blessed beads, the fervour and personal piety of the supplicant, and not the material object of the religious use, is held to be the efficient cause of the grace which is thereby imparted.

Orache (*Atriplex*), a genus of plants of the natural order Chenopodiaceæ, having male and female flowers on the same plant. The species are numerous and widely spread over the maritime or saline parts of the earth, scarcely any species except the Common Orache (*A. patula*) being ever found inland or away from saline influence. Five species, including the Garden Orache (*A. hortensis*), are natives of Britain. Although formerly much cultivated in Britain, orache is now displaced as a pot-herb by spinach (*Spinacia oleracea*), a species of a closely allied genus. All the species have similar qualities, and may be used as spinach.

Oracle, the response delivered by a deity or supernatural being to a worshipper or inquirer; also the place where the response was delivered. These responses were supposed to be given by a certain divine afflatus, either through means of mankind, as in the oracles of the Pythia and the dreams of the worshipper in the temples; or by its effect on certain objects, as the tinkling of the caldrons at Dodona, the rustling of the sacred laurel, the murmuring of the streams; or by the actions of sacred animals, as exemplified in the Apis or sacred bull of Memphis, and the feeding of holy chickens among the Romans. Such responses were, however, closely allied to augury, which differed in this respect, that auguries could be taken anywhere, while the oracular spots were defined and limited. Oracle dates from the highest antiquity, and gradually declines with the decline of Animism (q.v.) and with the increasing knowledge of mankind. Among the Egyptians all the temples were probably oracular. In the hieroglyphic texts the gods speak constantly in an oracular manner, and their consultation by the Pharaohs is occasionally mentioned. In later days the most renowned of these oracles was that of Ammon in the Oasis, where oracular responses were rendered either by the shaking of the statue of the god or by his appearance in a certain manner. Oracles were also used by the Hebrews, as in the consultation of the Urim and Thummim by the high-priest, and the unlawful use of Teraphims, and consultations of the gods of Phœnicia and Samaria. The Hebrew oracles were by word of mouth, as the speech of God to Moses, dreams, visions, and prophetic denunciations;

besides which there were oracles in Phœnicia, as that of Beelzebub and others of the Baalim. They were also in use throughout Babylonia and Chaldæa, where the responses were delivered by dreams given to the priestesses, who slept alone in the temples as concubines of the gods. The most renowned of all Greek oracles was the Delphic oracle (see DELPHI), which was Panhellenic or open to all Greece. Sacrifices were offered by the inquirers, who walked with laurel crowns on their heads, and delivered in questions inscribed on leaden tablets (of which many have been recently discovered); the response was deemed infallible, and was usually dictated by justice, sound sense, and reason. Other oracles of Apollo were at Abæ in Phocis; at Ptoon, which was destroyed in the days of Alexander the Great; at Ismenus, south of Thebes; and in Delos. In Asia Minor the most reputed were those of Branchidæ, close to Miletus, celebrated in Egypt, and of Gryneum. Besides that of Dodona, Zeus had another at Olympia; and those of various other deities existed elsewhere. A secondary class of oracles of heroic or prophetic persons existed in Greece, the two most celebrated of which were those of Amphiaraus and Trophonius. The first mentioned was one of the five great oracles in the days of Croesus, and was situate at Oropus in Attica. Those who consulted it fasted a whole day, abstained from wine, sacrificed a ram to Amphiaraus, and slept on the skin in the temple, where their destiny was revealed by dreams. That of Trophonius was at Lebadea in Boeotia, and owed its origin to a deified seer. It was given in a cave, into which the votary descended, bathed and anointed, holding a honeyed cake. There were some other oracles of minor importance. Besides these oracles, written ones existed of the prophecies of celebrated seers, as Bacis and Mæseus, which were collected by the Pisistratidæ, and kept in the Acropolis of Athens. Others of the Sibyls (q.v.) or prophetic women were popular, and at a later period Athenais and others prophesied in the days of the Seleucidæ. Amongst the oriental nations, as the Arabs and others, divination was and is extensively practised, but there are no set oracles. The Celtic Druids are said to have delivered responses, and the oracle of the Celtic god Belenus or Abelio was celebrated.

See Herodotus, *Hist.* v. 89, viii. 82; Curtius, iv. 7; Hare, *Ancient Greeks* (1836); Bos, *Antiquities of Greece* (1823, p. 31); F. W. H. Myers, *Essays: Classical* (1883); Stengel, *Griechische Sakralaltertümer* (§§ 44-50, 1890); Schömann's work on *Greek Antiquities* (*Religious Antiquities*, French trans. by Galuski, 1887); Bouché-Leclercq, *Histoire de la Divination*; Halliday, *Greek Divination* (1913); Dempsey, *The Delphic Oracle* (1918).

Oradia Mare, Rumanian name of Grosswardein (q.v.).

Oran (Arab. *Waran*), a seaport of Algeria, stands on the Gulf of Oran, 130 miles by sea S. of Cartagena in Spain. It climbs up the foot of a hill, is defended by detached forts, and possesses a Roman Catholic cathedral (1839), a grand mosque, a large military hospital, a college, a seminary, and two citadels or castles. Oran is a naval station. The outer harbour, east of the old one, was begun in 1905; alfa and cereals are the chief exports. Pop. 141,000 (124,000 Europeans). Oran was built by the Moors. During the second half of the 15th century it was a highly-prosperous commercial town, and was celebrated for its cloth and arms and fine public buildings. But it was taken by the Spaniards in 1509 and made a penal settlement. It was captured by the Turks in 1708, but retaken by the Spaniards in 1732. In 1790 it was destroyed by an earthquake, and shortly after was altogether abandoned by the Spaniards, the Turks

occupying it again in 1792. The French took possession in 1831, and, mostly rebuilt by them, the town has a thoroughly French appearance.—The department of Oran has an area of 23,000 sq. m., and a pop. of 1,300,000 (353,000 Europeans).

Orang, or ORANG-UTAN (*Simia satyrus*), an anthropoid ape, found only in the forests of Sumatra and Borneo. There is only one species, though it has been said that a smaller variety (*S. morio*) occurs in Borneo. The orang is distinguished from other anthropoid apes by its reddish-brown colour; and it has been noticed that the colour corresponds to that of its human neighbours, just as the black colour of the chimpanzee and gorilla answers to



Orang-utan (*Simia satyrus*).

that of the African tribes inhabiting the same country. The Malays never use their words *Orang utan* ('man of the woods') for any ape, but for an uncultured tribe of Malays living in the woods.

Like other anthropoids the orang is arboreal in habit, and can move with considerable swiftness through a forest, passing from tree to tree; on the ground it is awkward. It has a curious habit of building among the branches a temporary hut or nest as it is usually called. The orang was formerly regarded as capable of all manner of iniquities, such as carrying off women and children, and throttling people with its hind-foot as they passed under the trees. When these beliefs were proved to be false they were transferred to the chimpanzee, and particularly to the gorilla. They were mainly dispelled by Wallace, who stated, however, of the orang that 'there is no animal in the jungle so strong as he;' but strength does not necessarily imply ferocity, and the orang seems to be a very tamable creature.

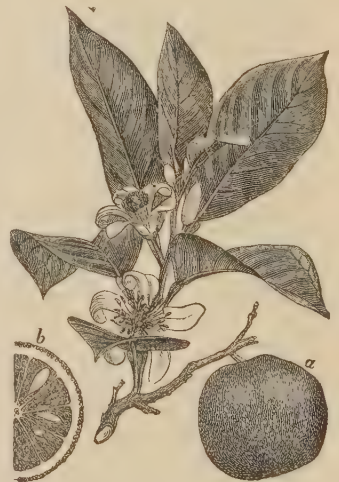
Hornaday, an American traveller, observed the orang in the act of making its nest. He thus describes the process: 'I got there just in time to see the orang build a large nest for himself. He took up a position in a fork which was well screened by the foliage, and began to break off small branches and pile them loosely in the crotch. There was no attempt at weaving, nor even regularity in anything. He reached out his long, hairy arm, snapped off the leafy branches with a practised hand, and laid them down with the broken ends sticking out. He presently got on the pile with his feet, and standing there to weight it down, he turned slowly, breaking branches all the while

and laying them across the pile in front of him until he had built quite a large nest. When he had finished he lay down upon it, and was so effectually screened from us that I could not dislodge him, and after two or three shots I told the natives that they would have to cut down the tree.' During one day's travel in Borneo thirty-six old nests and six fresh ones were seen; there appears to be nothing like house-building, which has been stated by some to exist among the orangs.

The structure of the orang shows its near relationship to the other anthropoids and to man. The curvature of the spine, which is an important character, appears, according to D. J. Cunningham, to be different from that of a full-grown man, but to correspond to that of a boy of six years old. The extension of the cerebral hemispheres in the brain backwards over the cerebellum is about equal to what is found in the chimpanzee; naturally this is considerably less than in man, but greater than in the new-born child. The orang comes nearest among the anthropoids to man in certain other characters, e.g. the form of the ear; but, as the gorilla and chimpanzee also show a nearer approximation in various other points, it would not be safe to call the orang the most man-like of apes. See ANTHROPOID APES.

Orange (Arabic *nāranj*, from Sanskrit *na-grungo*), the name of one or more species of *Citrus* (q.v.), of which the fruit is much prized. Botanists generally regard all the oranges as of one species, *Citrus Aurantium*, but some make the Sweet Orange, the Bitter Orange, the Bergamot Orange, &c., distinct species. The wild state of the orange is not certainly known, although its characters may be pretty confidently inferred from the degeneration of cultivated varieties; and no cultivated plant shows a greater liability to degenerate, so that seedling oranges are almost always worthless. From a remote antiquity it has been cultivated in India; and thence it seems to have spread into western Asia and Europe. It has been alleged that the orange is a native of North America, near the Gulf of Mexico; but the probability rather seems to be that it has been introduced, and has become naturalised.

The Common Orange, or Sweet Orange (*Citrus Aurantium*), is an evergreen tree of moderate size, with greenish-brown bark; the leaves oblong, acute, sometimes minutely serrated, the leaf-stalks more or less winged, the flowers white, the fruit roundish, the oil-cysts of the rind convex, the juice sweet and acid. It is cultivated in almost every part of the world of which the climate is warm



Sweet Orange (*Citrus Aurantium*),
Branch in Flower;
a, fruit; b, transverse section of same.
(Bently and Trimen.)

enough, but succeeds best in the warmer temperate or subtropical climates, as in the south of Europe, where it is very extensively cultivated as far north as the south of France. The orange

does not seem to have been cultivated by the Greeks or Romans, but was probably brought to Europe by the Moors, and is supposed to have been introduced into Italy so recently as the 14th century, fully 1000 years after the citron. In the north of Italy oranges are sometimes grown in conservatories, but often in the open air, except during winter, when they are covered with temporary houses of boards. In the south of England they are sometimes in like manner grown in the open air, with a shelter of boards or matting in winter, but trained against a south wall; they attain a large size, and yield good fruit. The abundant importation of the fruit, however, renders the cultivation of the orange in Britain unnecessary; and, in general, only small plants are to be seen in green-houses or conservatories, as mere objects of interest.

There are many varieties in cultivation, which are perpetuated by grafting upon seedling orange stocks and by layers. Of the varieties of the Sweet Orange perhaps the most deserving of notice are the Portugal or Lisbon Orange, the most common of all, having the fruit generally round or nearly so, and a thick rind; the China Orange, said to have been brought by the Portuguese from China, and now much cultivated in the south of Europe, having a smooth thin rind and very abundant juice; the Maltese or Blood Orange, remarkable for the blood-red colour of its pulp; the Egg Orange, having fruit of an oval shape; the Mandarin Orange, or Clove Orange (*C. nobilis*), has fruit much broader than long, with a rind very loosely attached to the flesh, and small leaves; and the Tangerine Orange, apparently derived from the Mandarin. The St Michael's Orange is a sub-variety of the China Orange. The Jaffa Orange has now a great reputation. The Majorca Orange is seedless. The Kum-quat (*C. japonica*), from China and Japan, is little bigger than a gooseberry, and grows well in Australia.

The Bitter Orange, Seville Orange, or Bigarade (*C. Aurantium*, var. *amara*, otherwise *C. vulgaris*, or *C. bigaradia*), is distinguished from the sweet orange by the more truly elliptical leaves, the acid and bitter juice of the fruit, and the concave oil-cysts of its rind. Its branches are also spiny, which is rarely the case with the sweet orange. The varieties in cultivation are numerous. The bitter orange was extensively cultivated by the Moors in Spain, probably for medicinal purposes, as stomachic and tonic. Its chief use, however, is for flavouring puddings, cakes, &c., and for making marmalade. The Bergamot Orange (*C. Aurantium*, var. *Bergamia*) is noticed in a separate article.

Orange-leaves are feebly bitter, and contain a fragrant volatile oil, which is obtained by distilling them with water, and is known in the shops as *Essence de Petit Grain*. Orange-flowers yield, when distilled with water, a fragrant volatile oil, called *Oil of Neroli*, which is used in making *Eau de Cologne* and for other purposes of perfumery. The flowers both of the sweet orange and of the bitter orange yield it, but those of the bitter orange are preferred. Dried orange-flowers, to be distilled for this oil, are an article of export from the south of Europe. They are packed in barrels, and mixed with salt. The dried flowers have a yellowish colour; the fresh flowers are white and very fragrant. The use of them as an ornament in the head-dress of brides is common throughout great part of the world. The small green oranges, from the size of a pea to the size of a cherry, which fall from the trees, both of the sweet orange and the bitter orange, when the crop is too great to be brought to maturity, are carefully gathered and dried, and are the *Orange berries* of the shops. They are used in making Curaçoa, and yield a fragrant oil on distillation, the original *essence de petit grain*. The dried and candied rind of the

ripe bitter orange, well known as *Orange-peel*, is used as a stomachic, and very largely for flavouring puddings and articles of confectionery. The rind of the sweet orange is sometimes employed in the same way, but is inferior. A fragrant essential oil is obtained from the rind of the orange by distillation with water, and is sold by perfumers as *Oil of Sweet Orange*, or *Oil of Bitter Orange*, according as it is obtained from the one or the other, although the two kinds of oil are very similar. The rind of the orange is used in the preparation of a fine liqueur called *Orange Rosoglio*, which is an article of export from some parts of Italy. Besides the use of the sweet orange as a dessert fruit, and as a refrigerant in cases of sickness, its juice is extensively used as a refrigerant beverage, and is valuable in febrile and inflammatory complaints. The wood of the orange-tree is yellowish-white and close-grained. It is used for inlaying and for turnery.

Orange trees are often extremely fruitful, so that a tree 29 feet high and occupying a space of little more than 12 feet in diameter sometimes yields from 3000 to 4000 oranges in a year. One tree in Florida has often borne 10,000 oranges in a single season. The orange tree attains the age of at least 100 to 150 years. Young trees are less productive than old ones, and the fruit is also less juicy, has a thicker rind, and more seeds. The orange may be successfully cultivated where the winter temperature does not fall below 40°. It prefers strong loam or clayey soil, but succeeds in any kind of soil if well fertilised. It is much grown in the Azores, Malta, Sicily, Spain, Portugal, the Syrian coast, in Florida, Louisiana and California, and in parts of Australia. Superior perhaps to all are the Mandarin Orange of China, and the Navel Orange of South America. The latter is nearly twice the size of an ordinary orange, and has a navel-like formation on the top of the somewhat oval fruit. Oranges when gathered for export must not be quite ripe; those fully formed and with the colour just turning from green to yellow are chosen.

The Mock Orange is the tree known botanically as *Philadelphus* and popularly as *Syringa* (q.v.). The latter name properly belongs to the lilac.

Orange, or GARIEP, the largest river of South Africa, rises in the Kathlamba Mountains, in the east of Basutoland, and flows west, with an inclination to the north, to the Atlantic Ocean. It describes numerous wide curves in its course of 1000 miles, and separates the Cape Province, on the south, from the Orange Free State, Griqualand West, Bechuanaland, and Great Namaqualand, on the north. There are great falls at Aughrabies. Area of basin, 325,000 sq. m. Its principal tributaries are the Caledon and the Vaal, both joining it from the right. Its volume varies greatly between the dry season, when it is not navigable, and the rainy season, when it overflows its banks in the upper parts of its course. Its mouth is, moreover, obstructed by a bar.

Orange, a town in the French department of Vaucluse, on the left bank of the Aigue, 18 miles by rail N. of Avignon. The *Arausio* of the Romans, which contained 40,000 inhabitants, it retains two splendid Roman remains—a triumphal arch, 72 feet high, and a theatre whose façade was 340 feet long by 118 high. A neighbouring circus has been swept away. There is a Romanesque cathedral, and statues of two of the counts. Pop, 10,000.

Orange was the capital of a small independent principality, which was ruled by its own sovereigns from the 11th to the 16th century. The last of these sovereigns, Philibert de Chalons, died in 1531 without issue. His sister, however, had married a

Count of Nassau, and to that house the estates and titles passed. The Count of Nassau who obtained the principality of Orange was the father of William the Silent (see *HOLLAND, History*). William III., Prince of Orange and king of England, having died in 1702 without issue, there began a long-continued controversy as to the succession between Frederick I. of Prussia (as grandson of one of the last Princes of Orange), the representative of the older branch of the House of Nassau (q.v.), and the head of the younger line. At the Peace of Utrecht (1713) the king of Prussia took the settlement into his own hands, so far as the territory of Orange was concerned, by making it over for certain equivalents to the king of France. The title Prince of Orange, however, remained with the younger Nassau line, afterwards sovereigns of Holland. See Bastet's *Histoire d'Orange* (1856).

Orange, a city of New Jersey, 12 miles W. of New York by rail, and 3 miles by tram-car from Newark. The slope of Orange Mountain is laid out in beautiful parks and ornamented with villas. There are manufactures of phonographs, hats, &c. Pop. 33,000 (or with East, South, and West Orange, 100,000).

Orange Free State, an original province of the Union of South Africa, lying between the Vaal and Orange rivers, surrounded by the Cape Province, the Transvaal, Natal, and Basutoland. This region is a plateau, rising from 3000 to 5000 feet above the sea-level, with very little wood, except alongside the numerous watercourses. Its vast undulating plains of magnificent pasture-land slope down to the Vaal and the Orange, and are dotted over with the isolated hills called 'kopjes.' Area estimated at 50,400 sq. m.; pop. (1921) 628,360—189,142 being whites and 439,220 coloured. About 200,000 are members of the Dutch Reformed Church. Education is compulsory up to a certain standard, and fees are always charged; in 1922 the pupils numbered about 65,000. Except where parents object, Dutch and English are equally taught. Merino sheep, cattle, horses, goats, and ostriches are reared; corn (wheat, maize, Kaffir corn) is grown chiefly in the east. Coal is mined in the north and diamonds in the south-west. The climate is healthy and temperate. Railways connect Bloemfontein (q.v.), the capital, with the chief ports and other towns of South Africa. The chief exports are wool, diamonds, hides, ostrich-feathers, and live animals; the principal imports, cottons, woollens, boots and shoes, iron and steel manufactures. When the Dutch Boers left the Cape Colony (1836) and took possession of this country it was inhabited by Bushmen, Bechuanas, and Korannas. The Cape government appointed a resident in the republic in 1845, and three years later it was annexed to the British crown as the Orange River Sovereignty; but in 1854 it was given up to the Boers, who formed themselves into the independent republic of the Orange River Free State. President Sir J. H. Brand (1863-83) cherished the friendliest relations with Britain, and mediated in 1881 between Britain and the Transvaal. In 1899 President Steyn allied the State with the Transvaal in the ultimatum of 9th October, and the consequent war (see *TRANSVAAL*); the country was occupied by the British in 1900, and from Bloemfontein in May Lord Roberts proclaimed the annexation. At the peace (1902) the Free State became part of the British Empire as the Orange River Colony; and in 1907 the colony was granted responsible government similar to that of the Transvaal (q.v.). It joined the Union of 1910 as the Orange Free State.

See **BOERS**, **TRANSVAAL**, **CAPE OF GOOD HOPE**; **NORRIS-NEWMAN**, *With the Boers in the Transvaal and Orange*

Free State (1882); Anthony Trollope, *South Africa* (1878); numerous works on the Transvaal war (1899-1900); Somerset Playne, *The Orange Free State* (1912); Theal's historical works on South Africa; and South African guides, handbooks, and annuals.

Orangemen, an association of Protestants to support and defend the Protestant succession to the British throne and the Protestant religion in Church and State, as settled by the Bill of Rights and Act of Settlement of 1688. It had its origin in William, Prince of Orange—hence its name—on his arrival in England to accept the crown. The first declaration of its objects and principles was drawn up in November 1688 at Exeter by the prince's chaplain, the famous Dr Burnet, at the suggestion of Sir Edward Seymour, and subscribed by the leaders who had invited the prince to England—pledging themselves 'to stand by the prince and one another,' and to 'persevere until the liberties and religion of England should be effectually secured.' This declaration was in force till 24th February 1696, when a scheme for the invasion of England by James, helped by France, was revealed to both houses of parliament. This led to a second declaration of the association, which was signed by 420 members of the House of Commons, by 83 peers, by the corporation of London, and other municipalities and counties in England, and thus 'four-fifths of the nation were combined in one vast club.' It was also signed by every member of the Irish House of Commons except one. After the death of William the association remained quiescent till the reign of George III., when in 1795 it was vigorously revived in consequence of the discovery of treasonable societies in England and an approaching rebellion in Ireland. It has existed ever since. It cherishes the memory of William and holds anniversaries of the principal struggles in Ireland, such as the siege of Londonderry, the battles of the Boyne (1st July) and Anghrim (12th July), and the day of the landing of William at Torbay (5th November). The structure of the organisation is similar to that of freemasonry, although it is not a secret society. In consequence of the tactics of its opponents it has been most prominent in Ireland, but wherever ultramontane principles are propagated within the British dominions the Orange Society exists, as in Canada and Australia. Its membership is extensive. Its objects are carried out by lodges, individual or private, district, county, or provincial and national—all united by one grand lodge in each country. Every lodge is opened by prayer and reading of a portion of Scripture. Each member must be a Protestant. A lodge is guided by a master, secretary, treasurer, and other office-bearers. The grand lodge is representative, and is held usually every twelve months, although power is given to summon it in any case of emergency. There is also an imperial grand council, composed of delegates from the grand lodge of every country within the British dominions. It meets every three years.

Oratorio, a sacred story set to music, which, like opera, requires soloists, chorus, and full orchestra for its performance, but dispenses with the theatrical adjuncts of scenery, costumes, and acting. It is named from the oratory or mission-hall in Rome, where on feasts St Philip Neri (q.v.), prompted by the same spirit as had in the mediæval miracle and mystery plays sought to interest and educate the unlearned, arranged the performances (1571-94), which developed into the modern oratorio.

The effort to find a more dramatic vehicle of expression which had proved in Florence the germ of Opera (q.v.) was also being made in Rome by Emilio del Cavaliere. And by a curious coincidence the first oratorio and the first opera (properly so called)

were produced in the same year (1600) in these two cities. Cavaliere's oratorio, which was written throughout in recitative style, was called *La Rappresentazione di Anima e di Corpo*, and the directions for acting, dressing, and dancing, as well as singing, show how entirely the conception of oratorio has changed since its first rude beginning. During the 17th century Carissimi and Scarlatti wrote many works full of expression, but the Italians were, as a rule, more engrossed with the development of opera. Indeed, save in such expressive works as Carissimi's *Jephtha*, Stradella's *John the Baptist*, and the like, there is no difference between opera and oratorio composition, and it was among the graver nations of the North that the oratorio was to arrive at its maturity. There the first and almost universal subject was the Passion; and to illustrate the story and direct the meditations of the devout, Schütz, Graun, Handel, and Bach employed all their skill in musical construction, and all the resources which counterpoint, harmony, and orchestration could afford them. Solid part-writing for voices is absolutely necessary for such impressive and serious works as oratorios, and it is the neglect among the Italians of the art they had brought to such perfection during the 16th century which has caused the crown to pass from Italy to Germany. The greatest 'Passion Music' is the *St Matthew*, written for service on Good Friday, 1729, by Seb. Bach. It contains choruses, solos, and chorales (in which the congregation took part), all of surpassing interest and beauty, and showing when requisite great dramatic truth and force. And as this work is the climax, so it is the close of passion music development.

The next and most important phase of oratorio was the *Epic*, which became in Handel's giant hands such a powerful instrument. Before he wrote *Saul and Israel in Egypt* (1739) he had written an early oratorio in the Italian, and Passions, &c. in the German style. Between his arrival in England (1710) and his abandonment of the opera he had in no fewer than forty-four operas accustomed himself to all the possibilities of vocal expression; and his Italian training, his studies in Germany, and his varied experience eminently fitted him for his task. In twelve years he composed fifteen grand oratorios (*Israel in Egypt*, *Messiah*, *Samson*, *Judas Macabæus*, *Joshua*, *Solomon*, *Jephtha*, &c.), besides several cantatas and anthems of almost oratorio dimensions. The greatest is *Israel in Egypt*, with its massive double chorus-writing and its grand effects; but the *Messiah* is a work which stands out not only among oratorios, but in all musical literature as a great inspiration. Pure inspiration it must indeed have been, for it was written in twenty-four days! The great admiration for Handel's compositions in England finds expression every three years in the Handel Festival, held in London, at which the *Messiah*, *Israel in Egypt*, and a 'selection' are performed on a gigantic scale (about three thousand singers and five hundred instrumentalists).

Haydn heard Handel's works when he visited England in 1791-92, and was incited to the composition of his great oratorio, the *Creation* (and also the charming pastoral the *Seasons*, which should scarcely be called an oratorio); in fact, Handel has been the inspiration and model of nearly all succeeding oratorios, as England, his adopted country, has been oratorio's peculiar home. There the unequalled choruses and the general custom of choral festivals on a large scale offer numerous opportunities for producing familiar masterpieces and inducements to compose new works. For the Birmingham Festival of 1846 Mendelssohn wrote his masterpiece, the *Elijah*, a work of great originality, which, however,

owes more to the influence of Bach than of Handel. *St Paul* was produced at Düsseldorf ten years earlier.

Daring orchestral colour and original effects characterise Spohr's oratorios, *Last Judgment* (1826), *Calvary* (1835), and *The Fall of Babylon* (1842). Modern oratorios take advantage of the dramatic element which became so strong in the music of the 19th century, and in many works the name is modified (e.g. Dramatic Oratorio—Mackenzie's *Rose of Sharon*, Parry's *Judith*, &c.) or avoided (Sacred Trilogy—Gounod's *Redemption*, Berlioz's *Childhood of Christ*, &c.). Dvořák's *St Ludmila* and Liszt's *St Elizabeth* and *Christus* lean more and more to the form of dramatic cantata, of which Beethoven's *Mount of Olives* (miscalled an oratorio), Schumann's *Paradise and the Peri*, Sullivan's *Golden Legend*, and Mackenzie's *Dream of Jubal* and *Sayid* are fine examples.

A new period in English oratorio began with Elgar's *Dream of Gerontius* (1900) and *The Apostles* (1903).

Oratory of St Philip Neri. CONGREGATION OF THE. The origin of the Congregation of the Oratory has been described in the article on St Philip Neri, its founder (see NERI). Here something must be said of its constitution and work. The primary idea on the institution was that its members should be bound by no religious vows. They were to be secular priests living together under a common rule, and practising obedience as free subjects, with liberty to quit the community if they so willed. Each father must contribute an annual pension towards the upkeep of the house, and have, moreover, a sufficiency of private means for his personal expenses. Otherwise he has absolute control over his own property. The government of the congregation is of a remarkably republican character. Each community is entirely independent, being subject to no mother-house or general-superior. The community is composed of three classes—the novices, triennial and decennial fathers. A member after passing his novitiate becomes a triennial father, with a consultative voice in the affairs of the congregation. On the completion of his tenth year he becomes a decennial father, with a decisive vote. The superior, who is generally spoken of as 'the Father,' is elected every three years, and with him are elected four deputies, who form a committee which meets weekly, has the appointment of the other officers, distributes the ecclesiastical work, and controls the ordinary expenditure. But no large expenditure or new undertaking can be entered upon without the consent of the general congregation, where in all cases the voting is by ballot. The father superior, *primus inter pares*, has no privileges and is exempt from no rules. He takes his turn in the waiting at table in the refectory, and has his share in the work of the church. The principal religious exercise of the community, beyond the duties common to all priests, is half-an-hour's mental prayer in the evening followed by the litanies, for which three times a week is substituted the taking of 'the discipline' or self-flagellation in a darkened room. The ceremonial for this exercise will be found described in Hone's *Ancient Mysteries*. The ministerial work of the Oratory consists chiefly in constant attendance in the confessional and in the characteristic daily preaching. Another essential part of the institute is an external brotherhood similar in some respects to the 'Third Orders' of the older religious orders, but consisting of men only, who meet in a separate chapel called the Little Oratory, under the direction of a father prefect. The brothers, as a rule, observe the same exercises as the fathers. It is in the Little Oratory that the musical services which originated the ora-

torio are held. Music was so often performed in the oratory at Seville that Blanco White speaks of it as the 'spiritual opera-house.' Philip Neri, who governed the community at Rome as long as he lived, committed no rule to writing. The traditional rules drawn up at a later time were approved by Paul V. in 1612.

The Oratory spread rapidly through the chief cities of Italy, and there were several houses in Spain. In Germany it never took root. In France Cardinal de Bérulle took the institute as his model in a new foundation (1611), approved by Paul V. in 1614, under the name of the 'Congregation of the Oratory of our Lord Jesus Christ in France.' But it differs essentially from the Oratory of St Philip Neri. It was governed by a superior-general, and was mainly concerned with the institution of seminaries for the training of priests.

The life in the Roman Oratory admitted leisure for private study; and the founder, in encouraging Cesare Baronio to write his great work on church history, set an example which was followed by many distinguished scholars—Bozio, Gallonio, Aringhi (*Roma subterranea*), Bianchini (*Evangelium quadruplex*), Gallandi (*Bibliotheca patrum*), and others. It was natural that the character of Philip Neri and the community life which he established should have a particular attraction to a number of men from the English universities, who were led by the Oxford movement to the Church of Rome. Dr Newman when at Rome obtained from the pope a brief (26th November 1847) authorising him to establish the Oratory in England. Shortly afterwards F. W. Faber, who had founded a new order, 'the Brothers of the Will of God,' generally known as 'Wilfridians,' joined, with his whole community, the Oratory at Birmingham. In 1849 Father Faber was sent to London with some other fathers to set up a house in King William Street, Strand, which in October 1850 was constituted an independent congregation, and in 1854 was transferred to its present abode in Brompton.

There seems to have been a project of introducing the Oratory into England in the reign of James II., and there is in the British Museum an extremely rare if not unique copy of an English translation of the Rule printed in 1687.

The early history of the Oratory was written in 5 vols. folio by Marciano, *Memorie Storiche*, &c. (1693–1702). Compare *Newman e la Religione Cattolica in Inghilterra, ovvero l'Oratorio Inglese*, by Capeceletro (Naples, 1859), and *Life and Letters of F. W. Faber*, by J. Bowden (1869). The *Instituta Congregationis Anglicæ* was printed in Rome at the Propaganda Press in 1847.

Orbis Pictus. See COMENIUS.

Orbit, in Astronomy, is the path described in space by a heavenly body in its revolution round its primary. The path so described is of an elliptic form, and would be accurately an ellipse were it not for the disturbing influence of the other heavenly bodies (see PERTURBATIONS). The complete determination of a planet's orbit is of the last importance to astronomers, as it enables them to predict the planet's place in the heavens at any period, and thus determine the exact date of eclipses of the sun and moon, of transits and occultations of the planets, and of the appearances and disappearances of comets. For the determination of a planet's orbit it is necessary to know three things: (1) The situation of the *plane* of the orbit in space; (2) the position of the orbit in this plane; and (3) the situation at a given epoch, and rate of motion, of the planet in its orbit. Since the plane of the ecliptic is for convenience taken as the reference plane, the position of the plane of a planet's orbit is known when (1) its inclination to the plane of the ecliptic and (2) the line of intersection of the two planes are known.

Orcagna, or ARCAGNUOLO, nickname of *Andrea di Cione*, a painter, sculptor, and architect, as well as a maker of poems. Born, about 1316, the son of a Florentine worker in silver, he was early imbued with artistic tastes. Sculpture he learned in the studio of Andrea Pisano, and in painting was helped by an elder brother. In 1355 he was appointed architect to the church of Or San Michele in his native city; his greatest artistic triumph exists in the marble tabernacle in this church. 'This, in its combined splendour of architectural design, sculptured reliefs and statuettes, and mosaic enrichments, is one of the most important and beautiful works of art which even rich Italy possesses. It combines an altar, a shrine, a reredos, and a baldacchino' (Middleton). From 1358 to 1360 he was chief architect of the cathedral at Orvieto, for which he designed some mosaic pictures. In Florence he planned a mint, piers in the cathedral, and other works. His earliest achievement with the painter's brush was to execute, in conjunction with his elder brother Nardo, several frescoes in the church of Santa Maria Novella at Florence. Some of these have perished; but a 'Last Judgment' and 'Christ and the Virgin enthroned in Heaven' still survive, though greatly restored. Other frescoes in the cemetery at Pisa that were attributed to Orcagna are now believed to have been by a painter or painters of the Siennese school. Orcagna painted several panel pictures, including a retable for the altar in the Strozzi chapel of Santa Maria Novella; another for the church of San Pietro Maggiore in Florence, now in the National Gallery, London; an altarpiece in the chapel of the Medici (Santa Croce), Florence; and 'St Zenobius Enthroned,' in the cathedral of Florence. Orcagna's death is usually given as 1389; but 1376 seems a more likely date, or even 1368. See the article by Professor J. H. Middleton in *Ency. Brit.*; and Crowe and Cavalcaselle, *Painting in Italy*, vol. i. (1864).

Orchard (O.E. *ort-gearde*, from Latin *hortus* with its English equivalent *geard*, modern English *yard*, added in explanation, showing in the Miltonic form *orchat* confusion with Gr. *orchatos*) is a space of ground employed for the growth of hardy tree-fruit, such as apples, cherries, pears, and plums. By common usage and the force of climate the word in Great Britain has now become suggestive of apples only; and if the fruit be of any other staple a special prefix is generally employed, except in the counties (and few they are) in which cherries, pears, or plums are grown thus largely, such as Kent, Hereford, and Worcester. In some parts of the United States peaches are grown in vast quantities upon orchard-trees, and that fruit can be ripened thus in the southern counties of England when the spring and summer have been favourable. But in the main with us the orchard is a plot of ground planted with apple-trees, and thus we shall chiefly regard it.

In England, as well as the more fruitful parts of Scotland, the manor-house, vicarage, manse, or farm, or other well-enviored dwelling-place, has its own orchard not far from the house, and capable of producing fruit, unless too much discouraged. Too often the orchard is treated with contempt, as a space where the children, turkeys, calves, or pigs may roam at pleasure; and if there are any apples they are regarded as a windfall of some rarity. This is not as it ought to be. Orchards were laid out at a time when there was room enough to move freely, and people knew less than they seem to know now. Accordingly we find on these old trees either no fruit at all, or very little, and of that the chief part worthless. There is no greater puzzle to the farmer or squire farming his own land than the sad condition of his

orchard and his own deep ignorance about it. Amid the more important works the trees have too often been neglected; and the space which should yield its fair share of profit, as well as of picturesque enjoyment, has become a frowsy wilderness.

Much of the blame for this would fall on those who are now beyond it. Seldom indeed can we find an orchard planted by our ancestors with any common sense or judgment. The trees have been placed there anyhow, without any knowledge of their habit, growth, fertility, use, or requirements. And for this the nurserymen of that time must also be held accountable, their ignorance of their own produce having been equal to that of their customers. In this particular a vast advance has been made in the last half-century, and the planter of an orchard now has himself to thank if he plants amiss. For of late years it has been imagined largely that profit, equally speedy and heavy, can be secured very pleasantly by the growth of fruit in Britain. In spite of all experience this may be so, as we find the laws of nature overcome now and then by superhuman effort. And when everything comes to pass exactly as it should, the orchard takes occasion sometimes to pay its way. With a view towards this we may consider first the formation and planting of an orchard; secondly, the renewal of an old and not too hale plantation.

(1) Situation and soil are the first two questions, the former being even the more important in the colder parts of Britain. A slope towards the south or south-east is best of all; but if that cannot be found a fair level will do, unless it be in the bottom of a valley or too near some broad river. A damp situation is always bad; and especially evil is the spot—though it may be the warmest in summer—where the fog of the morning draws and packs from the marshes or from a tidal river. For the worst of all enemies to British fruit is the late spring frost, which settles chiefly in the valley or along the plain; whence the bleak hillside is often fruitful when the sheltered dale is barren. Also the soil must be fairly good, neither too sandy nor of very heavy clay. When the site has been chosen the ground should be trenched to the depth of two feet if possible, and drainage provided where needful, as in all but the most favoured spots it is. Time for settlement should be allowed after the trenching; and then the stations may be prepared for the standard-trees. The distance from tree to tree and row to row ought to be governed by the choice of kinds, and this again depends upon the object of the planter. He may plant for home use, or for sale, or for both; and in either case for table use or for cider. If he plants for his own table use—he be it for cooking or dessert—his chief concern is quality combined with fair fertility. If he plants for market he must first consider productiveness and appearance and the common opinion of his neighbourhood; for if he took into the market the best apple ever grown, but as yet of no reputation, he would have to take it home again until the trees grew old. Also, he would rather sell good fruit than bad; but generally speaking this is difficult without much self-sacrifice. For the finer kinds are, with few exceptions, less fertile than the inferior. But whatever his objects be, and whatever varieties he selects, the planter must be guided by the habit of the trees as to the space allowed them. It is better to allow too much room than too little; and in a plantation intended to endure, 25 feet from tree to tree is not one too many. The permanent trees should be straight standards, worked upon the crab-stock, and with 6 feet of stem from the root to the spread of the branches. Let them be planted almost upon the surface, then banked up with good soil, and staked securely,

until they can hold their own against the wind. Of pruning little or none is required during the first year of their growth, except that any weak shoot should be cut out, or rival to the leader repressed at once, if the tree is to be carried up in conical form. No manure should be given as yet, unless it be in the way of mulching, where the soil is very droughty. When all the standards are planted and staked, and seen to 'cut true,' as gardeners term it, both along and across the rows, the temporary crop may be planted among them, whether of dwarf-trees, or of bushes, vegetables, clover, or anything else; but a clear space must be reserved at all times of at least a yard around the orchard-tree. And throughout the next year the young plantation must be heeded frequently, disfruited (if any rash produce form), watered in case of protracted drought, restaked or rebound if any break loose, and watched that no grub or other vermin bore the slender stem, or injure bark, branch, or foliage. In the second year judicious pruning will be needed, for which see our article on that subject. The ground between the trees may be cropped with grass or clover (not allowed to become too long), which can be broken up for the purpose of manuring, and at other times saves the dropping fruit from bruises. With regard to varieties it is quite impossible to offer useful advice without a knowledge of each special case. If the planter is providing for his own household he generally knows what suits it best and befits the situation. If he grows for market he can have recourse to the counsel of some good nurseryman acquainted with the neighbourhood, its wants and suitabilities; he will probably find his trees true to name, clean, well grown and healthy; for in no line of business has there been more advance during the last half-century than in that of the nurseryman.

(2) With regard to the renewal of an ancient fruit-grove or the way to make the best of it, any one coming into possession or management of a decrepit orchard may wisely allow one fruiting season to show what good there is in it. All trees of valuable kind may then be marked for better cultivation, while the rest are divided into those worth grafting and those that are worthy of the domestic hearth; and the last will perhaps be more numerous. The trees that have goodness or beauty of fruit, with vigour sufficient to carry it, should at once be relieved of all moss and decay, straggling or worn-out or ill-placed members, or thickety growth of feeble wood, and perhaps in some places be cut back with discretion. Then the ground should be opened around the trunk, with tender avoidance of all upper roots (if any still live as a rarity), and a mulching of good, rich manure should be laid on in the winter-time; or, failing such encouragement, a frequent supply of good liquid strength, when the roots are on the feed in summer-time. The difficulty is to get this new supply to the parts that are fit to take it up, and then to provide the proper dose. And none but a man who knows the nature of a tree should be permitted to attempt it. Too often the roots of these old trees are prongs that strike downwards mightily, in the manner of a well-grown carrot, leaving nothing with a mouth for better feeding reasonably near the surface. Little improvement must be looked for during the first season, but even then there should be symptoms of increasing vigour, and in the second year the tree should be making healthy growth again.

Those that are of inferior kind, but have kindly wood for grafting, should be headed back or shortened home, with the dry and ragged wood removed. Then in the spring let fair stout scions of the better sort be inserted, chosen from strong growers, such as impart their own vigour to the

stock; for it is vain to work a feeble kind upon a long-established tree. The result will sometimes be a great success and sometimes downright failure, according to the harmony of stock and graft, upon which point the most experienced gardener as yet knows very little.

Many old trees, as before suggested, will be fit for nothing but firewood. These should be grubbed up at once, not with a feeble hand, but following every root as if you hated it. Then let a large space be excavated and filled in with abundant fresh soil trodden at every layer, and upon this young standards of vigorous kind must be planted, as shallow as may be, and banked up and staked. None but the strongest and most rapid growers can hope to make good these gaps among the elders, and even so they will be long about it. The virtue of patience must be highly cultivated by the owner of an ancient orchard. Even for renewal of an old plantation little can be said as to choice of sorts without thorough knowledge of locality. Many apples that become a picture in Kent or Surrey or Devonshire are plain little dowdies in Yorkshire, and unsightly scrubs in Scotland; while others that are comely and good in the north are rapid in the southern counties. Again, few or none of the American kinds, so handsome and fine when imported, can be grown to perfection in Britain.

See the Royal Horticultural Society's prize essays on hardy fruit-growing; Hogg's *Fruit Manual* (new ed. 1885); Scott's *Orchardist*; Bunyard's *Fruit Farming for Profit*; books by Burbidge, Fish, Grindon, and Cheal (1892); and for America, books by Thomas (1897) and Bailey (*Cyclopædia of American Horticulture*, and other works). And see the articles in this work on APPLE, PEAR, CHERRY, PLUM, FRUIT, GARDENING, PRUNING, &c. Good work in fruit-growing has been done by Luther Burbank, since 1875 at Santa Rosa, California, in 'originating' new and superior types of plums, apples, peaches, and other fruits, for which see his own books.

Orchardson, SIR WILLIAM QUILLER (1832-1910), a genre-painter and portraitist distinguished for his accuracy, expression, and dexterous execution, was born in Edinburgh, where he studied under Scott Lauder at the Trustees' Academy. He became A.R.A. in 1868, R.A. in 1877, and was knighted in 1907. Best known among his exquisite and highly-popular pictures are 'The Challenge' (1865), 'The Duke's Ante-chamber' (1869), 'Casus Belli' (1870), 'The Protector' (1871), 'The Bill of Sale' (1875), 'The Queen of the Swords' (1877), 'A Social Eddy' (1878), 'Hard Hit' (1879), 'On board H.M.S. *Bellerophon*, July 23, 1815' (1880; bought by the Chantrey Bequest), 'Mariage de Convenience' (1884), 'After' (1886), 'The Salon of Madame Récamier' (1885), 'The First Cloud' (1887), 'The Young Duke' (1889), 'Sir Walter Gilbey' (1891), 'Trouble' (1893), 'Blossoms Fair' (1901), and Sir Samuel Montagu (1904). See monographs by Sir W. Armstrong (1895), and J. S. Little (1897).

Orchestra, the part of the Greek theatre where the chorus danced; with us, the part set apart for the band; hence the band itself, in a theatre or at a concert. For the development of the orchestra in this latter sense, and the partition of instruments in a representative orchestra, see MUSIC, and Carse, *History of Orchestration* (1925). See also BAND, THEATRE.

Orchids (ORCHIDÆE or ORCHIDACEÆ), a family of monocotyledons distinguished from all others in the same alliance by their irregular gynandrous flowers and parietal placentæ. The essential peculiarities of the family are due to the consolidation of the stamens and style into one body called the *column*; to the suppression of all the anthers but one in all the genera except those comprising the tribe Cyripediæ, in which

there are two anthers; to a peculiar condition of the pollen and the structure of the anthers containing it; and to the remarkable forms and development generally assumed by the lip (*labellum*)—one of the inner members of the perianth which often plays an important mechanical part in the fertilising of orchids. The species are perennial herbaceous plants or shrubs of terrestrial habit in the temperate and colder parts of the world, but in warmer countries become epiphytal, adhering to the stems and limbs of trees, or fixing themselves on rocks by their strong fasciculate roots without penetrating the structure of these, or having any direct connection with the soil. Hence they have been popularly named air plants, as those which assume the epiphytal habit derive the greater part of their nutriment from the atmosphere. Their roots are fibrous or fasciculate or fleshy and tuber-like, the latter being peculiar to the terrestrial species. Their stems are annual, herbaceous, perennial, and woody, and very often pseudo-bulbous. Their leaves are flat or round, equitant, and generally sheathing, often leathery, and having parallel nerves. The flowers are irregular, extremely variable in form, often beautifully coloured, and deliciously fragrant, and are either solitary or in spikes, racemes, or panicles. They are composed of six usually petal-like segments: the three outer ones are called sepals, and two of the inner ones, which are usually alike in form and colour, are called petals; the third inner one, which differs in shape and also generally in



Fig. 1.—*Paphiopedilum Boxallii*.

direction from the others, is the lip. It is really the posterior petal, but the twisting or bending of the flower brings it to the front. Facing the lip is the *column*, bearing the anther or anthers and the stigma variously situated relatively to each other. The more obvious features described are well illustrated in the accompanying figures of *Paphiopedilum* (see also LADY'S SLIPPER, Mormodes, Odontoglossum, and Oncidium, in which the six segments of the perianth are so conspicuous as to reveal at a glance their structural relation to each other.

Orchids are found in almost all parts of the world, except in extremely dry climates and on the borders of the frozen regions. In Britain there are found eighteen genera and about forty species. In Europe, the temperate parts of Asia, in North America, and the Cape of Good Hope they are common inhabitants of groves, marshes, and meadows; and in these regions they are invariably terrestrial in habit. But in the hot damp parts of the West and East Indies, in Madagascar, and other islands in

the same region, in the moist forests of Brazil, the warm parts of Central America, and western Mexico they abound in the greatest profusion, no longer dependent on the soil for their nutriment, but clinging to the trunks and branches of trees,

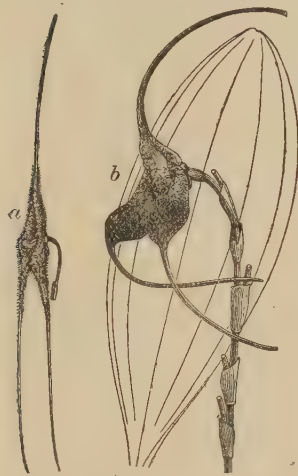


Fig. 2.—*a*, *Masdevallia Chimæra*;
b, *M. Schlimii*.

to stones and crags, where they vegetate among ferns and other shade-loving plants, or occupy by themselves exclusively the places which they affect. The family is a very numerous one, there being perhaps 10,000 species known to botanists, largely owing to the zeal of collectors. Of exotic species Linnæus knew only about a dozen. The beauty and the fragrance of the flowers, the singularity and almost endless variety of form which they exhibit, and their interesting structure botanically, along with the rarity of many of the most beautiful, place orchids among the most remarkable of the families of the vegetable kingdom. Darwin, who devoted much attention to the family, particularly in regard to their fertilisation, says of the peculiarity of the structure of the flowers of orchids that 'an examination of their many beautiful contrivances will exalt the whole vegetable kingdom in most persons' estimation,' and that 'hardly any fact has struck him so much as the endless diversities of structure—the prodigality of resources—for gaining the same end, namely, the fertilisation of one flower with pollen from another



Fig. 3.—*Mormodes Ocanæ*.

plant.' This part of the history of orchids is, like every other point connected with them, too wide to be dealt with here in detail. Those, however, who desire to study the matter closely should see the work quoted from—*The Fertilisation of Orchids*, by Charles Darwin.

Since the middle of the 19th century the cultivation of orchids in Britain, on the Continent, and in America has become an absorbing pursuit with wealthy amateurs. The possession of a rare or unique species or variety is an ambition that can only be attained by the millionaire; the prices of such are quite beyond the means of those possessed only of moderate wealth. Syndicates are formed for the purpose of collecting and

importing orchids from all countries in which rare or otherwise valuable species are known to exist, and private persons and several of the leading London and Continental nurserymen send experts in orchid-collecting to those countries at great expense with the same object in view. There is thus considerable commerce in orchids, and large sums of money are spent. Among genera in greatest request among amateurs are *Cypripedium*, *Dendrobium*, *Masdevallia*, *Odontoglossum*, *Cattleya*, *Lælia*, *Oncidium*, *Chysis*, *Cymbidium*, *Calanthe*, *Phalænopsis*, *Cœlogyne*, *Angræcum*, *Vanda*, *Anguloa*, *Epidendrum*, *Sophranitis*, *Renanthera*, *Saccolabium*, *Miltonia*, *Peristeria*, *Lycaste*.



Fig. 4.—*Odontoglossum Harryanum*.

The cultivation of orchids is accounted a difficult branch of the gardener's art. When the value of a considerable collection of rare kinds is considered, their successful management is at least a responsible undertaking. To be successful in their treatment the cultivator should above all things be well informed regarding the conditions under which each species grows in its native habitat. The prevailing temperature and other atmospheric conditions during the periods of growth and of rest, and the amount of shade or of light to which they are exposed at those seasons, must be known to and comprehended by the cultivator before he can adapt his means to the end in view. Houses or compartments of houses are set apart for the accommodation of species which are natives of the more hot and humid parts of the world, such as tropical East India, Madagascar, and Brazil, and a similar arrangement is made for those from Mexico and Central America.



Fig. 5.—*Oncidium Kramerianum*.

The management of the atmosphere of these houses is then based on such knowledge as the cultivator possesses regarding the temperature and moisture, light and shade, that prevail in the countries the several species are natives of. The plants of truly epiphytal habit are usually cultivated on blocks of oak, teak, or other timber, with or without moss about their roots for the retention of moisture. All classes are also grown in pots or lattice-baskets, in rough fibrous peat and Sphagnum moss largely intermixed with charcoal and porous crocks, to secure abundant drainage. Only the terrestrial species are grown in soil proper, and as there are exceedingly few of

such that require the accommodation of special houses, space need not here be taken up with their needs. The propagation of orchids is effected by division of the root-stocks, by separating the pseudo-bulbs in some cases, by cuttings in the case of *Dendrobiums* and some others with similar forms of growth, and by seed in all cases when it can be obtained, which rarely occurs with cultivated plants unless they have been artificially fertilised. Since about 1860, when Mr Dominy of London gained his first success, many hybrid orchids have been in cultivation; certain species of *Calanthe*, *Cattleya*, *Cypripedium*, *Dendrobium*, and *Epidendrum* being the first to yield to the hybridist's art.

Few orchids yield products useful to man. Of these *Vanilla* (q.v.) is perhaps the best known in commerce. The leaves of *Angræcum fragrans*, a native of the Mauritius, where it is called *Fahum*, and by the French *thé de Bourbon*, are delightfully fragrant, having the odour of Tonquin bean with the flavour of bitter almonds. The tubers of *Aplectrum hyemale* are so viscid that they are called Putty-root in the United States, and are there used for cementing broken earthenware.

See Sander's *Reichenbachia*; Veitch's *Manual of Orchids*; *The Amateur's Orchid Guide*, by Britten and Gower; Watson, *Orchids: their Culture and Management* (1890; ed. Chapinan, 1903); Ames, *Orchidaceæ* (7 vols., 1905-22).

ORCHIS is a genus of Orchidææ, to which, as now restricted, ten of the British species are referred. Some of them are among the most common of British Orchidææ, adorning meadows and pastures with their flowers in summer. It is a rather numerous genus, chiefly spread over Europe, northern Asia, and a very few of the species belong to North America. The British species have mostly red or lilac flowers, sometimes white or green, and often beautifully mottled. The roots of some of the species when dried constitute the salep of commerce, which reduced to a fine powder, and mixed with boiling water, sugar, and milk, makes an excellent diet drink. *O. mascula* and other British species yield such an excellent fecula that it has been suggested the production of salep might be made a profitable industry in England. The accompanying figure gives an idea of the general features of the genus.



Orchis mascula:
a, the lip of the perianth.

Orchil. See ARCHIL.

Orchom'enos, an ancient city of Bœotia, the capital of the kingdom of the Minyæ, was situated at the north-western corner of Lake Copaïs, where it was joined by the Cephissus, and extended from the marshy edges of the lake up the face of a steep rocky hill, on which stood the acropolis. It sent thirty ships to the Trojan war, and at a later date became a member of the Bœotian confederacy. Its government was thoroughly aristocratic, and after

the Peloponnesian war the jealous democratic Thebans destroyed it by fire, and sold its inhabitants as slaves. It was rebuilt in the reign of Philip of Macedon, but never recovered its position. It was famous for its musical festival in honour of the Graces, who were specially worshipped in the city. In 1880 Schliemann excavated there the 'treasury of Minyas,' or rather a royal beehive tomb slightly smaller than the 'treasury of Atreus' at Mycenæ (q.v.); it dates from about 2000 B.C., and is notable for its ornamentation. In 1903 Furtwängler laid bare various dwellings of the same period, including a large decorated palace. See works by O. Müller (1844), and Schliemann (1881); and Bulle in the *Abh. Kgl. Bayr. Akad.* (1907).—There was a second Orchomenos in Arcadia, lying NNW. of Mantinea.

Orcin, or **ORCINAL**, $C_6H_3(CH_3)(OH)_2$. This substance is found in the free state in the lichens from which Archil and Litmus (q.v.) are prepared. It is formed when the acids which occur in these plants are boiled with baryta water or submitted to dry distillation. It is also prepared artificially from the nitro-derivatives of the hydrocarbon toluene. As shown by the formula, orcinal is a di-acid phenol, and appears in large colourless crystals which turn a reddish-brown colour when exposed to the air. By the action of ammonia and the oxygen of the air it is converted into orein, $C_7H_7NO_3$, which is the colouring matter of archil.

Ordeal (O.E. *ordél*, *ordāl*, the prefix *or-* meaning 'out,' and *dél*, *dāl*, 'a dealing'; cognates are the Dutch *oordeel*, and Ger. *Urtheil*, 'judgment'), a practice which has prevailed largely among various widely-separated nations, of referring disputed questions, particularly such as relate to the guilt or innocence of an individual, to the judgment of God, determined either by lot or by the success of certain experiments. And there need be no doubt that it is often successful in the detection of a criminal whose trepidation before the dreaded ordeal betrays him, conscious of his guilt, and more than half afraid of the occult influences he is about to outrage. Of its existence among the ancient Jews we have an instance in Numbers v., where a Hebrew woman, accused of adultery, is required to drink the waters of jealousy as a test of innocence; a similar ordeal for incontinence is still in use among the natives of the Gold Coast of Africa. Compurgation of accused persons by fire, as existing among the Greeks, is referred to in the *Antigone* of Sophocles. Among the Hindus the ordeal has been in use to be practised in nine different ways—by the balance, by fire, by water, by poison, by the *cosha* or drinking water in which images of the sun and other deities had been washed, by chewing-rice, by hot oil, by red-hot iron, and by drawing two images out of a jar.

Livingstone describes the practice of ordeal with a bark infusion of *Erythrophloeum guineense* as common among all the negro races north of the Zambezi. 'When a man suspects that any of his wives have bewitched him he sends for the witch-doctor, and all the wives go forth into the field, and remain fasting till that person has made an infusion of the plant (called *goho*). They all drink it, each one holding up her hand to heaven in attestation of her innocence. Those who vomit it are considered innocent, while those whom it purges are pronounced guilty, and put to death by burning. The innocent return to their homes and slaughter a cock as a thank-offering to their guardian spirits.' The women themselves eagerly desire the test on the slightest provocation; each is conscious of her own innocence, and has the fullest faith in the *muavi* ('the ordeal') clearing all but the guilty. There are varieties of procedure

among the different tribes. The Barotse pour the medicine down the throat of a cock or dog, and judge of the innocence or guilt of the person accused by the vomiting or purging of the animal. The Calabar Bean (q.v.) is also used for the ordeal; as was Tanghinin (q.v.) in Madagascar.

Throughout Europe in the dark ages the ordeal existed under the sanction of law and of the church, and was closely related to the oath. The most prevalent kinds of ordeal were those of *fire*, *water*, and the *wager of battle*. *Fire ordeal* was only allowed to persons of high rank. The accused had to carry a piece of red-hot iron for some distance in his hand, or to walk nine feet barefoot and blindfolded over red-hot ploughshares. The hand or foot was bound up and inspected three days afterwards; if the accused had escaped unhurt he was pronounced innocent; if otherwise, guilty. Under such a judicial system there were probably few acquittals; but there can be little doubt that in the severer kinds of ordeal precautions were taken by the clergy to protect those whom they wished to clear from suspicion. And the feats of modern jugglers suggest possibilities of official trickery which may at once have saved the credit of the ordeal and cleared those meant to be acquitted. Queen Emma, mother of Edward the Confessor, when suspected of a criminal intrigue with Alwyn, Bishop of Winchester, triumphantly vindicated her character by walking unhurt over red-hot ploughshares. *Water ordeal* was the usual mode of trial allowed to bondsmen and rustics, and was of two kinds—the ordeal of *boiling water* and of *cold water*. The ordeal of *boiling water*, according to the laws of Athelstan, consisted of taking a stone out of boiling water, where the hand had to be inserted as deep as the wrist; what was called the triple ordeal deepened the water to the elbow. The person allowed the ordeal of *cold water*—the usual mode of trial for witchcraft—was flung into a river or pond; if he floated without any appearance of swimming he was judged guilty; while if he sank he was acquitted. The *wager of battle* was a natural accompaniment of a state of society which allowed men to take the law into their own hands. The defeated party, if he craved his life, was allowed to live as a 'recrunt,' that is, on retracting the perjury which he had sworn to.

Other kinds of ordeal were practised in particular circumstances in different parts of Europe. In the ordeal of the *beer*, a suspected murderer was required to touch the body of the murdered man, and pronounced guilty if the blood flowed from his wounds. Undoubtedly this touched a primitive time, when death was not fully understood, and the lifeless body was supposed still capable of thought and action. And to this day English peasants expect every one who sees a corpse to touch it to show that he bears the dead no ill-will. The ordeal of the *eucharist* was in use among the clergy: the accused party took the sacrament in attestation of innocence, it being believed that, if guilty, he would be immediately visited with divine punishment for the sacrilege. A somewhat similar ordeal was that of the *corsned*, or consecrated bread and cheese: if the accused swallowed it freely he was pronounced innocent; if it stuck in his throat he was presumed to be guilty. Godwin, Earl of Kent, in the reign of Edward the Confessor, when accused of the murder of the king's brother, is said to have appealed to the ordeal of the *corsned*, and been choked by it. There can be no doubt that the popular English asseveration 'May this bit choke me if I lie!' is a distinct survival. An early form of ordeal, abolished by Louis le Debonnaire in 816, was that of the *cross*: the accuser and accused stood upright before a cross, and he who first fell, or shifted his

position, was pronounced guilty. It was done away with as being irreverent towards the mystery of the cross. Besides these, there was the ordeal by *lot*, dependent on the throw of a pair of dice, one marked with a cross, the other plain.

Trial by ordeal at first carried with it the sanction of the priests as well as of the civil power, though the clergy in the course of time came to discountenance it. In England it seems to have been continued till the middle of the 13th century. On the Continent it was, generally speaking, abolished rather earlier, although as late as 1498 we find the truth of Savonarola's doctrine put to the test by a challenge between one of his disciples and a Franciscan friar to walk through a burning pile. In Scotland in 1180 we find David I. enacting, in one of the assemblies of the frank tenantry of the kingdom, which were the germ of parliaments, that no one was to hold an ordinary court of justice, or a court of ordeal, whether of battle, iron, or water, except in presence of the sheriff or one of his sergeants; though, if that official failed to attend after being duly summoned, the court might be held in his absence. The first step towards the abolition of this form of trial in Saxon and Celtic countries seems to have been the substitution of compurgation. See COMPURGATORS.

See the articles BATTLE (WAGER OF), DIVINATION; also the works of Bastian, Grimm, Tylor and Waitz *passim*; Tylor's article 'Ordeals and Oaths,' in *Macmillan's Magazine* for 1876; H. C. Lea's *Superstition and Force* (Phila. 1866; new ed. 1892); and George Neilson's *Trial by Combat* (1890).

Ordericus Vitalis, a mediæval historian, born at Atcham near Shrewsbury in 1075. He was the son of Odeler of Orleans, who in Roger de Montgomery's train had accompanied the Conqueror to England, and from childhood was dedicated to God. At ten he was sent to Normandy to be educated for the monastic life in the abbey of St Evroul. Here he spent all his life, although he made several visits to England to collect historical materials. He became a priest in 1107, and died most probably about 1143. Between the years 1130 and 1141 Orderic compiled his *Historie Ecclesiastice*, an elaborate work on the history of Normandy and England, preceded by a brief chronicle of events from the birth of Christ down to his own time. The work is a singular mixture of important history and trivial gossip, marred by absolute lack of order, grotesque style, and laboured grandiloquence; but its writer possessed the seeing eye and the sympathetic heart, and the result is that his confused book remains a precious storehouse to the historian, abounding in those truthful photographic glimpses of reality which are beyond the reach of all the laborious erudition of a later age. With the Conquest it becomes of great value as an honest and trustworthy contemporary source.

The first edition of the *Historie Ecclesiastice* was published by Duchesne, in his *Hist. Norm. Scip.* (1619). The best edition is that by A. le Prevost (5 vols. Paris, 1838-55). It was translated into English by T. Forester (4 vols. 1853-56) in Bohn's *Antiquarian Library*. See the introduction by Delisle in Prevost's edition, and chap. vi. of Dean Church's *St Anselm* (1870).

Orderlies are non-commissioned officers or soldiers employed as messengers or attendants. Thus in the British army each general or commanding officer has an orderly always at his disposal; a *Post-office Orderly* fetches the letters of each corps; and when a court-martial or board of officers is convened, a non-commissioned officer is appointed as *Court-orderly* to attend upon it. The men of the medical staff corps, when on duty with the sick, are also called *Hospital-orderlies*. The *Orderly-officer* is the officer on duty for the day

in each corps. He attends all parades, inspects rations, visits the barrack-rooms at the dinner-hour, hospital, cells, guardroom, &c., remaining in uniform and on duty in barracks the whole day. Similarly, an *Orderly Non-commissioned Officer* of each corps is on duty for the week, calls the roll, warns men for parade, copies orders, &c. The regimental *Orderly-room* is the office where the lieutenant-colonel, assisted by the adjutant and a staff of clerks, transacts his business and sees prisoners daily. Each troop, battery, or company has a similar *Orderly-room* for the use of its commander. The *Orderly-book* or *Order-book* contains the general or regimental orders, which are copied into it as they are issued.

Orders, HOLY, an institution, regarded in the Greek and Roman churches as a sacrament, by which ministers are specially set apart for the service of religion. While some of the reformed churches altogether deny the distinction of ranks in the ministry, none of them admits more than three ranks, of bishop, priest, and deacon. But in the Roman and Greek churches a distinction is made between the major or holy orders and the minor orders. The major orders are those of Bishop, Priest, and Deacon (q.v.). A fourth rank of sub-deacons is generally regarded as one of the major orders, but its functions closely resemble those of the deacon. Some theologians, it should be noted, regard the episcopate not as a separate order, but as the completion and extension of the priesthood. The minor orders in the Roman Church are four in number—those of doorkeeper, reader, exorcist, and acolyte. To none of these orders is any vow of celibacy annexed. Some of their functions had their origin in the peculiar religious conditions of the early church. Preparatory to the receiving of these orders candidates are initiated in the *Tonsure* (q.v.). In the Roman Church the sacrament of holy orders is held to produce an indelible character, and therefore to be incapable of being forfeited and of being validly repeated. The Greek Church has also the distinction of major and minor orders; but all the functions of the four minor orders of the Roman Church are united by the Greeks in one single order, that of reader (*anagnōstēs*).

In the Anglican and other Reformed Episcopal churches the three higher orders of bishop, priest, and deacon are alone retained. An Anglican clergyman may be deprived of his benefice, or suspended by his bishop for various ecclesiastical offences. But, in the usual case of deprivation, the clergyman does not forfeit his status of priest or deacon, which can only be lost by deposition or *degradation*. A bishop may be deprived of his see by his metropolitan, but it has been questioned whether he can be lawfully deprived of his orders as bishop. Till 1870, a clergyman of the Church of England, as technically always a person in holy orders, could not become, under any circumstances, a member of the House of Commons. Not so now, however, all clergy in 1870 having been granted the statutory right to divest themselves of their orders. In the Presbyterian and other non-episcopal churches the ceremony of ordination is not held to impart any indelible character. A minister found guilty of heresy or immorality is deprived of his office by *deposition*, by which his clerical status is forfeited. A minister deposed ceases altogether to be a minister, and is no more capable of any of the functions of the office than if he had never been ordained. There is nothing to prevent a minister of any presbyterian or non-episcopal church from sitting in the House of Commons, with the exception only of ministers of the Church of Scotland, who are disqualified by Act of Parliament from doing so. No Roman Catholic clergyman may sit.

The use of a ceremonial for ordination is traceable among the Jews, and the New Testament contains frequent reference to the specific ceremonial of 'laying on of hands' (Acts, vi. 1-7, xiii. 1-4, xiv. 23; 1 Tim. iv. 14, v. 22; 2 Tim. i. 6). In the Roman, the Greek, and the other eastern churches this rite of ordination is held to be sacramental, and it is reserved, at least as regards the major orders, exclusively to bishops. In extraordinary cases it was permitted to cardinals and to certain abbots to confer the minor orders. Considerable controversy exists among Catholic writers as to what are the essential portions (*Materia Sacramenti*) of the rite of ordination. Some place it in the 'imposition of hands,' some in the 'presentation of the instruments' symbolical of each order. As regards the *validity* of the rite of ordination, the mere fact of its being conferred by a bishop suffices; but there is not any part of the Roman discipline which is more jealously guarded by laws than the administration of orders. The candidate can only be *lawfully* ordained by 'his own bishop' (*proprius episcopus*), or with the authority of his own bishop, who is 'his own' in respect of birth, of domicile, of benefice, or of connection by personal service.

In the Church of England and other Reformed Episcopal churches the rules of the ancient canon-law are retained, by which no one could be ordained without previous examination of his fitness, or who was disqualified by bodily infirmity, illegitimacy, immorality, or simony, or who was unprovided with a title (i.e. an appointment to serve in some church) which should provide him with a maintenance; or who, being a candidate for deacon's orders, was under twenty, and for priest's, under twenty-four years of age; but the age for admission to deacon's orders is changed to twenty-three.

In other Reformed churches ordination is performed by the presbytery by imposition of hands, or by one or more ordinary ministers. Some smaller Protestant denominations have no ceremony of ordination whatever.

Orders in Council, orders by the sovereign with the advice of the Privy-council. The Privy-council of Great Britain has no power to legislate, except so far as authorised to do so by parliament; but in periods of emergency it has nevertheless occasionally issued and enforced orders of a legislative kind; those who were concerned in passing, promulgating, or enforcing the orders trusting to parliamentary protection, and taking on themselves the personal responsibility of the proceeding. In such cases an act of indemnity afterwards passed has relieved from liability those who advised the order or acted under it, and given compensation to all who suffered by its enforcement. This course was adopted in 1766 with regard to an embargo on the exportation of corn, issued in consequence of a deficient harvest and prospect of famine. An important constitutional question was raised by the famous Orders in Council issued by Great Britain in 1807 and 1808, in reprisal for Napoleon's Berlin and Milan decrees. See CONTINENTAL SYSTEM.

Orders of Knighthood, of Chivalry, or of Merit.—From very early times we find a tendency in mankind to form associations for the purpose, among others, of the social amelioration of the human race, incentives to military prowess, or the reward of personal merit. The knights of the chivalric orders which came into being anterior to the Crusades had at least two of these objects in view: the religious orders like that of the Temple or of the Hospitaliers took vows of chastity, poverty, and obedience; the other more secular orders had also solemn initiatory cere-

monies, and one of their more special purposes was the redressing of wrongs, the protection of the oppressed, and the succouring of those in distress. Their ideals were lofty, and though in course of time these became of no practical value, it is but just to say that in their day the orders did appreciable service to the cause of humanity. The introduction of gunpowder rendered personal feats of arms obsolete, but many of the chivalric orders still continued to grant admission to members as a reward of personal merit, and as the grand-mastership of the surviving orders was ultimately invested in the reigning sovereign, it followed that all creations of these knights emanated from the regal authority.

It is only in Europe that the old chivalric orders are to be found. The orders of even the more ancient Eastern nations, such as Japan, only date from their comparatively recent contact with Europeans. The reconstitution of many European nations since the Great War on a republican basis has led to the abandonment (whether temporary or permanent remains to be seen) of the practice of bestowing orders as rewards for services to the state, though France, indeed, has its Legion of Honour. Across the Atlantic America still retains officially its pristine simplicity, but it abounds in societies—patriotic, genealogical, and otherwise—which are modelled on and named after or similar to the old chivalric orders.

The following columns contain a list of the principal orders in Europe and elsewhere. Even where the countries mentioned have ceased to bestow any orders, the descriptions of the latter have been retained as being of use to the historian, antiquary, genealogist, or collector.

AUSTRIA-HUNGARY.—The *Order of the Golden Fleece* (see **GOLDEN FLEECE**).—*Imperial Military Order of Maria Theresa*, founded by the Empress Maria Theresa in 1757 for 'officers distinguished in war.' Badge, a cross pattée moline enamelled white, in the centre a circle with the arms of Austria, viz. gules a fess argent, within a white band edged gold and inscribed 'Fortitudini' in gold letters. Ribbon, white watered silk with red edges.—*St Stephen*, founded by the Empress Maria Theresa in 1761. Badge, a cross pattée concave, enamelled green, edged gold, surmounted by the crown of Hungary: on a red enamelled centre within a white band with gold edges and inscribed with the motto 'Publicum meritorium premium' a green mount, thereon a patriarchal cross silver, issuing from a golden crown between the letters M and T. Ribbon, red with green border.—*Order of the Iron Crown*, instituted by Napoleon in 1805, abolished 1814, revived by the Emperor Francis I. in 1816. Badge, the Iron Crown on which is the Austrian double-headed eagle pendant from an imperial crown all gold: on the breast of the eagle a shield azure charged with the letter F. in gold. Ribbon, orange with two green stripes.—*Order of Leopold*, instituted by Francis I. 1808. Badge, red cross pattée concave with white border and gold edge pendant from the imperial crown: on a red centre the monogram F. I. A. surrounded by a white band inscribed 'Integrate et Merito.' Ribbon, red with two white stripes.—*Order of Elizabeth Theresa*, instituted 1750, renewed 1771. Badge, on an oval escutcheon surrounded by eight rays each enamelled per pale from the points argent and gules edged gold the monograms E. C. and M. T., above them the imperial crown, and round them the motto 'M. Theresia parentis gratiam perennem voluit.' Ribbon, black.—*Order of the Community of Noble Ladies of the Starry Cross*, an order for ladies of noble birth instituted by the Empress Eleanor in 1668. Badge, on an oval silver medallion surrounded by a blue band entwined by a silver ribbon the imperial Austrian eagle, charged with a green Latin cross edged gold, resting on a similar cross of brown wood. Ribbon, black.—*The Teutonic Order*, an ancient order of uncertain origin, abolished by Napoleon in 1809, but renewed in 1840. Badge, an elongated cross pattée slightly molined, black upon white with gold edging, surmounted by a black helmet affrontée, visor closed, and ducally crowned gold with a plume of white ostrich feathers. Ribbon, black.

Baden.—*Order of Military Merit of Charles Frederick*, instituted 1807. White Maltese cross resting on green laurel wreath surmounted by a gold crown: on a red centre surrounded by blue band inscribed 'Für Badens Ehre' the monogram C. F. Ribbon, yellow with two red stripes and outside edges white.—*Order of Loyalty, or Fidelity*, founded 1715, renewed 1803. Badge, red Maltese cross, on the points gold knobs, in the angles two C's reversed gold, all pendant from a gold crown. Ribbon, orange with silver borders.—*Order of the Lion of Zaehringen*, instituted 1812. Badge, green Maltese cross, with ornamental gold clasps between the angles:

on a red centre a lion rampant contourné in gold, the arms of Zaehringen within a white fillet, with the motto 'Für Ehre und Wahrheit.' Ribbon, green with two orange stripes.

BAVARIA.—*Order of St Hubert*, founded 1444 by Gerhard V., Count of Ravensburg, to commemorate his victory over Arnold, Count of Egmont, confined to members of the royal house, foreign sovereigns, &c. Badge, white Maltese cross with knobs on the points and three golden rays between the angles: in the centre is a representation of the conversion of St Hubert, within a red border inscribed 'In Trau Vast.' Ribbon, red with green border.—*Order of St George*, supposed to have been founded in the 12th century, renewed in 1494, modified in 1827 and 1871. Exclusively Roman Catholic. Badge, a blue Maltese cross with white border and edges of gold, and between the arms of the cross four projecting points coloured like the cross, and on them the initials V. I. B. I. (Virgini Immaculatæ Bavaria Immaculata): on a gold centre within a white border a representation of the Immaculate Conception: the cross is surmounted by a lion's head and gold ornament. Ribbon, blue with white stripes on which are narrow black stripes.—*Order of Maximilian Joseph*, founded 1797, modified 1806. Badge, a white Maltese cross with gold knobs on the points and gold rays in the angles: on a blue centre the royal cypher, all pendant from a gold crown. Ribbon, black with a broad white stripe with narrow blue stripes on it.—*Order of the Bavarian Crown, or of Civil Merit*. Badge, a white Maltese cross surmounted by a smaller one in saltire, a golden ray between the arms of the crosses, all encompassed by a green oak wreath: the centre is paly-bendy argent and azure charged with a royal crown gold, the whole pendant from a gold crown. Ribbon, blue with white border.—*Royal Order of Louis*, founded 1827. Badge, a cross wavy gold, on a white centre the portrait of the founder, on the four limbs of the cross the inscription 'Ludwig König von Bayern.' Ribbon, crimson with blue border.—*Order of Maximilian*, founded 1853, for Germans only; two sections, science and art. Badge, a blue cross botonée inscribed with the date of foundation and having a gold ray in each angle: in the centre a portrait of the founder: the cross rests on a gold laurel and oak garland, all being pendant from a crown. Ribbon, dark blue with white border.—*Order of Military Merit*, founded 1866. Badge, a blue Maltese cross with silver rays in the angles: in the centre on a blue ground the letter L surmounted by a crown in gold and surrounded by a white band bearing the word 'Merenti' in gold. Ribbon, white with blue edges. Bavaria had three orders for ladies.—*Order of Elizabeth*, founded 1766. Confined to Roman Catholic ladies of noble descent, having 'seize quartiers' on their own or their husband's side. Badge, white cross pattée concave surmounted by the electoral crown: in the centre St Elizabeth giving alms. Ribbon, blue with red borders.—*Order of St Anne*, founded 1783. Badge, blue Maltese cross with white border, and gold annulets in the angles: on a white centre the Virgin in gold, and on the arms of the cross the motto 'Sub tuum præsidium patronus noster.' Ribbon, light blue with white borders.—*Order of Louis*, founded 1814. Badge, small black cross pattée, on a blue centre the letter L. surrounded by stars. Ribbon, white with two black stripes.—*Order of Theresa*, founded 1827. For unmarried noble ladies. Badge, light blue Maltese cross with white border, and in the angles a fusil, fusilly of four argent and azure: in the centre the letter T surrounded by a white band charged with a wreath of rue. Ribbon, white with two blue stripes.

BELGIUM.—*Order of the Iron Cross or of Civil Merit*. Black Maltese cross with gold knobs on points: on a gold centre the Belgian lion in relief. Ribbon, crimson with black stripe, and yellow border with black stripe.—*Order of Leopold*, founded 1832. Badge, white Maltese cross, between the angles on the dexter side a laurel branch and on the sinister side an oak branch: on a black centre the Belgian lion surrounded by a red band with the motto 'L'union fait la force.' Ribbon, crimson watered silk.

BRUNSWICK.—*Order of Henry the Lion*, founded 1834. Badge, blue Maltese cross: on three of its limbs peacock's feathers, and on the bottom limb a helmet: in the angles the ducal cypher crowned: on a red centre a pillar crowned between two sickles, over all a horse courant silver, all pendant from a lion passant guardant within two laurel branches with royal crown above. Ribbon, dark red with yellow borders.

BULGARIA.—*Military Order of St Alexander*, founded 1879. Badge, white Maltese cross, in the angles two swords in saltire: on a red centre the Bulgarian lion encircled by a green band with the words 'For Bravery' in Bulgarian characters.

DENMARK.—*Order of the Elephant*, a very old order renewed in 1458 and revised in 1693. Badge, a white elephant, tusked gold with a castle on its back and an Indian sitting on its head. Ribbon, light watered blue.—*Order of Dannebrog*. Badge, white oblong Maltese cross with red border slightly concave, in the centre a crowned W (Waldemar), and on the four arms the words 'Gud-og-Kongen' (God and the King): in the angles of the cross a gold crown, and above the cross the king's initials surmounted by the royal crown. Ribbon, white with crimson edges.

FRANCE.—The only order bestowed by the French Republic is that of the Legion of Honour (q.v.).

GREAT BRITAIN.—The orders of the *Garter* (the oldest extant chivalric order), the *Thistle*, *St Patrick*, *Bath*, *St Michael* and *St George* are all described under their respective titles. See also **INDIAN ORDERS.**—*Order of Merit*, instituted in 1902, limited to twenty-five members, exclusive of such foreign members as may be admitted, for persons who have rendered exceptionally meritorious service in the navy and army or towards the advancement of art, literature, and science. Badge, a hollow

Maltese cross of red and blue enamel of eight points, having within a laurel wreath upon a centre of blue enamel the words *FOR MERIT* in gold. Ribbon, Garter blue and crimson.—*The Royal Victorian Order* was founded in 1896 as a reward for special services personally rendered to the sovereign. There are five classes—Knights Grand Cross, Knights-Commanders, Commanders, and members of the fourth and fifth classes.—King Edward VII. in 1904 founded a special decoration styled the *Royal Victorian Chain*, which is only conferred on a few individuals of eminence. Badge, a white enamelled Maltese cross of eight points: on the oval centre of crimson enamel the royal and imperial cypher (V.R.I.), within a blue enamelled circle with the motto 'Victoria' in gold.—*The Most Excellent Order of the British Empire*, founded 1917. This is the most widely conferred of all the British orders. It is open both to men and women, and is divided into five classes: Knights Grand Cross and Dames Grand Cross, Knights-Commanders and Dames-Commanders, Commanders, Officers and Members. Badge, a cross patonce enamelled pearl fimbriated or, and surmounted by a gold medallion with a representation of Britannia seated within a circle gules inscribed with the motto 'For God and the Empire' in gold. The officers of the order wear a silver-gilt badge and the members a silver one. Ribbon, purple.—*Order of Companions of Honour*, instituted 1917. The membership is limited to fifty males and females who may have rendered conspicuous service of national importance. Badge, an oval-shaped gold medallion with representation of an oak-tree and pendant from a branch a shield of the royal arms, in the dexter a representation of a knight armed and in armour mounted on a horse, the whole within a circle azure inscribed with the motto 'In action faithful and in honour clear.' Ribbon, carmine with a border interlaced gold.—*The Distinguished Service Order*, founded 1886, for conspicuous services rendered by officers of the navy, army, and air force. Badge, a gold cross enamelled white edged gold, having on one side within a wreath of laurel green the imperial crown in gold upon a red ground, and on the reverse within a similar wreath on a similar ground the royal cypher.—*Imperial Service Order* for meritorious service extending over at least twenty-five years by members (male and female) of the Civil service. Badge, a medallion bearing the imperial and royal cypher for the current reign, and the words 'For faithful service' both in dark blue enamel on a gold plaque surrounded by a seven-pointed star of silver surmounted by the imperial crown. In the case of women members the plaque is surrounded by a wreath of laurel in place of the star. Ribbon, a stripe of blue between two stripes of crimson of equal size.

HESE, GRAND DUCHY OF.—*Order of the Golden Lion*, founded 1770, revived 1870. Badge, red Maltese cross with white border: on an oval centre azure a lion rampant gold surrounded by a red band with the motto 'Virtute et Fidelitate.' Ribbon, crimson.—*Order of Louis*, founded 1807. Badge, black Maltese cross with red border: on a red centre the letter L. between two laurel branches gold surrounded by a white band with the motto 'Für Verdienste.' Ribbon, black with red borders.—*Order of Merit of Philip the Magnanimous, or the House of Philip-le-Bon*, founded 1840. Badge, white cross pattée slightly concave: on a blue oval centre the full-length effigy of Philip-le-Bon surrounded by a white band inscribed 'Si Deus nobiscum quis contra nos.' Ribbon, red with blue borders.—*Order of Military Merit*, founded 1870. A cross pattée nowy-lozengey of gilt bronze resting on a laurel wreath: on the arms of the cross the words 'Gott Ehre Vaterland' and in the middle a crowned L. Ribbon, light blue with deep scarlet edges.—*Order of the Military Sanitary Cross*, founded 1870. A twelve-pointed variety of the cross pattée: in the centre an old English L crowned, and in the limbs of the cross 'Für Pflege der Soldaten' 1870. Ribbon, scarlet with narrow silver edges.

ITALY.—*Order of the Annunciation*, founded 1862, revived 1818, and modified 1869. Badge, gold medallion with a representation of the Annunciation surrounded by interlaced love-knots. Ribbon, blue.—*Order of St Maurice and St Lazarus*, formed by the union of two orders, the first dating from the 15th century and the latter claiming to have been in existence in Jerusalem 1000 A.D. After several changes it was ultimately revised by Victor Emmanuel II. in 1855. Badge, white cross botonné for St Maurice surmounting a green Maltese cross placed saltireways, all pendant from a royal crown. Ribbon, green watered silk.—*Order of Military Merit*, founded 1815, revised 1855. Badge, white cross urdee resting on a wreath of laurel and oak banded gold: on a round centre gules two swords in saltire points upwards or, in chief the date '1855.' Ribbon, blue with red stripe in centre.—*Civil Order of Savoy*, founded 1831, revised 1861, limited to sixty knights 'who have contributed to the service of the king and the welfare of the state': a blue Savoy [Latin] cross, in the centre a round white shield with the cypher 'C. A.' (Charles Albert). Ribbon, pale blue with two white stripes.—*Order of the Iron Crown*, established in 1868 to commemorate the annexation of Venetia. Badge, white cross pattée convex, the arms of the cross connected by laces of gold cord: on a circular blue centre a representation of the old Iron Crown of the Longobardian kings in gold. Ribbon, red with white strip in centre.

JAPAN.—*Order of the Rising Sun*, instituted 1874. Badge, a red sun with thirty-two double-pointed rays of gold and white enamel: it is suspended from three blossoms and a leaf of the Paulownia; the lowest class of the order wear the Kiui leaf in place of the Paulownia. Ribbon, white with red borders.—*Order of the Chrysanthemum*, instituted 1876, mostly conferred on princes of the blood and foreign sovereigns. Badge, very much the same

as that of the Rising Sun, with the addition that the rays rest on a wreath of chrysanthemums, having green leaves with gold veins: the badge is suspended by a gold ring from a yellow chrysanthemum. Ribbon, crimson with purple border.

LIPPE AND SCHAUMBURG-LIPPE, PRINCIPALITY OF.—*Order of the Cross of Honour*, founded 1869. Badge, white Maltese cross with eight-rayed gold star in the centre for Schaumburg and Sternberg: in the centre of the star a white circle charged with a red rose for Lippe, surrounded by a blue band inscribed 'Für Treue und Verdienst.' Ribbon, red with gold edges.

LUXEMBURG, GRAND DUCHY OF.—*Order of the Oak Leaf Crown*, founded 1841. Badge, a silver cross pattée: in a green centre within a red band encircled with an oak wreath the letter W in gold with crown above. Ribbon, orange with three green stripes.

MECKLENBURG-SCHWERIN AND STRELITZ, GRAND DUCHIES OF.—*Order of the Cross of Military Merit*, founded 1814. Silver cross pattée with gold centre for 1st class, silver for 2d, copper with silver centre for 3d, all copper for 4th class: in the centre the cypher P. F. M. with crown above. Ribbon, crimson, blue stripes with yellow edges.—*Order of the Crown of the Wendes*, founded 1864. Five classes, the first being open to ladies of noble rank; 96 members apportioned to Schwerin and 32 to Strelitz. Badge, white Maltese cross with gold knobs on points, in each angle of the cross a griffin passant gold: on the blue centre the crown of the Wendes gold within a red band with the mottoes 'Avito viret honore' for Strelitz, and 'Per aspera ad astra' for Schwerin; above the cross the double cypher T interlaced with W surmounted by the crown of the Wendes in gold. Ribbon, red with yellow stripes and blue borders.

NETHERLANDS.—*Military Order of William*, founded 1815. Badge, white Maltese cross with gold knobs on the points, in each angle an oak leaf green edged gold, and distributed on the wings of the cross the words 'Voor-Moed-Belief-Trouw': in the centre the Burgundian fire-steel gold, all pendant from a gold crown. Ribbon, orange with two blue stripes near the edge.—*Order of the Netherlands Lion*, founded 1815. Badge, a white Maltese cross with gold knobs on the points: in each angle the letter W gold: on a blue centre the motto 'Virtus Nobilitat,' the cross ensigned with a gold crown. Ribbon, blue with two orange stripes.

NORWAY.—*Order of St Olaf*, founded 1847. A white Maltese cross with the Gothic letter O crowned gold in the angles of the cross; the centre of the badge is surrounded by circles of gold, white, blue, and white, and within there is the Norwegian lion rampant carrying an axe on a red ground. Ribbon, red with blue and white border.

OLDENBURG, GRAND DUCHY OF.—*Order of Merit*, founded 1838. White cross pattée: on a white centre with gold border the dual arms with mantle and crown: on the top of the cross two swords in saltire surmounted by a gold crown: on the limbs of the cross '17 Jan. 1755,' '6 July 1755,' '21 May 1829,' '21 March 1838.' Ribbon, red with blue stripes near the edges.

PERSIA.—*Order of the Lion and Sun*. Star of eight points each adorned with emeralds, rubies, and diamonds: upon a blue enamelled field a green mount, thereon a lion couchant contourné proper, the Sun rising from behind the Lion gold, the star suspended by two gold rings from a green ribbon. There is also a badge with a gold border jewelled and ornamented: a Lion and Sun as in the centre of the star. Ribbon, green.

PONTIFICAL.—*Order of Christ*, instituted 1320. Badge, red cross charged with a plain Latin cross white, edged gold, the cross surmounted by a gold crown. Ribbon, red.—*Order of the Holy Sepulchre*, said to have been founded 1099, confirmed 1746 and 1868. Badge, a cross potent gold cantoned with a similar cross on each angle, surmounted by a royal crown. Ribbon, black.—*Order of St Gregory the Great*, founded 1831. Red Maltese cross with gold knobs on points: on a blue centre the bust of St Gregory gold surrounded by a gold band inscribed 'S. Gregorius Magnus.' Ribbon, red with yellow borders.—*Order of Pius*, founded 1847. Badge, blue star of eight points: on a circular white centre 'Pius IX.' surrounded by a gold band with the motto 'Virtuti et Merito.' Ribbon, dark blue with red double border.—*Order of St Cecilia*, founded 1847. Blue cross, surmounted by a laurel wreath green, attached to the cross by a gold chain: on a white centre within an arch of blue the Papal tiara.—*Order of St John of Jerusalem*, see HOSPITALIERS.

PORTUGAL.—*Order of Christ*, instituted 1317 by Dionysius of Portugal, transferred to the Portuguese crown 1522, and reorganised 1789. Badge, a red cross batune, the extremities of the arms bevelled inwards from the outside points, charged with a white Latin cross edged gold, surmounted by a white star of eight points with gold rays in the angles: on the centre of the star a gold circle charged with a red heart inflamed and wreathed in fess: above the heart and issuing from the flames a Latin cross sable edged gold. Ribbon, crimson watered silk.—*Military Order of St Benedict of Aviz or of Ivora*, originated in 1143 in a society of noble Portuguese for the purpose of opposing the Moors. Badge, a green cross fleury, with the ends of the arms reflexed, ensigned with a white star of eight points with gold rays: in the centre of the star a gold circle charged with a red heart inflamed and wreathed in fess: above the heart a black Latin cross edged gold. Ribbon, green watered silk.—*Order of St James of the Sword*, founded 1112, remodelled 1789. Badge, a red lily cross, the lower arm terminating in the form of a sword-blade. Ribbon, violet. The grand crosses have the badge surmounted by the Sacred Heart as in the Order of Christ.—*Order of the Tower and Sword*, founded

1459, revived 1808, reconstructed 1832. Badge, a white star of five points resting on an oak-wreath fructed : between the two upper rays of the star a gold tower : in a white centre a green laurel wreath on which rests a sword : both surrounded by a blue band with the motto 'Valor Lealdade e Merito.' Ribbon, blue.—*Order of St Isabella*, founded 1801. Badge, on a gold medallion St Isabella dispensing alms, on the edge a laurel wreath with ribbon entwined, surrounded by a border of roses and ribbons tied in chief issuing from a cherub, surmounted by a golden crown : in base overlaying the rose border a blue ribbon with the motto 'Pauperum solatio.' Ribbon, pink with white stripes.—*Order of Our Lady of the Conception of Villa-Vieosa*. Badge, a white enamelled star of nine points, in the centre a gold disc with the monogram M. A. within a blue band having the motto 'Padroeira do Reino' : between the points of the star golden rays on which are placed nine white stars of five points, with plain gold lines from the centre of each point, the whole surmounted by a royal crown jewelled with rubies and emeralds. Ribbon, blue with white edges.

PRUSSIA had no very ancient order. The *Order of the Black Eagle* was founded in 1701 in commemoration of the Elector of Brandenburg as King of Prussia (Frederick I.). It was limited to thirty knights (exclusive of princes of the royal blood), who must prove noble descent for four generations. Badge, a blue Maltese cross with a black eagle, crowned gold, displayed on each angle : on a gold centre the royal cypher F. R. within a white band bearing the motto 'Suum cuique' in chief and two green laurel branches in base. Ribbon, orange.—*Order of the Red Eagle*, founded 1705, with frequent subsequent alterations. Only those holding this order could receive the Black Eagle. Badge, same as the Black Eagle, save that the cross is white and the eagles red : the cypher is F. W. R., and the motto 'Sincere et Constante.' Ribbon, white with two orange stripes.—*Order of Merit*, originally a reconstitution in 1740 of an older order. It had a military and civil division, and in 1842 a special division for science and art was included. Badge, the Prussian eagle in gold on a white circle edged gold and surrounded by a white band charged with four double cyphers F. adorsed gold, and between them II in Roman numerals, the whole encircled by a blue band inscribed 'Pour le Mérite' : outside the band four gold crowns at top, bottom, and sides. Ribbon, white with two black stripes at the borders.—*Order of Military Merit*, founded 1740. Badge, blue Maltese cross, on its upper arm the letter F. crowned and on the other three arms the motto 'Pour le Mérite' : between the angles of the cross a golden eagle displayed and crowned. Ribbon, black with two white stripes.—*Order of the Iron Cross*, founded 1813, and modified 1870. Badge, an iron cross pattée with silver edges : on its upper arm the letters F. W. crowned : in the centre three oak leaves, on the bottom limb '1813.' Ribbon, military division, black watered silk with two white stripes ; civil division, white watered silk with two black stripes.—*Order of the House of Hohenzollern*, founded 1841, incorporated with the Prussian orders 1851, and revised 1861. Badge, white cross pattée slightly convex with black border edged gold surmounted by the royal crown : in the angles of the cross an oak and laurel wreath : on a white circular centre within a blue band inscribed 'Vom Fels zum Meer' the Prussian eagle charged on the breast with the arms of the House of Hohenzollern.—*Order of the Crown*, founded 1861. Badge, a white cross pattée slightly concave edged gold imposed on a similar but larger one : on a gold centre surrounded by a blue band inscribed 'Got mit Uns' in German characters a royal crown. Ribbon, dark blue.

RUSSIA, PRINCIPALITIES OF.—*Order of the Cross of Honour*. Badge, white Maltese cross with seven rays on each angle : on a circular centre the arms of the princely house surmounted by a crown. Ribbon, purple.

ROMANIA.—*Order of the Star* (1877), a blue cross crosslet with golden rays in the angles (the military division has the cross ensigned with two swords in saltire with crown above) : on a red centre with blue band inscribed 'In Fide Salus' and surrounded by a green oak leaf an eagle displayed and crowned gold. Ribbon, red with two blue stripes near the borders.—*Order of the Crown of Rumania*, founded 1881. Badge, red Maltese cross with white border and gold edges, between the arms of the cross the royal cypher C reversed : on a red circular centre within a white band inscribed 'Prin noi insine—14 Martie 1881' the crown of Rumania in silver. Ribbon, bright blue with gray borders with blue edges.

RUSSIA had no very ancient orders, though the entry into any of them created nobility.—*Order of St Andrew*, instituted 1698. Badge, the double-headed Russian eagle crowned and ensigned by two swords in saltire surmounted by the imperial crown : superimposed on the eagle is a blue St Andrew's cross with the figure of the saint on it, the initials S. A. P. R. distributed on the arms of the cross. Ribbon, blue.—*Order of St Catherine*, founded 1714, for ladies only. Badge, on an oval enriched with diamonds, resting on a diamond cross the figure of St Catherine. Ribbon, scarlet with two silver stripes, embroidered with the words in Russian 'For Love and Fatherland.'—*Order of Alexander Nevsky*, founded 1725. Badge, a red cross pattée, on the angles a crowned double-headed eagle gold : on a white centre St Alexander Nevsky on horseback. Ribbon, red.—*Order of St Anne*, instituted 1735. Badge, a red cross pattée, the arms of which are connected by gold ornaments : on a white centre the effigy of St Anne. Ribbon, red with yellow stripes at borders.—*Order of St George*, founded 1769. Badge, a white cross pattée : on a red centre St George and the Dragon. Ribbon, orange with three black stripes.—*Order of Merit*, founded 1792, revived 1807. Badge, a black cross pattée concave, with

gold knobs on the points, the whole ensigned by an imperial crown : on a gold centre encircled by a green laurel wreath an eagle displayed silver crowned gold : on the arms of the cross the words 'Mili-tari, vir-tute.' Ribbon, dark blue with three black stripes.—*Order of St Vladimir*, founded 1782 (for saving life from fire or water). Badge, a black cross pattée edged gold, the centre of each arm being red edged gold : on a black centre with gold border a heraldic mantle crowned and charged with the initial of the saint. Ribbon, red with black border. Two Polish orders were incorporated with those of Russia in 1831.—*The Order of the White Eagle*, said to have been first instituted in 1325, and revived in 1705. Badge, a red Maltese cross with white borders edged with gold and with gold knobs on the points : on the face of the cross the white eagle displayed and crowned, gold flames on the corners of the cross, which is ensigned with the imperial crown. Ribbon, light blue.—*Order of St Stanislaus*, founded 1765, and revived 1807. Badge, a red Maltese cross edged gold and with gold knobs on the points, the Polish eagle on each angle, the wings falling over each arm of the cross : golden rays issuing from the hollow of the arms : on a white centre surrounded by a green laurel wreath the effigy of St Stanislaus. Ribbon, red with white edges and two white stripes.

SAN MARINO.—*Order of San Marino*, founded 1859, modified 1860. Badge, white cross moline, at each end of the centre of the extremities a gold ball, and between the arms of the cross gold towers : in the centre a red shield charged with a triple-towered castle gold standing on a green mound and surrounded by a blue band with the motto 'Merito Militari.' Ribbon, blue with red borders.—*Order of St Agatha*, founded 1923.

SAXE-COBURG-GOTHA, DUCHY OF.—*The Saxon Ernestine Order*, instituted 1690, restored 1833. Badge, white Maltese cross edged and knobbed gold, pendant from a gold crown : on each angle of the cross a lion passant guardant gold : on the upper limb the cypher of the reigning duke : on a gold centre the bust of Duke Ernest within a blue enamelled band on which is inscribed 'Fideliter et Constante' : the band is surrounded by a wreath of oak green. Ribbon, dark red watered silk with two narrow green stripes.

SERBIA.—*The Order of St Sava* (1883) has a representation of that saint on its badge. Ribbon, white with pale blue borders.—*The Order of Takova* (1865). The badge is rather peculiar, consisting of a Maltese cross surmounting a cross saltire surrounded by a wreath of palm and in the centre of the badge and within a blue motto ribbon is on a red ground the monogram M. O. (Prince Michael Obrenowitch III.), a royal crown above and III. below in gold.

SIAM has no ancient orders. That of the *White Elephant*, instituted in 1861, is considered the highest. Badge, a white elephant caparisoned in red and gold on a dark blue field and surrounded by a triple circlet of leaves yellow, red, and green, and surmounted by the Siamese crown. Ribbon, red with green borders, having on its inside edge narrow stripes of blue and yellow.—*The Order of the Crown* (1869) has for badge a red and green enamelled vase supporting the golden crown of Siam between conical royal emblems, the whole encircled by a border of red and green nenuphar leaves. Ribbon, blue with green borders separated by three red and yellow lines. There are also two very limited family orders of *Chulachondiao*.

SPAIN.—Besides the Golden Fleece (which is treated separately) Spain has several ancient orders. That of *Calatrava* was at first a religious Order of Knights, and was founded in 1147 to commemorate the recovery of Calatrava from the Moors, but ultimately lost this character and became a purely military order. Badge, on a green lozenge a red cross of fleurs-de-lys. Ribbon, red.—*Order of St James of Compostela*, founded in 1175, was also originally a religious order, but was secularised by Ferdinand and Isabella in 1493. Badge, on a white ground a red enamelled sword fitchée (practically a dagger) with a hilt of fleurs-de-lys. Ribbon, red.—*Order of Alcántara* was originally the Society of the Knights of St Julian, and was raised by Pope Alexander III. into a knighthood order, but was secularised in 1495 by Ferdinand V. Badge, the same as Calatrava, but in green. Ribbon, green.—*Order of Our Lady of Montesa*, founded in 1317 by James II. of Aragon under Benedictine rule. The grand-mastership was annexed to the crown of Spain in 1587. Badge, on a white ground a Greek cross couped, red, fimbriated gold (the fimbriation is unnecessary and wrong as it puts metal on metal against all heraldic rule). Ribbon, red. The other Spanish orders are comparatively modern. They include the *Order of Charles III.*, or the *Immaculate Conception*, founded 1771. The badge contains a figure of the B.V.M. : the ribbon is white with broad blue border.—*Order of Maria Louisa*, founded in 1792 'for noble ladies.' The badge has in the centre a representation of St Ferdinand royally crowned and robed. Ribbon, violet with white centre.—*Order of St Hermenegilde*, founded by Ferdinand VII. in 1814 for officers of the army and navy. The badge has in the centre a figure of the eponymous saint of the order. Ribbon, violet with two white stripes.—*Order of St Ferdinand*, founded in 1811 for all classes in the army and navy. The badge has in its centre the figure of St Ferdinand in royal robes. Ribbon, red with yellow borders.—*Order of Isabella the Catholic* bears on its badge the Pillars of Hercules on the dexter side and an imperial orb of blue ensigned with a gold crown.

SWEDEN.—*The Order of the Seraphim*, or blue ribbon, is said to have been instituted by Magnus II. in 1334, but was reconstituted by Frederick I. in 1748. Badge, white cross pattée with seraphs heads between the arms of the cross, bears on a blue ground the holy monogram I.H.S. between three crowns and

issuing from the centre of the H in pale a patriarchal cross, all gold.—*Order of the Sword*, or yellow ribbon, has a badge bearing on a blue ground a sword in pale point upward between three gold crowns. It was originally instituted in 1532 by Gustavus Vasa, and after being dormant for a considerable time was revived by Frederick I. in 1748 as a military order.—*Order of Vasa*, or green ribbon, founded by Gustavus III. 1776. The badge has on a white ground the Vasa crest, a gold vase.—*Order of the Pole Star*, or black ribbon, founded 1748. The badge has on a blue ground a white cross charged with a silver star surrounded by the motto 'Nascit occasum.'—*Order of Charles XIII.*, founded 1811, has on its badge the number XIII. between two C's, the last reversed.

See *The Orders of Chivalry, War Medals and Crosses, &c.*, with illustrations, by Charles Norton Elvin (1893); *The Orders of Chivalry*, by Major J. H. Lawrence-Archer (1887); Carlisle's *Foreign Orders of Knighthood* (1889); Favine's *Theater of Honour* (trans. 1628), &c.

Orders, Religious. See MONACHISM, MILITARY ORDERS, HOSPITALERS, TEMPLARS.

Ordinaries. See HERALDRY.

Ordinate. See GEOMETRY.

Ordination. See ORDERS (HOLY).

Ordnance. See CANNON, FIREARMS, MACHINE GUN, MORTAR, &c.

Ordnance Survey. By this term is understood the various operations undertaken by the British government for preparing maps and plans of the whole kingdom and its parts, the term 'ordnance' being applied from the fact that during its earlier days the survey was carried out under the direction of the Master-general of the Ordnance. The idea of a general map of any portion of the country to be executed by the government was first proposed after the rebellion in 1745, when the want of any reliable map of the northern parts of Scotland was much felt by the officers in command of the royal troops. Its execution was entrusted to Lieutenant-general Watson, the deputy quartermaster of North Britain; but it was mostly carried out by Major-general Roy, an officer of engineers. The drawing, on a scale of $1\frac{1}{2}$ inch to the mile, was completed in 1755; but, in consequence of the war which broke out in that year, was never published. In 1784, with the object of calculating the difference of longitude between the observatories of London and Paris, a base-line was measured by General Roy, R.E., on Hounslow Heath, from which started a series of triangles extending to Dover. This triangulation was connected with that carried out in France in 1786. The government shortly afterwards decided on having, for military purposes, a general survey on the 1-inch scale of the United Kingdom, and the triangulation carried out by General Roy in the south-eastern counties became the basis of the general triangulation. In 1794 the survey for the 1-inch map was begun, and the first sheet was published in 1801. As the series of principal triangles was extended westwards towards the Land's End, it was thought right to measure another base on Salisbury Plain in 1794; and two base-lines for verification were subsequently measured—one in 1801 at Misterton Carr, and the other in 1806 on Ruddlan Marsh. Though first intended chiefly as a military map, the publication of the survey soon created a desire on the part of the public for better maps, and surveyors were then hired to hasten its progress. This, however, was very slow, the map being at one time entirely suspended during the war in the beginning of the 19th century, and even the parts which were executed, having been done by contract, were found very inaccurate. In this condition the survey of England continued during the first quarter of the century, sometimes delayed by the government from motives of economy, at other times urged on by the county gentlemen, who wished the map either as a hunting-map or for local improvements.

In Scotland the principal triangulation was

begun in 1809, but was discontinued in the following year, to enable the persons who had been employed there to carry forward the subordinate triangulation required for constructing the detail maps in England. In 1813 it was resumed, and continued steadily up to 1819; a new base-line having been measured on Belhelvie Links, near Aberdeen, in 1817, and the great sector used at various stations, both on the mainland and in the islands. In 1820 it was again suspended, was resumed in 1821 and 1822, and anew broken off in 1823, the large theodolite being wanted in order to proceed with the principal triangulation in South Britain. In 1824 the survey of Ireland was begun, and nothing more was done in Scotland till 1838, except that some detail surveying for a 1-inch map was continued for a few years in the southern counties. The chief strength of the surveying corps was now transferred to Ireland. A map of that country was required for the purpose of making a valuation which should form the basis of certain fiscal arrangements and other improvements which the social evils and anomalies of Ireland urgently demanded. For this map a scale of 6 inches to the mile was adopted, as best suited for the purposes in view. On this scale the whole map was completed, and published in 1845, though the first portions were in an imperfect form, and needing revision, which was proceeded with in 1873.

The triangulation of Scotland was resumed in 1838, and in 1852 the whole of the primary triangulation of the United Kingdom was completed. It comprises, in all, 250 trigonometrical stations, and the average length of the sides of the triangles is 35.4 miles, the longest being that from Scaw Fell to Slieve Donard, which measures 111 miles. During the triangulation of Ireland a base-line had been measured on the border of Lough Foyle. As a test on the general accuracy of the triangulation the length of this base was afterwards calculated through the series of triangles from the base on Salisbury Plain; the length so found differed from the measured base by only a little more than 5 inches. The distance apart of these two bases is about 360 miles, and their length about 41,641 and 36,578 feet respectively.

The survey of Ireland having been finished in 1840, surveys for a 6-inch map were begun for the northern portions of England which had not been previously mapped on the 1-inch scale. In 1841 some secondary operations for a map of Scotland, also on a 6-inch scale, were begun, but proceeded so slowly that in 1850 only the map of Wigtownshire and some parts of Lewis were completed. Much dissatisfaction having been expressed in Scotland by the press and public bodies as to the slow progress of the map and the 6-inch scale on which only it was published, a committee of the House of Commons (Lord Elcho's) recommended in 1851 the 6-inch maps to be stopped, and the 1-inch map completed as speedily as possible. This change produced much discussion as to the relative value of the 1-inch and 6-inch scales then in use, and the expediency of adopting a still larger scale as more valuable to the public. Circulars were issued, asking the opinion of various public bodies, and of scientific and practical men, as to the proper scale for a great national survey. The great preponderance of opinion was in favour of a scale of $\frac{1}{25000}$ of nature, or nearly 1 square inch to the acre. This scale was therefore ordered by a treasury minute of 18th May 1855 (Lord Palmerston's), and though subsequently stopped, in consequence of a motion by Sir Denham Norreys in the House of Commons in June 1857, was again recommended by a royal commission (December 1857), and ordered to be resumed by another treasury minute (11th September 1858). In 1861

a select committee was again appointed, and reported that it was desirable that the cadastral survey on the scales directed by the treasury minute of the 18th May 1855 be extended to those portions of the United Kingdom that have been surveyed on the scale of 1 inch to the mile only. This recommendation was presently adopted by the government, and, generally speaking, the whole of the United Kingdom was surveyed on the $\frac{1}{250000}$ scale, but large tracts of moorland and uncultivated districts were surveyed on the 6-inch scale only. London was surveyed on a scale of $\frac{1}{10560}$, or 5 feet to a mile; whilst other towns exceeding 4000 inhabitants, of which the buildings are fairly concentrated, on a scale of $\frac{1}{1056}$, or about 10 feet to a mile.

All these original surveys were completed by 1890, when the first revision commenced, and this was completed as regards Great Britain in 1907. During this first revision in Ireland the work previously done on the 6-inch was re-surveyed on the $\frac{1}{250000}$ scale. This first revision and re-survey of Ireland was finished in 1914.

The normal work of the survey consists now of revision. The $\frac{1}{250000}$ scale maps are revised every twenty years for urban areas, and forty years for country districts. The 1-inch map is revised independently every fifteen years.

Of the maps on the larger scales only that on $\frac{1}{250000}$ is revised at the cost of the state. Should a corporation require a town revised on the $\frac{1}{1056}$ scale, a portion of the cost has to be borne by the town itself.

For a long time the 1-inch was the smallest scale employed, but increased speed of locomotion has created a demand for maps on smaller scales, and those on 2 miles, 10 miles, and 16 miles to an inch are now published.

The maps on the 25 and 6 inch scales are drawn on rectangular projections for each county or groups of counties. The 1-inch map is projected on one central meridian, likewise the smaller scale maps, which are photographically reduced from that map.

Originally the Survey Department was under the War Office; in 1870 it was transferred to the Office of Works, and in 1890 to the then newly constituted Board of Agriculture. The appointment of the officers of Royal Engineers, as well as the organisation and discipline of the Royal Engineer Companies employed on the survey, has always remained in the hands of the Secretary of State for War.

On the sheets of the $\frac{1}{250000}$ map is shown the area of each plot of ground, and on this scale 1 square inch represents approximately 1 acre. The elevations are shown by lines of levels along certain roads; as a rule, one mile and a half of levelling is run on each plan of 960 acres. On the 6-inch scale areas of plots are not shown, but the configuration of the country is indicated by contours as well as by the lines of levelling.

The second Geodetic levelling of England and Wales was commenced in 1912, and completed in 1921. Zeiss precise levels and special staves graduated on invar were used. The mean sea-level datum was determined by hourly readings of a tide-gauge at Newlyn extending over a period of six years. The probable accidental error per mile of this second levelling is ± 0.0077 feet, as compared with a probable error of ± 0.03 feet in the original levelling carried out between 1840 and 1860. A feature of this second levelling is the system of fundamental bench-marks spaced about 30 miles apart. These bench-marks are of special construction, and their sites are selected that they may be, so far as possible, permanent and stable. They should be available for determining

in future years the vertical movements of the earth's crust and the relative movements of land and sea. In 1910 some special work was commenced near Lossiemouth, in Scotland, with the view of investigating the accuracy of the principal triangulation of the United Kingdom. A detailed account of this work is given in Ordnance Survey Professional Papers, New Series, No. 2.

For further general information about the survey, see a book published in Edinburgh in 1886, entitled *The Ordnance Survey of the United Kingdom*, by Colonel T. P. White, Royal Engineers. The state of revision on the various scales is shown in the Report of Progress made annually by the Director-General, and published by H.M. Stationery Office. The Survey Department issues a comprehensive catalogue containing indexes of all the plans and sheets of the survey; specimens of the various styles in which the maps are printed and coloured; lists of technical works dealing with the work of the survey, as well as lists of other works on subjects indirectly connected with the survey proper, such as facsimiles of old county and baronial maps of Ulster, copies of the Domesday Book of England, the Jerusalem and Sinai surveys, and many others.

Ordovician, a name sometimes given to a geological formation intermediate between Cambrian and Silurian; otherwise accounted the Lower Silurian strata. It is so called from the Ordovices, an ancient British tribe.

Örebro. See CEREBO.

Ore-deposits. An ore is a mineral from which, under existing economic conditions, one or more elements may be extracted at a profit. A mineral containing a large proportion of a metal is not necessarily an ore of that metal. For example, common iron pyrites (sulphide of iron) is rich in iron, but is not an ore of iron, because that metal cannot be profitably extracted from it. Some minerals become ores because of a valuable impurity; the pyrite deposits of Río Tinto and Tharsis, South Spain, are of this kind; they are worked for the small proportion of copper they contain. A mineral, formerly worthless, may become an ore because of progress in technology. Thus wolfram, at one time thrown away in large quantities in Cornwall, is now much prized as the chief ore of tungsten. Ores are met with in various forms and positions in the earth's crust. Sometimes they are found in gravel, sand, and other alluvial deposits. Examples of this class are afforded by the placers of Alaska (see GOLD), the now exhausted stream-tin works of Cornwall, and the bog iron ores of Sweden and elsewhere. In other cases the ores occur disseminated through igneous rocks. Tin ore and magnetic iron ore occur in this way. When the whole rock is permeated with mineral matter, accumulated in minute veins, the deposit is termed a *stockwork*. Examples of stockworks of tin ore occur in Cornwall and Saxony. Again, ores may occur in detached masses. Such, for instance, are the red hæmatite deposits of Furness, North Lancashire, the brown hæmatite of the Forest of Dean, the iron mountains of Gellivara and Taberg in Sweden, and the rich hæmatite deposits of Michigan. Ores may occur in regular parallel beds or seams interpolated between rocks of sedimentary origin, as in the case of the ironstone of the Coal-measures, and in that of the cupriferous shale of Mansfeld in Prussian Saxony, a seam not more than 5 inches thick which has been worked since the 14th century. Lastly, ores are met with in tabular masses, known as mineral veins or *lodes*, differing in character from the enclosing rocks. (See MINING for classification and definitions of deposits.)

Lodes are very variable in thickness, from a mere film up to 500 feet or more. Their longitudinal extent is equally variable. The great Mother Lode of California has been traced for a distance of 70 miles. In tabular deposits, whether beds or lodes, two dimensions predominate, and the third or smallest dimension, the perpendicular distance between the two bounding planes, is termed the thickness. The adjacent rock on both sides of these two planes is termed the *country*; the portion on which the deposit lies is the *foot-wall*, and that covering it is the *hanging-wall*. With beds or seams, these are known as the *floor* or *roof* respectively. The *strike* of a deposit is the direction of a horizontal line drawn in the plane of the deposit, and its *dip* is the inclination downwards measured in degrees from the horizontal. As the dip of lodes is usually considerable, it is often measured from the vertical, and is then termed *underlie* or *hade*. The portion of a mineral deposit occurring at the surface is known as the *outcrop*, *basset* or (in the United States) *apex*. The contents of lodes vary, some parts containing worthless vein matter or *gangue*, others being filled with ore. The productive portions are termed *courses*, *bunches*, *shoots* (U.S. *chutes*), or *pipes* of ore. Cross-courses are veins with a direction nearly at right-angles to the chief lodes of any particular mining district. Experience shows that the productiveness of lodes is affected by intersection with other veins, by the nature of the adjacent rock, and by changes of dip or of strike.

The origin of mineral veins is a much debated subject which has long occupied the attention of geologists. The close connection, direct or indirect, of veins with igneous rock masses is now generally admitted. Many deposits originated with the final phases of solidification of large *magmas*, or masses of once molten rock, generally deeply buried. In certain instances valuable ore is found in *dykes*, or sheet-like deposits of igneous rock (*pegmatites*) traversing other igneous rocks; in other cases the lode is nothing else than a mineralised zone extending through an igneous mass. The great copper deposit at Sacramento, South Arizona, is of the latter description, and so, on a much smaller scale, are many of the tin lodes of Cornwall. These Cornish lodes lie in granite; they have no definite walls or boundaries, the ore (cassiterite with other minerals) having spread or been *disseminated* from a narrow fissure in the granite into the rock on each side. They are considered to have resulted from the chemical attack of the granite by hot vapours rising up the fissure, and bearing volatile tin and other compounds. Other veins, occupying fissures of all sizes, have undoubtedly been formed of minerals deposited out of aqueous solution. Though these minerals are generally designated insoluble, they are all slightly soluble in water. Moreover, hot water under great pressure is a relatively powerful solvent. In many cases—perhaps the majority—of the kind now under consideration, the water originated in deep-seated hot igneous masses from the margins of which it dissolved mineral matter. As the very weak solution rose up the fissure it gradually cooled and deposited the minerals in their order of solubility. Most veins show by their structure that they were not formed at one period, but that the fissure opened and reopened, permitting of the ascension of different solutions at different times. Some vein-quartz has been carried in by downward percolation and some from the wall-rocks or ‘country.’ Certain shallow cracks in limestone (*gash-veins*) are found to contain iron ore, which must have been carried into the cracks from above. *Contact-deposits*, generally very irregular in width and roughly lenticular in plan, occur at the contact of two different rocks.

Some contact-deposits are of great importance as, for instance, those of Rio Tinto, which occur along the junction of slate and intrusive porphyry.

The scientific study of mineral deposits has made great headway of late years, and none of the earlier works repay perusal, except by those interested in the historical aspect of the subject. This branch of geology is systematically treated in Rastall's *Geology of the Metalliferous Deposits* (Cambridge, 1923), and Thomas and MacAlister's *Geology of Ore Deposits* (London, 1920).

Ore-dressing embraces those preparatory operations to which crude ore is submitted till any further work to extract the metalliferous content is best conducted by metallurgical operations. The two arts of dressing and metallurgy have this relation, that the former effects a mechanical and preparatory concentration of the valuable constituents, while metallurgy effects a chemical and final concentration.

The place of dressing, therefore, is definite. It receives the crude ore from the mine and delivers it suitably cleaned for metallurgical treatment. On the side of the mine the line between mining and dressing is distinct: dressing begins upon arrival at the shaft top. On the side of metallurgy there is some overlapping of the two arts. Ore-dressing is, for instance, taken to include such roasting or calcining as may be necessary to induce magnetism preparatory to dressing by magnetic separation; such also as may be necessary to break up a sulphide or arsenide preparatory to dressing by water; and such drying or other heat-treatment as may be preparatory to a directly-following dressing operation.

That there should be this place for dressing lies in certain physical and mineralogical differences between crude ore and ore suitable for metallurgical treatment, and in certain economic advantages accruing as the result of dressing. The certain differences are: firstly, in the matter of lump size; secondly, in that of the relative amount of valuable mineral present; thirdly, in the possible presence of valuable minerals of two metals, these minerals requiring separation before metallurgical operations may proceed; and, fourthly, in that of the possible presence of worthless minerals actively injurious to the success of the subsequent metallurgical operations. The advantages which accrue as the result of dressing are that there is less material to be submitted to the more expensive metallurgical treatment, or to transport if transport be necessary, and that the material so submitted is more regular in value and character. Against these advantages have to be set the actual cost of dressing, which is not high—generally 1s. to 6s. per ton treated—and the loss of mineral in the operation, this loss tending to be high, and being generally about 10 to 25 per cent. of the valuable content of the ore.

In greater detail, the broken ore sent from underground to the surface contains pieces of all sizes, from large lumps to powder, yet metallurgical operations cannot accept large lumps, and sometimes require complete pulverisation. It is not uncommon, therefore, for dressing to consist mainly of a reduction in size of the pieces, as witness the complete pulverisation required in the cyanidation of precious-metal ores.

Not less important is the necessity to raise the low mineral content of crude ore. Crude copper ore may, for instance, contain as little as 1.5 per cent. of copper, yet copper-smelting, by which the great bulk of copper is produced, generally requires more than 5 per cent. or there is too great a loss in the slag, and the present range is 10 to 35 per cent. The same may be said of lead; lead ore may sometimes contain as little as 4 per cent. of

lead, but smelting is rarely undertaken on material containing less than 10 per cent., a much higher content than this being usual. With zinc the necessity for a high zinc content is even more pronounced; though a large proportion of the world's production of zinc may be from ore containing as little as 5 per cent. metallurgy generally requires not less than 33 per cent., while common practice has a range of 40 to 60 per cent. With tin the case is extreme; crude tin ore does not often contain more than 2 per cent. of tin, yet metallurgical operations for the production of metal are rarely conducted upon material containing less than 55 per cent., and a still higher content is usual. With the precious metals, gold and silver, when these are associated with pyritic sulphides, the concentration of these sulphides into a much smaller bulk would permit their submission to a metallurgical treatment impossible by reason of expense to the great bulk of the original crude ore. It is common knowledge that even with such minerals as ironstone and coal, where the mineral content is very high, some amount of dressing or cleaning is necessary nowadays.

Then, in the matter of the complexity of many crude ores by reason of the presence of different valuable metalliferous minerals demanding separate metallurgical treatment, the sulphides of lead and zinc are close associates in deposits, yet only in proportion to the completeness of their separation by dressing can they be recovered metallurgically. More than that, not only is the unseparated portion of the interfering mineral lost, but, whether lead in zinc ore or zinc in lead ore, difficulties in subsequent treatment are caused by the presence of the one or the other. Similarly, lead present in copper ore is lost in smelting.

Finally, there is the presence of minerals not worthy of separation for themselves alone, but necessitating separation because of their active interference with subsequent metallurgical operations. Zinc is not infrequently present as an impurity with lead and copper ores, making the slags pasty when present above a certain proportion; an excess of alumina or silica has the same effect, necessitating greater heat to keep the slags fluid. On the other hand, iron must be removed from zinc ores, and so must fluorite; the retorts used in volatilising the zinc would suffer from the iron, and the mass would fuse in the presence of fluorite. Copper renders tin less suitable for plating, while iron alloys itself with tin to the loss of that metal. Copper and antimony minerals are liable to prejudice the success of the recovery of gold by cyanidation by destroying the cyanide or robbing the solutions of oxygen.

Obviously the natural associations of valuable and worthless minerals in ore-deposits make dressing necessary. Though that be so, it must be said that the differences in the physical properties of these minerals make dressing possible. These properties are: specific colour, lustre, general appearance, density, surface energy, magnetic permeability, electric conductivity, &c.

Of the first three properties advantage is taken in hand-picking and sorting. All minerals have distinctive colour and characteristic lustre, by which they largely declare themselves; upon that there is no need to insist. Where, however, these are masked by the sparse distribution of the mineral, the ore itself may have a distinctive appearance, as, for instance, is strikingly the case with the 'banket' of the Witwatersrand gold-fields, no difficulty being experienced in picking out pieces of this auriferous conglomerate from among the pieces of quartzite broken with it.

The remaining properties are those of which advantage is taken in mechanical dressing.

Of these the most important is specific density, commonly expressed in terms of specific gravity; most metalliferous minerals are of relatively high density. This property, it is true, can be appreciated by the human intelligence, and advantage of it may be taken in hand-picking; the sense of weight in the hand would declare the metalliferous nature without assistance from sight. In mechanical dressing, however, it is not by greater pressure upon a support that higher density usually takes effect, but by a more rapid rate of fall in a resistant medium, generally water, or by the greater inertia of the denser particle. Differences in density are the basis of that most important means of dressing, Water Concentration, as well as of Pneumatic Concentration.

Next in importance comes specific surface energy. As with liquids, each solid, and accordingly each mineral, possesses a surface energy peculiar to itself. This energy, unlike liquid surface energy, cannot be directly measured, but it manifests itself when a solid is brought to an interface between two fluid phases, say, that between air and water. Then, according to the equilibrium obtaining between the three interfacial energies present, the solid will become wetted and sink, or it will hold back the water and float, provided it be fine enough. With sulphide ores crushed to a pulp with water the solid-liquid interfacial energy of the mineral particle is relatively high, or by the addition of suitable agents can so be made, and the particle forming part of a system containing potential energy and being free to move will break upwards through an air-liquid interface to bring the potential energy to a minimum. With gangue it is the other way; the solid-liquid interfacial energy is relatively low or can so be made, and the particle finds its condition of stability in the liquid. The dressing operations, which in this manner make use of differences in surface energy, constitute Flotation Concentration.

Next, but no longer of primary importance, come the magnetic properties of minerals. Each mineral has a specific power to concentrate lines of magnetic force within its mass (and thus to develop polarity), that is, to become magnetic; this property is known as its magnetic permeability. Some minerals, such as magnetite, have a high permeability—that is, they are highly magnetic; others, such as wolframite, are feebly magnetic; while others again, such as cassiterite, are non-magnetic. Differences in magnetic permeability are the basis of Magnetic Separation.

Specific electric conductivity is made use of in Electrostatic Separation. Most of the ore-minerals are good conductors, and in consequence quickly become charged and repelled when placed in contact with a charged body. Contrariwise, most of the gangue-minerals are non-conductors, and, becoming charged only at the actual contact, are not so vigorously repelled. Differential paths may thus be forced upon mineral and gangue, and a separation thereby be effected. It is possible that the future may see specific inductive capacity a means of separation.

As indicated above, a reduction in the size of the crude ore—this reduction being spoken of as Comminution—is an essential part of dressing. With ores suitable for direct smelting or for direct treatment by chemicals in solution comminution may constitute the whole of dressing, the crude ore being thereby prepared for fusion or for the intimate play of solutions. Where, however, mechanical separation follows, comminution, accomplishing the release of the mineral grains from those of the gangue or worthless material, is but a part of dressing; dressing, then, includes the important separating operations

which follow, from which operations the mineral is obtained clean—that is, in a concentrated condition.

The machines used in comminution may apply pressure, as with rock-breakers and rolls; or pressure and attrition, as with roller-mills and grinding-pans; or attrition and impact, as with cylinder-mills; or they may apply impact practically alone, as with falling stamps. Water concentration requires release of the mineral without excessive pulverisation. To that end the separating operations should begin in as coarse a stage as possible, that the coarse mineral may be withdrawn before the finer stages of comminution begin. With flotation no similar necessity to avoid fine comminution exists, but comminution proceeds better when the material already crushed fine enough is withdrawn from a succeeding crushing operation; moreover, by dividing the crushing into stages the machine chosen for each stage may be better suited to the size of material at that stage. Finally, with treatment by chemical solutions the finest comminution is desirable, and this again is most economically achieved by crushing in stages. Comminution, therefore, generally proceeds in stages defined by sizing appliances, screens in the coarser sizes, and water-sizing appliances, known as classifiers, in the finer sizes.

Water concentration is effected either with the aid of the vertical movement of water as in jigs, or by its horizontal flow in a thin film as on inclined tables, the streaming action of the flow being generally supplemented by a shake or oscillation, as on shaking tables and oscillating belts, the latter being known as vanners. Vertical movements of water are applied to coarse material, the mineral falling by its greater density; gentle flow down an inclined plane is applied to fine material, the mineral particles remaining while those of gangue are rolled away; and the shake is applied to an intermediate size which has sufficient ponderability to respond to an applied impulse. Water concentration is employed with every success to recover coarse mineral; it is also successful with fine mineral so long as the material retains some granularity; but the recovery diminishes with the particle size, till eventually, from material having the size-condition of slime, it is quite unsatisfactory. With sulphide ores fine material is best treated by flotation; with oxide ores, such as tin ores, there is as yet nothing to do but to continue to treat such fine material by water. Speaking generally, it is seen that water concentration proceeds by stages, and with machines suited to each stage; this division of the work is again effected by sizing appliances, screens with the coarse sizes and classifiers with the fine sizes.

Flotation recovers fine particles of mineral sulphides in a froth which forms after agitation in water to which a soluble contaminant has been added. This contaminant permits a mist of minute air-bubbles to be maintained in the water, which bubbles being brought into contact with the particles by agitation make selection of those which are of mineral, leaving those of gangue alone. To reinforce this natural tendency an oily contaminant for the mineral particles is added, this contaminant spreading itself as a tenuous film over the sulphide particles, the gangue particles again being left alone. The two contaminants, that for the water and that for the sulphide particles, are generally found in the soluble and insoluble portions respectively of a single oily substance, natural or compounded. Rising to the surface the air-bubbles merge themselves into what is essentially a mineral froth, the mineral particles endowing the relatively large bubbles with the elasticity necessary for their permanence.

This froth is scraped away, or it builds itself so high that it overflows. Flotation is successful on fine mineral and on the finest, but it cannot be employed with mineral coarser than about a third of a millimetre. Where the ore is fine-grained, flotation may accomplish the whole work of separation; but ordinarily the grain is such that the dressing system finds water concentration and flotation in combination, the former to recover the coarser, the latter to recover the finer mineral.

These two methods of concentration, water and flotation, are the prime methods of dressing, sharing between them, and with little help from other methods, the brunt of maintaining for dressing a useful place is the beneficiation of ore deposits. The other methods are quite subsidiary; magnetic concentration may be applied to the recovery of magnetite from a crude magnetite ore, but its most useful application is in the cleaning of concentrates already obtained by water concentration, the removal of iron from a zinc concentrate, for instance; the separation of wolfram from a tin concentrate; the recovery of monazite from beach sands.

Dressing, it is seen, is essentially a middle operation, of which the raw material, crude ore, may be considered as purchased at the cost of mining, and the finished article, dressed ore, as saleable at the price it is worth to the metallurgist. As such, greatest profit is the over-riding consideration, and not perfect cleanliness nor complete recovery. The extent of dressing, accordingly, varies considerably. Dressing is only pursued as long as the better terms received for the concentrate more than make good the extra cost and the extra loss of mineral involved in prolonging the operation. Rich ores allow more equipment and a more extensive dressing; poor ores have to be content with the simplest dressing—a simple washing may be all.

The choice, grouping, and arrangement of the machines employed constitutes the dressing system, which, when represented graphically, gives what is described as the flow sheet.

Oregon, one of the Pacific states of the American Union, was named from the Oregon River (an Indian name), now known as the Columbia (q.v.), and is bounded N. by Washington, E. by Idaho, and S. by California and Nevada. Area, 95,600 sq. m., or almost twice that of England. Oregon on the west is literally rock-bound by the Coast Range of mountains, having, however, numerous indentations which furnish good harbours for sea-going vessels. The Columbia River affords the largest and deepest entrance. Seventy miles east of the Coast Range is the Cascade Range, rising to a height of 6000 to 8000 feet, and at almost regular intervals surmounted by snow-capped peaks of nearly double that altitude. From the Cascade Range eastward to the Blue Mountains, about 70 miles, and farther on to the eastern boundary of the state, the surface is diversified by mountains and valleys, rolling plains, and tablelands. Here the soil and climate are suitable for agriculture and grazing. In Western Oregon is the Willamette valley, 130 miles long and 60 miles wide, every foot of which is arable and fertile—adapted by soil and climate to grain and fruit. The valley is situated between the Coast Range and the Cascade Range of mountains. South of this are the Umpqua and Rogue River valleys, both of which produce large quantities of fruit.

The climate of Oregon is mild, in spite of its northerly situation, owing first to the oceanic current from Japan, which, starting with a temperature of 90°, is from 49° to 54° off the coast here. Moreover, the cold Arctic winds are warded off by the Cascade Range, and no blizzard can cross the Rocky Mountains. The range of temperature from

summer to winter is small. On the coast the climate is mild and varies little, but there is fog in summer and excessive rain in winter; in the Willamette valley the summers are pleasant, the winters wet, and spring and autumn foggy in the mornings; the Umpqua valley has a delightful climate, with some snow in winter; and the same, with greater heat and cold, is true of the Rogue River valley, the lake region in the south-east, and Eastern Oregon, where there is a good deal of snow in winter. The average mean temperature is 50° F., the rainfall 36 inches—17 at Linkville, in the interior, and 59 at Astoria, on the coast.

The grain-crops of Oregon are wheat, oats, barley, maize, and rye, in this order. Flax-seed, hay, potatoes, tobacco, sugar-beet, and hops (principally along the rivers Willamette and Mackenzie) are also raised. Several million pounds of butter and cheese are produced annually. Great quantities of fruit, both green and dried, are annually shipped from the state, especially from the western districts; but in Eastern Oregon, too, excellent fruit is produced, and, as the bunch-grass is fast disappearing, and the herds of cattle are diminishing, agricultural and horticultural pursuits are receiving more attention. The lands best suited for fruit-farming are mainly limited to the valleys and foot-hills; but these are of vast extent, and the extreme richness of the soil and the mildness of the climate make the state's productive powers almost inconceivably great. The demand abroad for Oregon fruits continues steadily to increase. The most successful fruits are the Italian prune, apples (Oregon is called 'the land of red apples'), pears, peaches, grapes, and cherries (the Royal Ann cherries grow too large for one bite). Oregon possesses one-sixth of the standing timber of the United States. The Oregon Pacific Railroad, in crossing the Cascade Range, passes through a great timber belt extending for 90 continuous miles; and it is stated that careful examination shows in one locality enough timber on one square mile to supply for twenty years a mill cutting 150,000 feet a day.

Among the other industries of Oregon may be mentioned the catching and tinning of salmon (which the Columbia River has long yielded in great abundance); the rearing of sheep (the eastern part of the state producing large quantities of wool of good quality); and mining. The minerals of the state comprise coal, iron ore, gold (declining in yield of late years), copper, nickel, quicksilver, fireclay, chrome, silver, manganese, zinc, lead, and platinum. Trade is facilitated by numerous lines of railway, and the navigable rivers have steamers running all the year. Politically the state is notable as being the chief seat of the Initiative and Referendum, which have worked successfully.

Under the title of Oregon was formerly included all the land between the Rocky Mountains and the Pacific Ocean north of 42° N. lat. John Jacob Astor established Astoria (q.v.) in 1811; in 1813 it was sold to the North-western Fur Company, and it afterwards passed into the possession of the Hudson Bay Company. Great Britain's claim to the territory was based on Drake's discovery of the coast in 1579, Cook's visit to Juan de Fuca Strait in 1778, the explorations of Captain John Meares in 1788-89, and Vancouver's survey of the entire coast from 30° to 60° N. lat., and discovery and ascent of the Columbia River, in 1792. A treaty of joint occupation was agreed to between Britain and the United States in 1818, and endured until 1846. Settlement by the New Englanders began in 1832, and an Indian mission was planted at Salem by the Methodists in 1834. The Oregon question was a prominent feature of the presidential

contest in 1844. In 1846 the dispute was compromised, the boundary line with British America being fixed at 49° N. lat. Oregon became a territory in 1848, and, with reduced limits, a state in 1859. It has thirty-six counties, and sends three representatives and two senators to congress. The judges of the supreme court are elected by popular vote. In 1919 the total expenditure on public school education was about fifteen million dollars. The public school system consists of district schools free to all between the ages of four and twenty, the state university at Eugene, the state agricultural college at Corvallis, and normal schools, besides institutions for the blind, deaf and dumb, and orphans. There are also many private and denominational institutions, including the Willamette University, Pacific University, &c. The principal cities are Portland (population 258,000), Salem, the capital (18,000), Astoria (14,000), Eugene (10,600). Pop. of the state (1860) 52,464; (1880) 174,768; (1900) 413,536; (1910) 672,765; (1920) 783,389.

Oregon River. See COLUMBIA.

Orel, a town of Russia, stands on the Oka, 222 miles by rail SSW. of Moscow, has manufactures of ropes, tallow, bricks, machinery, and verdigris, and a busy trade in grain, ropes, tallow, hemp, and timber. It was burned down in 1848 and again in 1858. A university was established in 1919. Pop. 72,000.

O'Rell, MAX. See BLOUET.

Orellana. See AMAZON.

Orelli, KASPAR VON, scholar, was born at Zürich, 13th February 1787. Ordained in 1806, he next year became a Reformed preacher at Bergamo; in 1813 a teacher in the cantonal school at Chur; in 1819 professor at Zürich, and in 1833 professor of Classical Philology in the newly-founded university. He died at Zürich, 6th January 1849. Orelli edited many classical authors with great learning, taste, and acute discrimination, in particular Horace (1837-38), Tacitus (1846-47), and Cicero (1826-31). His *Onomasticon Tullianum* (1836-38) and *Inscriptionum Latinarum Selectarum Collectio* (1828) also deserve mention.

Orelli, KONRAD VON (1846-1912), theologian, born at Zürich, studied at Lausanne, Zürich, Erlangen, Tübingen, and Leipzig, and was professor at Basel.

Orenburg, a town of Russia, capital of the Kirghiz republic, stands on the river Ural, by rail 727 miles ESE. of Moscow. Founded (1743) as a frontier fortress, it is now of importance for its commerce; it imports cotton, silk-stuffs, cattle, hides, &c. from Bokhara, Khiva, and Tashkent. Corn, metals, sugar, woven goods, camel-hair are the principal exports. The Orenburg and Tashkent railway was opened in 1905. Pop. 100,000.

Orense, capital of the Spanish province of Orense, near the frontier of Portugal, on the left bank of the Minho, and 60 miles from its mouth. It has hot sulphurous springs, and manufactures woollens, linens, and chocolate. Pop. 18,000.

Oreodaphne, an old genus now mostly included in *Ocotea* (q.v.).

Oreodonts, an extinct family of ungulates, the remains of which occur in the Tertiary deposits of North America.

Oreodoxa. See PALM.

Orestes, son of Agamemnon and Clytemnestra. When his father was murdered by his mother and her paramour Ægisthus, he was saved by his sister Electra, who sent him secretly to Phocis to the court of Strophius, husband of Agamemnon's sister. Here he formed a romantic friendship with the king's son, Pylades, and as soon as he had grown up the pair went secretly to Argos, and slew Clytemnestra

and Ægisthus. Madness seized him after the matricide, and he fled from land to land, ever haunted by the avenging Erinyes or Furies. At Athens, whither he had fled by advice of Apollo, he was purged of guilt by the Areopagus. Learning from Apollo, according to another story, that he could only recover from his madness by carrying off the statue of Artemis from the Tauric Chersonesus, he journeyed thither along with Pylades, but the friends were seized by the natives to be sacrificed to Artemis. Her priestess Iphigenia recognised her brother in Orestes, and all three escaped together, carrying the statue with them. Orestes recovered his father's kingdom at Mycenæ, slew Neoptolemus, and married his wife Hermione, who had been formerly promised to himself. The story of Orestes afforded a favourite theme to the great tragedians—to Æschylus in the extant trilogy, the *Oresteia*; to Sophocles in his *Electra*; to Euripides in his *Orestes* and *Electra*. See Becker, *Die Orestes-sage der Griechen* (1858).

Orfa. See EDESSA.

Orfila. MATHIEU JOSEPH BONAVENTURE, founder of the science of toxicology, was born at Mahón in Minorca, 24th April 1787, and studied at Valencia, Barcelona, and Paris (whither he was sent by the junta of his province). In October 1811 he received the degree of Doctor of Medicine, and immediately commenced a private course of lectures on chemistry, botany, and anatomy, which was largely attended, and, along with his successful practice, soon rendered him famous. In 1813 appeared the first edition of his celebrated work on poisons, entitled *Traité de Toxicologie Générale* (Paris). In 1819 he was created a citizen of France, and became professor of Medical Jurisprudence; and in 1823 he was transferred to the chair of Chemistry, to which in 1831 was added the deanship of the faculty. On the outbreak of the revolution of 1848 he was deprived of his place in the medical faculty on account of his conservative opinions, but retained his professorship. He died at Paris, March 12, 1853. Other works were on medical chemistry (1817) and on forensic medicine (1825). He also contributed largely to various journals, dictionaries, and encyclopædias.

Orford. See WALPOLE.

Organ (Gr. *organon*, 'an instrument'), a musical instrument played by keys, and generally also by pedals, and consisting of metal and wood pipes, which sound by wind stored in bellows, and admitted into them at will. The following description is necessarily restricted to the most fundamental arrangements of this very complicated instrument. As met with in cathedrals and large churches, the organ comprises four departments, or sometimes more, each in most respects a separate instrument with its own mechanism—the *great-organ*, the *choir-organ*, the *swell-organ*, the *pedal-organ*, sometimes the *solo-organ*, possibly also the *echo-organ*. Each has its own keyboard, but the different keyboards are brought into juxtaposition, so as to be under the control of one performer. Keyboards played by the hands are called *manuals*; by the feet, *pedal-boards*. Three manuals, belonging to the choir, great, and swell organs respectively, rise above each other like steps in front of the performer, while the pedals by which the pedal-organ is played are placed on a level with his feet. The condensed air supplied by the bellows is conveyed through a *wind-trunk* into a *wind-chest*. Each department of the organ, it may be mentioned, has its wind-chest. Attached to the upper part of the wind-chest is the *upper board*, an ingenious contrivance for conveying the wind at pleasure to any individual pipe, or pipes, exclusively of the rest.

In the upper board are set the *pipes*, of which a number of different quality, ranged behind each other, belong to each note. Beneath the upper board is a row of parallel *grooves*, running horizontally backwards, corresponding each to one of the keys of the instrument. On any of the keys being pressed down, a valve is opened which supplies wind to the groove belonging to it. The various pipes of each key stand in a line directly above its groove, and the upper surface of the groove is perforated with holes bored upwards to them. Were this the whole mechanism of the sound-board the wind on entering any groove would penetrate all the pipes of that groove; there is, however, in the upper board another series of horizontal grooves at right angles to those beneath, supplied with *cross-slides*, which can be drawn out or pushed in at pleasure by a mechanism worked by the *draw-stops* placed within the player's reach. Each slide is perforated with holes, which, when it is drawn out, complete the communication between the wind-chest and the pipes: the communication with the pipes immediately above any slide being, on the other hand, closed up when the slide is pushed in. The pipes above each slide form a continuous set of one particular quality, and each set of pipes is called a *stop*. Each department of the organ is supplied with a number of stops, producing sounds of different quality. The *great-organ*, some of whose pipes appear as show-pipes in front of the instrument, contains the main body and force of the organ. Behind it stands the *choir-organ*, whose tones are less powerful, and more fitted to accompany the voice. Above the choir-organ is the *swell-organ*, whose pipes are enclosed in a wooden box with a front of louvre-boards like Venetian blinds, which may be made to open and shut by a pedal, with a view of producing *crescendo* and *diminuendo* effects. The *pedal-organ* is sometimes placed in an entire state behind the choir-organ, and sometimes divided and a part arranged on each side. The opening of the valve on the pressing down of the key may be effected by a mechanism of rods, levers, and rollers, moved either directly by the energy of the organist or by pneumatic apparatus brought into play when the key is down (thereby lightening the touch); but since 1867 tubular pneumatic and electro-pneumatic actions have come into use. These substitute air-tubes or an electric cable for the old 'trackers.' Greater freedom in the distribution of an organ about a building is thereby obtained, an advantage not always unmixed. Depressible stop-keys take the place of draw-stops.

Organ-pipes vary much in form and material, but belong to two great classes, known as *flue-pipes* and *reed-pipes*. A section of one of the former is represented in the figure. Its essential parts are the *foot* *a*, the *body* *b*, and a flat plate *c*, called the *language*, extending nearly across the pipe at the point of junction of foot and body. There is an opening, *de*, in the pipe, at the spot where the language is discontinuous. The wind admitted into the foot rushes through the narrow slit at *d*, and, in impinging against *e*, imparts a vibratory motion to the column of air in the pipe, the result of which is a musical note, dependent for its pitch on the length of that column of air, and consequently on the length of the body of the pipe: by doubling the length of the pipe we obtain a note of half the pitch, or lower by an octave. Such is the general principle of all flue-pipes, whether of wood or of metal, subject to considerable diversities of detail. Metal pipes have generally a cylindrical section, wooden pipes a square or oblong section. A flue-pipe may be stopped at



the upper end by a plug called a *tompion*, the effect of which is to lower the pitch an octave, the vibrating column of air being doubled in length, as it has to traverse the pipe twice before completing its course. Pipes are sometimes half-stopped, having a kind of chimney at the top. The *reed-pipe* consists of a reed placed inside a metallic pipe. This *reed* is a tube of metal, with the front part cut away, and a tongue or spring put in its place. The lower end of the tongue is free, the upper end attached to the top of the reed; by the admission of air into the pipe the tongue is made to vibrate, and, in striking either the edge of the reed or the air, produces a musical note, dependent for its pitch on the length of the tongue, its quality being determined to a great extent by the length and form of the pipe or bell within which the reed is placed. When the vibrating tongue does not strike the edge of the reed, but the air, we have what is called the *free reed*, similar to what is in use in the Harmonium (q.v.). To describe the pitch of an organ-pipe terms are used derived from the standard length of an open flue-pipe of that pitch. The largest pipe in general use in a large organ is the 32-feet C, which is an octave below the lowest C of the modern pianoforte. By a 32-feet or 16-feet stop we mean one whose lowest note (C) is produced by a pipe 32 feet or 16 feet in length.

The stops of an organ do not always produce the note properly belonging to the key struck; sometimes they give a note an octave, or, in the pedal-organ, even two octaves lower, and sometimes one of the harmonics higher in pitch. The variety of stops, of course, gives an organ a much greater compass than the two and a half octaves of its manuals promise. *Compound* or *mixture stops* have several pipes to each key, corresponding to the different harmonics of the ground-tone. There is an endless variety in the number and kinds of stops in different organs; some are and some are not continued through the whole range of manual or pedal. Some of the more important stops are called *open* or *stopped diapason* (a term which implies that they extend throughout the whole compass of the keyboard). The stops on an organ are principally of 8 feet in the manuals. The *dulciana* is an 8-feet manual stop, of small diameter, so called from the sweetness of its tone. Among the reed-stops are the *clarion*, *oboe*, *bassoon*, *vox humana*, *trumpet* or *posauene*, and *trombone* or *ophicleide*, deriving their names from real or fancied resemblances to these instruments and to the human voice. Of the compound-stops the most prevalent in Britain is the *sesquialtera*—more frequently called *mixture*—consisting of three to five ranks of open metal pipes, often a 17th, 19th, 22d, 26th, and 29th from the ground-tone. The resources of the organ are further increased by appliances called *couplers*, by which a second manual and its stops can be brought into play, or the same manual can be united to itself in the octave below or above.

Organs are now generally tuned on the equal temperament (see TEMPERAMENT). The notation for the organ is in three staves, consisting of a treble and two bass clefs; but in old compositions the soprano, tenor, and alto clefs are used.

The organs used in antiquity were principally water-organs. Large water-organs were employed to accompany the performances at the Roman theatres, and similar instruments were to be found in the hippodromes of Constantinople. The scope of the instrument was therefore originally secular, and one of the earliest patrons of the organ was the Emperor Nero. Ctesibius of Alexandria must be credited with the invention of the organ. Taking the idea from a peculiar sort of clepsydra or water-clock which he had invented, and one function of

which was to tell the hours of the night by musical notes, he worked onwards from invention to invention until he constructed the earliest water-organs. The instruments shown to Nero and the first organs ever seen in Rome were from the designs of Ctesibius. The water mechanism in the 'water-organs' was connected solely with the blowing, and seems to have been insisted on so strongly by the early organ-builders in order to render that operation equable and steady. By means of pistons working in cylinders the wind was pumped through water into the wind-chest, where were set the pipes, furnished on the bottom with slides, which were connected with iron keys by strings or trackers. Such was the main difference between the water-organ and the wind-organ. The water-organ became the rage of Rome and increased in favour as the empire hastened to its decline. In the reign of Honorius (400 A.D.) no nobleman's house was considered complete without its organ, and portable water-organs were made in great numbers which could be carried by slaves from house to house, where concerts or musical gatherings were attended by their masters. After the overthrow of the western empire organ-building seems to have been lost, among other useful arts, under the influence of the barbarian inroads. Constantinople, however, remained what it had always been, the great home of organ-building in the ancient world. The magnificence of the organs in the Golden Hippodrome is spoken of with enthusiasm by the Byzantine historians. An organ which was brought by certain Byzantine ambassadors on a mission to Charlemagne is said to have served as a model for the first organ ever built in mediæval Europe, constructed by the orders of that emperor according to the Greek pattern. From Aachen the use of organs spread throughout Charlemagne's empire, and this instrument served as a model for the rest.

The application of bellows to the organ was known in the days of the later Roman emperors. On the obelisk of Theodosius we have a delineation of an organ blown solely by bellows. Probably the invention of the bellows mechanism dates from the time of the Emperor Julian. Yet this great secret of organ-building was rarely if ever acted upon; and until the end of the 9th century, when Germany had become the centre of organ-building, water-organs were the almost exclusive form of organ employed both in Europe and the East. Towards the end of the 9th century large bellows organs began to be built, in keeping with the large Romanesque churches of the times. Thirty bellows were employed in some of these organs; the outstretched arms of the organist could not span the compass of an octave; and the player or players struck each key with the fist. In the monasteries meanwhile, where size was not so much in demand, the mechanism of the organ was marvellously elaborated. The complete furnishings of the organ parts were manufactured in the monasteries, even down to the smelting of the metals whereof the pipes were made. Those diminutive organs, called *regals*, so small that they could be held on the palm of the hand, were the outcome of monastic ingenuity, and Pope Sylvester II. was a warm patron of organ-building, and himself no mean inventor in the art.

The family of the Antignati, in Brescia, had a great name as organ-builders in the 15th and 16th centuries. The organs of England were once in high repute, but the puritanism of the Civil War doomed most of them to destruction; and when they had to be replaced after the Restoration it was found that there was no longer a sufficiency of builders in the country. Foreign organ-builders were therefore invited to settle in England, the most remarkable of whom were Bernhard Schmidt

(generally called Father Smith), his nephews, and Renatus Harris. Christopher Schreider, Snetzler, and Byfield succeeded them; and, at a later period, Green and Avery, some of whose organs have never been surpassed in tone. Notable 19th-century organ-builders were Barker, Willis, and Hope-Jones. The German organs are remarkable for preserving the balance of power well among the various masses, but in mechanical contrivance they are surpassed by those of England.

Up till the middle of the 19th century little interest was taken in organ-building in America. The erection of the great organ in the Music Hall, Boston, by a German builder, Walcker of Württemberg, gave the first impetus to public interest in the matter.

For the structure of the organ, see Hopkins and Rimbault, *The Organ* (Lond. 1855-77); Audsley, *Art of Organ Building* (1913); Audsley, *The Organ of the 20th Century* (1920); W. and T. Reeves, *Organ-building* (1922). For the history of the organ, see Rowbotham, *History of Music*, vol. iii. (1887); Williams, *Story of the Organ* (1903). For organ-playing, see Archer's *Practical Organ Tutor*, Best's *School for the Organ*, Stainer's *The Organ*; Buck, *Organ Playing* (1912). There are also works on the organ by Warman (1882-87) and Elliston (1924). The American organ is discussed at HARMONIUM; and BARREL-ORGAN is a separate article.

Organ, Organic, Organism, terms derived from the Greek *organon*, 'an instrument,' and still retaining in some of their applications that significance. But the words have found special acceptance in connection with the forms of life; Linnæus described these, whether animals or plants, as *Organisata*; and we constantly speak of them as organisms, of their larger, well-defined, and integrated parts as organs, of their internal activity and its products as organic. Prior to the year 1828 it was believed that certain chemical compounds which were produced as the results of vital processes occurring within the tissues of animal and vegetable organisms could not be obtained by the ordinary methods of the chemical laboratory; and these compounds were, for this reason, designated as organic. Wöhler in that year, however, discovered that urea, the most important solid constituent of urine, could be obtained 'artificially,' as it has been called, from inorganic materials. Since that date a very large number of so-called organic compounds have been prepared artificially, so that the original signification of the term 'organic' does not hold any longer; and the old conception of an organism as an engine-like collection of organs with fixed functions is disappearing before the doctrine that it is the protoplasm or living stuff in all parts of the body that is the basis of all vital activities. The title of organic chemistry is now commonly applied to the chemistry of the compounds of carbon, whether these compounds are obtainable only as the products of vital processes or not; see the articles CHEMISTRY and ANALYSIS (ORGANIC). Organic impurities in water are those due to animalcules, bacteria, and decomposing organisms; while such phrases as 'organic disease,' 'organic connection,' refer to the relation between a living organism and its parts. See BIOLOGY, FUNCTION, MORPHOLOGY, PHYSIOLOGY.—For organic bases, see ALKALOIDS; for organic radicals, see RADICAL.

Organo-metallic Bodies. Under this term are included a large number of chemical compounds in which organic radicals, such as methyl, CH_3 , ethyl, C_2H_5 , &c., are united to metals. Amongst the earliest obtained of these substances were those derived from the metal zinc. Zinc-methyl, $\text{Zn}(\text{CH}_3)_2$, and zinc-ethyl, $\text{Zn}(\text{C}_2\text{H}_5)_2$, which may be taken as examples of the class, are colourless liquids, heavier than water, which boil at 46° and

118° C. respectively. They take fire spontaneously in contact with air, and burn with the production of a dense white smoke of oxide of zinc. In contact with the skin they give rise to severe wounds which are very difficult to heal. They are decomposed with great energy by water. Substances analogous to these zinc compounds have been prepared, containing cadmium, magnesium, antimony, arsenic, bismuth, tin, aluminium, mercury, lead, sodium, potassium, and some rare metals.

Organzine. See SILK (*Preparation of Silk*).

Orgies, secret rites or customs connected with the worship of some of the pagan deities; as the secret worship of Demeter, and the festival of Dionysus, which was accompanied with many customs of mystic symbolism, and much license. From this latter accident comes obviously the modern sense of drunkenness and debauchery implied in the word. See MYSTERIES.

Oribasius, a Greek medical author, and physician to Julian the Apostate (326-403 A.D.). He was born at Pergamus or Sardis, and his works are largely compilations from Galen (see MEDICINE). There is an edition of his works in 6 vols. by Buffemaker and Daremberg (Paris, 1852-76).

Oriel Movement. See KEBLE, NEWMAN.

Oriel Window, a projecting window in an upper story, supported on corbels, having more sides than one, usually three, and commonly divided into bays by mullions. It is one of the most picturesque features in mediæval and Elizabethan domestic architecture, and adds much to the convenience of the interior. The word oriel (Mid. Lat. *oriolum*, probably dim. from *os*, *oris*, as if a small opening or recess) formerly meant a chamber or apartment, and a window is so called which makes, as it were, a small apartment off a large room. By old writers oriels are called Bay Windows (q.v.).

Orientation, in Architecture, is the position of a church so that its chancel shall point towards the east. This was a fashion invariably adopted in northern countries, but not adhered to in Italy and the south. St Peter's at Rome, for example, has the choir to the *west*, and the principal entrance towards the east. The orientation of churches is not usually very exactly to the east, and it is supposed that the east end in some cases has been set so as to point towards the place where the sun rises on the morning of the patron saint's day. In other cases the choir and nave are not built exactly in a straight line, the choir having thus a slight inclination to one side, which in the symbolism of the middle ages was supposed to indicate the bowing of Christ's head upon the cross. This may be due to building at different dates, the direction of sunrise on the saint's day having perceptibly changed in the interval. Departure from the line of the true east, however, in many instances arose more probably from carelessness or ignorance. Attempts have been made to determine the dates of Egyptian temples and of such monuments as Stonehenge on the assumption that the sun or a star was observed along the axis of the building at rising or setting, on some particular date, as the solstice. Thus slight changes of direction of successive additions to the temple at Luxor have been supposed due to changing amplitude of the star. Such calculations begin with guesswork, and sometimes lead to unlikely conclusions. For kindred customs see EAST.

Oriflamme, the red silk banner first of the Abbey of St Denis, and afterwards of France, was so called because it was a flag (*flamme*) borne on a gilded (*or* = 'gold') staff. See FLAG.

Origanum. See MARJORAM.

Origen, the most learned and original of the early church fathers, and perhaps the noblest figure amongst them all, was born, probably at Alexandria, in 185 or 186. His full name was Origenes Adamantius. He was the son of the Christian martyr Leonidas, who was beheaded under Severus in 202. 'Origen was great even from his cradle,' says Jerome. In the early years when he was instructed by his father, Eusebius tells us, 'the simple and easy meanings of the sacred Scriptures were not enough for him, but he sought something deeper,' and Leonidas would often bend over his son's bed as he lay asleep and kiss his breast, 'which the Spirit of God had made His temple.' In the catechetical school of Clement he formed the friendship of Alexander, afterwards Bishop of Jerusalem. He encouraged his father to martyrdom, and his purpose of joining him in this was only frustrated by the artifice of his mother, who concealed all his clothes. After his father's death he supported his mother and six brothers by teaching 'grammar,' and from his eighteenth year he acted, with the consent of his bishop Demetrius, as master of the catechetical school. A collection of classical books which he had bought or copied out for himself he sold for a sum which yielded him four obols (or about 6d.) a day, which sufficed for his simple wants for many years. According to Eusebius he went so far in his asceticism as to mutilate himself, following a literal interpretation of Matthew, xix. 12, but by some this is doubted. His intercourse with heretics and educated heathens led him to devote himself to more thorough study of Plato, the later Platonists and Pythagoreans, and the Stoics, under the guidance of the Neoplatonist Ammonius Saccas. At Alexandria he taught for twenty-eight years (204-232), composed the chief of his dogmatic treatises, and commenced his great works of textual and exegetical criticism. The labours of those years were interrupted by journeys to Rome, Arabia, Antioch, and other places. During a visit to Palestine in 216 the bishops Alexander of Jerusalem and Theoctistus of Caesarea had employed him to deliver public lectures in the churches, and on a later occasion (in 230) had consecrated him as a presbyter without referring to his own bishop. A synod held at Alexandria under Demetrius forbade him to teach in that city, and a second Alexandrian synod (consisting of bishops only) deprived him of the office of presbyter. The churches of Palestine, Phoenicia, Arabia, and Achaea declined, however, to concur in this sentence. Origen then settled at Caesarea in Palestine, which was his chief home for twenty years. He there founded a school which afforded its disciples a thorough training in literature, philosophy, and theology. Among their number were Gregory Thaumaturgus and Firmilian of the Cappadocian Caesarea. In the latter city Origen took refuge for two years during the Maximian persecution. In the last twenty years of his life he made many other journeys. In the Decian persecution he was arrested at Tyre and cruelly tortured. He died there in 253 or 254.

Origen was a most voluminous writer. 'Which of us,' asks Jerome, 'can read all that he has written?' Yet the statement of Epiphanius that his works numbered 6000 is doubtless exaggerated. His exegetical writings extended over nearly the whole of the Old and New Testaments, and included *Scholía* (short notes), *Homilies*, and *Commentaries*. Of the Homilies only a small part has been preserved in the original, much, however, in the Latin translations by Rufinus and by Jerome; but unfortunately these cannot be relied upon, for the translators thought fit to modify and tamper with them. Of the Commentaries a number of books on Matthew and on John are extant in Greek, those on John of great value for the study of

his speculative theology. Origen's gigantic *Hexapla*, the real foundation of the textual criticism of the Scriptures, was too large to be preserved entire. The remains of its text of the Septuagint were collected by Bern. de Montfaucon (2 vols. fol. Paris, 1713) and Field (2 vols. Oxford, 1875). His *Eight Books against Celsus* (q.v.), written in his old age, are preserved entire in the original Greek. This, the greatest of early Christian apologies, effectively appeals to the Christian life as the most convincing proof of the Christian faith. The speculative theology of Origen is presented in his four books *Peri Archôn*, extant as a whole only in the somewhat garbled Latin translation of Rufinus. It is a bold attempt to evolve from the church's rule of faith, with the help of Scripture and reason, a science of Christian faith. Two books *On the Resurrection* and ten books of *Stromata* (in which he proved all the Christian dogmas by quotations from the philosophers) are lost. The eclectic philosophy of Origen bears the distinctive stamp of Neoplatonist and Stoic theories. God alone has being in the proper sense. It is essential to the Deity to will, work, and reveal Himself unchangeably and eternally. In the Logos, proceeding by eternal generation from God, and of the same substance with Him, all creative ideas are concentrated. He is the link between the oneness of Deity and the multiplicity of the world. All finite being is good only as it has part in the Divine. All created spirits are free. Their fall led to the creation of the material world, that in forms more or less material (*soul and body*) the renewing discipline of the *spirit* within might be realised. The idea of the procession of all spirits from God, their fall, their redemption, and return to God lies at the foundation of the whole development of the world, at the centre of which is the incarnation of the Logos for the revelation of redeeming truth and the union of divine forces with humanity. Origen's system is an elaborate web, of which Greek metaphysics is the warp, the gospel history the woof. All that was true in Greek philosophy Origen held to be traceable to the general revealing agency of the Logos, who in Christianity alone is fully and expressly manifested. The proper source of the knowledge of the Christian faith is the Word of Christ (i.e. the Scriptures). A living faith in those truths of Scripture which have been handed down as fundamental by the church's succession of bishops is itself sufficient for salvation. Beyond such 'unreasoning faith' there is the 'knowledge' or 'wisdom' which rises to the free love of God, and leaves behind it the historical contents of the church's teaching, which have served to it as the media of spiritual ideas in its progress from practical faith to the vision of God and likeness to Him. It is by entering more deeply into the successive senses of Scripture that this process is carried out. Scripture admits of a threefold interpretation, in correspondence to the tripartite nature of man. The 'bodily' (literal or historical) sense is always to be retained, except where it is unworthy of God or contradictory to reason; for God has intended such passages to be 'stumbling-blocks,' suggesting the necessity of seeking a deeper meaning. The *Psychical* (or ethical signification) is next; and beyond it is the *Pneumatic* (allegorical or mystical) sense.

Unhappily for the memory of Origen, his name was chiefly remembered in connection with the most erroneous part of his work. His fanciful method of interpretation was perpetuated alike in the east and the west, and the fruits of his gigantic labours were appropriated by orthodox theologians, who branded him as a heretic, and doubted of his salvation. Long after his death malignant falsehoods were heaped upon his name by unscrupulous enemies like Theophilus of Alexandria; and not

merely the heresy of maintaining the ultimate restitution of all mankind, but even heresy respecting the nature of Christ was triumphantly discovered in his writings. Yet, heterodox though he was, not one amongst those honoured by the church as saints surpasses him in saintliness or spiritual elevation of character. 'His whole life,' says Bishop Westcott, 'from first to last was fashioned on the same type. It was, according to his own grand ideal, "one unbroken prayer," one ceaseless effort after close fellowship with the Unseen and the Eternal. No distractions diverted him from the pursuit of divine wisdom. No persecution checked for more than the briefest space the energy of his efforts. He endured a double martyrdom: perils and sufferings from the heathen, reproaches and wrongs from Christians; and the retrospect of what he had borne only stirred within him a humbler sense of his shortcomings.'

There is an edition of Origen's works, edited by Kötschau and others for the Royal Prussian Academy (1899 *et seq.*); an earlier edition is that of the uncle and nephew De La Rue (4 vols. folio, Paris, 1733-59), reprinted by Lommatzsch (25 vols. Berlin, 1831-48), and by Migne, *Patrol. Curs. Compl.*, ser. Gr., vols. xi.-xvii. The work of P. D. Huet, *Origenis in sacras Scripturas Commentaria quaecunque Graece reperiri potuerunt* (2 vols. Rothomagi, 1668), was the foundation of the critical study of Origen. For an account of his theological opinions and the great controversies that these originated, see the works on church history by Baur, Neander, Dörner, Böhringer, Schaff, and E. de Pressensé; also E. W. Möller, *Geschichte der Kosmologie in der Griechischen Kirche bis auf Origenes* (Halle, 1860); Kahnis, *Die Lehre vom Heiligen Geist* (1847); and the following special books: Thomasius, *Origenes* (Nürnberg, 1837); Moehler, *Patrologie* (Regensb. 1840); and especially Redepenning, *Origenes, eine Darstellung seines Lebens und seiner Lehre* (2 vols. Bonn, 1841-46). See also Joly, *Étude sur Origène* (Dijon, 1860); Freppel, *Origène* (Paris, 1868); J. Denis, *La Philosophie d'Origène* (Paris, 1884); Harnack's *Dogmengeschichte* (new ed. 1905); Farrar's *Lives of the Fathers* (1889); Patrick, *The Apology of Origen* (1892); Fairweather, *Origen and Greek Patristic Theology* (1901).

Original Secession. See UNITED PRESBYTERIAN CHURCH.

Original Sin. See SIN.

Orihuela (the *Aurinelah* of the Moors), a town in the Spanish province of Alicante, on the Segura, 38 miles N. of Cartagena. Situated in a plain of great beauty and fertility, it offers an Eastern aspect with its palm-trees, towers, and domes, and has a cathedral, a college, and manufactures of silk, linen, hats, &c. Pop. 37,000.

Orinda, THE MATCHLESS. See PHILIPS (KATHERINE).

Orinoco, one of the great rivers of South America, has its origin on the slopes of the Sierra Parima, in the extreme south-east of Venezuela; its exact sources were only discovered in 1886 by M. Chaffanjon. It flows at first west by north, a mountain-stream, as far as 67° W. long. A little below Esmeralda (65° 50' W. long.) it divides and sends off to the south an arm, the Cassiquiare, which, after a course of 180 miles, enters the Rio Negro, a tributary of the Amazon. The other branch on reaching San Fernando (68° 10' long. and 4° 2' N. lat.) is met by the strong current of the Guaviare; the united stream then turns due north, and, after passing over the magnificent cataracts of Maypures and Atures (glowingly described by Humboldt), and picking up the Meta on the left, meets the Apure, which likewise strikes it from the left. Below the confluence with the Apure the Orinoco turns east and traverses the llanos of Venezuela, its waters, with an average breadth of 4 miles, being augmented from the right by the Caura and the Caroni. About 120 miles from the Atlantic, into which it rolls its

milk-white flood, its delta (8500 sq. m.) begins. Of the numerous mouths which reach the ocean over 165 miles of coast-line only seven are navigable. The waterway principally used by ocean-going vessels, which penetrate up to Ciudad Bolívar (Angostura), a distance of 240 miles, is the Boca de Navios, varying in width from 3½ to 23 miles. The total length of the river is some 1550 miles, of which 900, up to the cataracts of Atures, are navigable, besides a farther stretch of 500 miles above the cataracts of Maypures; area of drainage basin, 368,600 sq. m. Most of the larger affluents are also navigable for considerable distances, the Meta, for instance, to within 60 miles of Bogotá, the capital of Colombia. As a rule the river floods the districts adjoining its banks from May to January, the country under water sometimes measuring 100 miles across.

See A. von Humboldt and Bonpland, *Voyage au Nouveau Continent*, vol. ii.; Sir Robert Schomburgk, *Travels in Guiana* (1840); Michelina y Rojas, *Exploración Oficial* (Brussels, 1867); Mozans, *Up the Orinoco* (1910).

Oriole, a genus (*Oriolus*) and family (*Oriolidae*) of Passerine birds, confined entirely to the Old World, and characteristic of the Oriental and Ethiopian regions. The members of the family are generally of a bright yellow or golden colour, which is well set off by the black of the wings. Twenty-four species are enumerated under the genus. The best known is the Golden Oriole (*O. galbula*). The adult male is about 9 inches long. Its general colour is a rich golden yellow; the bill



Golden Oriole (*Oriolus galbula*).

is dull orange-red; a black streak reaches from its base to the eye; the iris is blood-red; the wings are black, marked here and there with yellow, and a patch of yellow forms a conspicuous wing-spot; the two middlefeathers of the tail are black, inclining to olive at the base, the very tips yellow, the base half of the others black, the other half yellow; legs, feet, and claws dark brown. The female is less yellow than the male, and the under parts are streaked with gray. This bird is somewhat rare in England, but it is an annual spring migrant to Cornwall and the Scilly Isles, and it has been found nesting in the south-eastern counties. In Scotland, especially in the southern districts, it has been reported several times; in Ireland it is more rare. In central and southern Europe it is common in summer in certain localities; it is abundant in Persia, and ranges eastwards through central Asia as far as to Irkutsk. It winters in South Africa, where it is found at the Cape, Damaraland, Natal, and Madagascar. In habit it is an unobtrusive bird, fond of the shade of woods, groves, and small ravines, and, although generally accounted very shy, it may be found building its nest in avenues in towns. Its food consists of insects and their larvæ, especially green caterpillars, and fruits such as currants, cherries, and mulberries. The song of the male is short, loud, clear, and flute-like; he has also a mewing call-note, and a harsh alarm-note. The nest is unlike any other

European bird's; it is placed in, and suspended from, a fork in a horizontal branch, sometimes of an oak, usually of a pine, in a shady grove or thick wood, and is made of bark, wool, and grass. The eggs number four or five, and are of a glossy, white colour, blotched with reddish purple. Other orioles are distinguished by having black on the head and nape. *O. kundoo* partly replaces the golden oriole in Turkestan, and extends eastwards to India. *O. auratus*, found in Africa between the Sahara and the equator, and *O. notatus*, found throughout south tropical Africa, have the lesser wing-coverts yellow, not black as in the European and Indian birds. The birds called 'Orioles' in the United States belong to a different family, the Icteridæ. See BALTIMORE BIRD.

Ori'on, in Greek Mythology, an unusually handsome giant and hunter, the son of Hyrieus of Hyria, in Bœotia. At Chios he fell in love with Merope, daughter of Enopion, but for an attempted outrage upon the maiden his eyes were put out by Dionysus. Orion recovered his sight by exposing his eyeballs to the rays of the rising sun, and afterwards hunted in company with Artemis. The cause and manner of his death are differently related. Some make Artemis slay him with an arrow, because Eos, enamoured of his beauty, had carried him off to Ortygia, and thereby offended the gods. Others say that Artemis, virgin-goddess though she was, cherished an affection for him that enraged her brother Apollo. One day pointing out to her at sea a black object floating in the water, he told her that he did not believe she could hit it. She took aim and hit the mark, which was the head of her lover swimming in the sea. A third myth makes him find his death from the sting of a scorpion. Æsculapius wished to restore him to life, but was slain by a bolt from Zeus. After his death Orion was placed with his hound among the stars, where to this day the most splendid of the constellations bears his name.

Orissa, an ancient kingdom of India, the authentic history of which goes back for probably more than one thousand years, extended from Bengal on the N. to the Godavari on the S.; on the E. it has the Bay of Bengal, and on the W. the Central Provinces. Orissa was long a Buddhist stronghold; in 474 a new dynasty made it Brahmanical, and introduced the worship of Siva; in 1132 this was replaced by Vishnuism and another dynasty. It ceased to be an independent state in 1568, being conquered and made an outlying province of the empire of the Great Mogul. Its next masters were the Mahrattas, who seized it in 1742; but they were forced to surrender it to the English in 1803. The British division of Orissa, together with twenty-four tributary states, were until 1912 accounted part of Bengal Presidency, when Orissa was formed with Bihar and Chota Nagpur into the province of Bihar and Orissa. The British portion has an area of 13,736 sq. m. and a pop. of 5,000,000; the tributary states, a hilly country with dense jungle, lying between the low coast districts and the interior plateau, have an area of 28,648 sq. m. and a population of 4,000,000. All this region was visited by severe famine in 1868-69. The principal river is the Mahanadi, and the chief towns Cuttack, Balasor, and Puri (Jagannath, q.v.). The entire district is sacred ground to the Hindus; evidences of the worship of Siva and Vishnu meet the eye at every turn. Great festivals are held in honour of this latter god and of his image called Juggernaut (q.v.). The most interesting of the aboriginal races are the Kandhs (Kondhs, Khonds), who number half a million, including those in the Central Provinces. Amongst these people agriculture and war are the only employments, the menial

offices of village life being performed by a subject, almost slave race. They pay profound reverence to the earth-god, and used to sacrifice human beings to secure his favour, until the practice was suppressed by the British (1837-50). The tribal government is strictly patriarchal. The tribesmen used to be summoned to arms by messengers bearing an arrow, who sped from glen to glen, like the bearers of the fiery cross in Scotland. Duelling was formerly in vogue. The irrigation of a large portion of Orissa is provided for by an extensive and costly system of canals, taken over by the government in 1868.

Oriza'ba, a city of the Mexican state of Vera Cruz, 82 miles WSW. of Vera Cruz City, and 181 ESE. of Mexico, lies in a fertile garden country, 4030 feet above the sea, and contains cotton and other factories; pop. 40,000.—The volcano of Orizaba, or Citlatpetel, 25 miles to the north, is a noble pyramid rising to an elevation of 18,250 feet, the highest peak in Mexico (Popocatepetl being 17,500); its last severe eruption was in 1566.

Orkhon, a tributary of the Selenga. For archæology see the last paragraph of MONGOLIA.

Orkneyinga Saga as a completed work may be placed with fair confidence in the first quarter of the 13th century. Commencing with the conquering of the Isles by Harald Harfagri in 872, it relates the history of the Earldom of Orkney under the long line of its Norse jarls, and is, for three centuries and a half, the principal authority for the history of northern Scotland. The narrative is mainly personal, and therefore picturesque, portraying the men in person and character, impartially recording their deeds and mentioning what was thought of them and their actions at the time, occasionally in the words of a contemporary skald. Skaldic songs were indeed the materials from which it was elaborated. These songs, sung as they were in the presence of kings and chieftains, tended to be laudatory, and in estimating the historical value of a record based on such materials, allowance must necessarily be made for this fact.

Orkney Islands, a group of ninety Scottish islands, islets, and skerries, of which only twenty-nine are inhabited, and which have an aggregate area of 376 sq. m., the largest being Mainland (207 sq. m.), Hoy (53), Sanday (26), Westray, South Ronaldshay, Rousay, Stronsay, Eday, Shapinshay, Burray, Flotta, &c. They extend 50 miles north-north-eastward, and are separated from Caithness by the Pentland Firth, 6½ miles wide at the narrowest. With the exception only of Hoy (q.v.), which has fine cliffs, and in the Ward Hill attains 1564 feet, the scenery is generally tame, the surface low and treeless, with many fresh-water lochs. The prevailing formation is the Old Red Sandstone, with a small granitic district near Stromness; and the soil is mostly shallow, incumbent on peat or moss. The mean annual temperature is 45°, the rainfall 34.3 inches. The holdings are generally small, and agriculture and fishing are the principal industries. Kirkwall (the capital) and Stromness, the only towns, are noticed separately, as also are the standing-stones of Stennis and the tumulus of Maeshowe. Orkney unites with Shetland to return one member to parliament, but it was dissevered therefrom as a county by the Local Government (Scotland) Act, 1889. Pop. (1801) 24,445; (1861) 32,395; (1921) 24,109. The Orkneys (Ptolemy's *Orcades*) were gradually wrested by Norse rovers from their Pictish inhabitants; and in 872 Harald Harfagri conquered both them and the Hebrides. They continued subject to the Scandinavian crown—under Norse jarls till 1231, and afterwards under

the Earls of Angus and Stratherne and the Sinclairs—till in 1463 they were given to James III. of Scotland as a security for the dowry of his wife, Margaret of Denmark. They were never redeemed from this pledge; and in 1590, on James VI.'s marriage with the Danish princess Anne, Denmark formally resigned all claims to the sovereignty of the Orkneys. The present landed proprietors are chiefly of Scottish descent, the islanders generally of mixed Scandinavian and Scottish origin. Scapa Flow, between Mainland and Hoy, was the headquarters of the Grand Fleet during the Great War, and was the scene also of the scuttling of the surrendered German High Seas Fleet, 21st June 1919.

Orkneys, SOUTH, a group of islands (Coronation Island, Laurie Island, &c.) in the South Atlantic, forming one of the several dependencies of the Falkland Islands Colony of the British Empire. The islands were discovered in 1821 by the English Captain Powell. Their temperature, even in the warmest months, scarcely ever rises above freezing-point. Whaling, which is carried on extensively in the southern seas, is the principal industry. There is a meteorological station belonging to the Argentine government, established with a view to forecasting the probable weather conditions in the maize and cereal growing districts of the Republic.

Orleans (Fr. *Orléans*), a city of France, the capital now of the department of Loiret, and formerly of the old province of Orléannais, which comprised the best part of the present departments of Loiret, Eure-et-Loir, and Loir-et-Cher, with portions of four others. It stands in a fertile plain on the right bank of the Loire, here crossed by a nine-arched bridge (1760), 364 yards long, and by rail is 75 miles SSW. of Paris. Close to it is the Forest of Orleans, covering nearly 150 sq. m., and planted with oaks and other valuable trees. The walls and gates have given place since 1830 to handsome boulevards, but the town as a whole wears a lifeless appearance, and its domestic architecture has much more interest than any of the public edifices. These include the cathedral, destroyed by the Huguenots in 1567, and rebuilt from 1601 onwards by Henry IV. and his three successors; the *Mairie* (1530); and the 15th-century *Musée* (till 1853 the *hôtel-de-ville*). Noteworthy are the houses of Agnes Sorel, Diane de Poitiers, and Joan of Arc, of whom there are three statues—the bronze equestrian one inaugurated in 1855. The commerce is far more important than the industries (of which the chief is market-gardening), Orleans possessing unusual transit facilities by road and railway, river and canal. Pop. (1872) 48,976; (1911) 72,096; (1921) 69,048. The Celtic *Genabum*, where in 52 B.C. the great Gallic rising broke out against Julius Cæsar, Orleans afterwards (about 272 A.D.) was renamed *Civitas Aureliani*, from which the present name is derived. It was besieged by Attila (q.v.) in 451; passed into the hands of the Franks; and was twice plundered by the Northmen (855 and 865). In 1428–29 it was besieged by the English under the Duke of Bedford, but was delivered by Joan of Arc (q.v.), called therefore the Maid of Orleans. Dunois (q.v.) was known as the Bastard of Orleans. The town suffered much in the wars of the Huguenots (q.v.); and in the Franco-German war it again figured prominently, being occupied by the invaders, October 11 to November 9, 1870, and becoming thereafter the headquarters of the great French Army of the Loire until its crushing defeat by Prince Frederick-Charles (December 3–5). Orleans was the death-place of the Earl of Salisbury (1429), of Francis II., Mary Stewart's husband (1560), and of the Duke of Guise (1563).

Orleans, DUKES OF. This title has belonged to three distinct dynasties of French princes of the blood. The title was first given in 1392 by Charles VI. to his dissolute brother Louis (1371–1407), who became regent on the king's madness, and was murdered in the streets of Paris at the instigation of the Duke of Burgundy in revenge for his father's death (see Jarry's *Louis de France*, 1890). His successor was his son Charles (1391–1465), the poet. Charles's son Louis succeeded to the throne as Louis XII. in 1498, whereupon the dukedom of Orleans merged in the crown. It was revived in 1626, when Louis XIII. created his ambitious and intriguing brother, Jean Baptiste Gaston (1608–60), Duke of Orleans and Chartres and Count of Blois. He died without male issue, whereupon Louis XIV. at once revived the title in favour of his brother Philippe (1640–1701), the husband of Henrietta, sister of Charles II., and, after her death, of the Princess Charlotte Elizabeth of Bavaria. His daughters married Charles II. of Spain, Victor Amadeus II. of Savoy, and Prince Charles of Lorraine; his son was the regent and debauchee, Philippe (1674–1723), and his great-grandson was the notorious *Égalité*, Louis-Philippe Joseph (1747–93). *Égalité*'s son, Louis-Philippe (1773–1850), bore the title during his exile, and until he became king of the French in 1830. His eldest son (1810–42) took the title; but it was not borne by his son, the Comte de Paris (1838–94), who in 1883 became head of the French Bourbons, his son, Louis Philippe Robert (born 1869; married an Austrian princess, 1896), assuming the old ducal title. For the Orleanist party, see BOURBON, FRANCE.

For the poet, CHARLES, DUKE OF ORLEANS, see CHARLES D'ORLÉANS.

JEAN BAPTISTE GASTON, DUKE OF ORLEANS, was the third son of King Henry IV., was born in 1608, and was granted the title in 1626 on his marriage with Marie of Bourbon, Duchess of Montpensier. His wife soon died, leaving one daughter, 'La Grande Mademoiselle.' He troubled France with incessant and bloody but fruitless intrigues against Richelieu, and but for his royal birth would have lost his head like Montmorency, Cinq-Mars, and De Thou. The validity of his marriage with Marguerite of Lorraine was only declared after a long disputation among jurists and theologians. After Richelieu's death a reconciliation was effected between him and the king, and he was appointed lieutenant-general of the kingdom during the minority of Louis XIV. The duke, finding himself impotent in the hands of Mazarin, placed himself at the head of the Fronde, but with his usual selfishness soon threw over his friends and made terms again with the court. After Mazarin's final triumph he was confined to his castle of Blois, where he died, 2d February 1660, leaving three daughters by his second marriage. See his *Mémoires* (Amsterdam, 1683).

PHILIPPE, DUKE OF ORLEANS, regent of France during the minority of Louis XV., was the son of the first Duke Philippe, and the grandson of King Louis XIII., and was born 4th August 1674. He possessed excellent talents, and acquired knowledge with rapidity, but his tutor, Dubois, afterwards cardinal, early demoralised him by ministering to his passions, and, hardly yet grown up, he gave himself up to debauchery. The king compelled him to marry Mademoiselle de Blois, his daughter by Madame de Montespan. The young prince now began to alarm the court by an unsuspected capacity for war, showed courage at Steenkirk and Neerwinden, and commanded with success in Italy and Spain. But his presence in Madrid after his victories was disliked both by Philip V. and by Louis XIV. For some years thereafter he

lived in complete exile from the court, spending his time by turns in profligacy, the practice of the fine arts, and the study of chemistry. Louis, having legitimised his sons the Duke of Maine and the Count of Toulouse, appointed the Duke of Orleans president of the regency only and not regent, giving the guardianship of his grandson and heir and the command of the household troops to the Duke of Maine; but this arrangement was set aside at his death (1715), and the Duke of Orleans became sole regent. He was popular, and his first measures increased his popularity; but the financial affairs of the kingdom were perplexing, and the regent's adoption of the schemes of Law led to disastrous results. He favoured an English and anti-Spanish alliance, and Anglomania, or a craze for everything English, was one of the features of his régime. His alliance with England and Holland, formed in 1717, was joined next year by the emperor, and this quadruple alliance succeeded in effecting the downfall of Alberoni and his wildly-ambitious schemes. At the instance of Lord Stair, the English ambassador, he expelled the Pretender from France. He put an end to the parliament of Paris meddling with financial or political affairs, and declared the legitimised sons of Louis XIV. incapable of succeeding to the throne. Dubois now became prime-minister, and ere long Archbishop of Cambrai and cardinal. To appease the Jesuits he sacrificed the Jansenists, compelling the parliament in 1722 to recognise the bull *Unigenitus*. Yet he was faithful to his trust, and the indolent young prince on his coming of age (1723) rewarded him by retaining him in power. But Dubois died in the August of the same year, and four months later, Philippe's frame gave way under the burden of his debaucheries, 2d December 1723. See the works by Piossens (5 vols. 1749) and Capefigue (2 vols. 1838).

LOUIS-PHILIPPE JOSEPH, DUKE OF ORLEANS, the famous *Egalité*, was born April 13, 1747, and succeeded to the title on his father's death in 1785, having been Duke of Chartres since 1752. He possessed good abilities, but early fell into a course of debauchery which he never quitted till the end of his career. In 1769 he married the heiress of the Duke of Penthièvre, and used her immense wealth to advance his political interest. But he was looked upon coldly at court, and still more so after the accession of Louis XVI. (1774), who abhorred his morals, while Marie Antoinette grudged him his wealth and independent position and hated the criticisms of the ring of witty reprobates who clustered round him. He fought at Ushant, but was prevented from further service and promotion to the rank of admiral by the jealousy of the court. He visited London frequently, became an intimate friend of the dissipated young Prince of Wales, afterwards inglorious as George IV., and infected young France with Anglomania in the form of horseracing and hard drinking. He made himself widely popular by profuse charity and by flinging open to the poor the splendid gardens of the Palais Royal. In the *lit de justice* of November 1787 he showed his liberalism boldly against the king, and was sent by a *lettre-de-cachet* to his château of Villers-Cotterets. As the States-general drew near he lavished his wealth in disseminating throughout France books and papers by Sieyès and other advocates of liberal ideas, and had himself put up in as many as five *bailliages*, but was elected in but three, Crépy-le-Valois, Villers-Cotterets, and Paris. In October (1788) he promulgated his *Délibérations*, written by Lacroix, to the effect that the *tiers état* was the nation, and in June 1789 he led the forty-seven nobles who seceded from their own order to join it. There is no doubt that, guided by Adrien Duport and others, he dreamed

of some day becoming constitutional king of France, or at least regent, but it is no less certain that the indolent debauchee was to a great extent the mere dupe of a party, and at no time the deep designing villain he was believed to be at court. There the blame of everything was cast upon his head, even of such great outbursts of the revolutionary fever as the fall of the Bastille and the march of the women on Versailles. Orleans gradually lost influence, and felt so hopeless of the Revolution that he would willingly have gone to America had his mistress, the abandoned Comtesse de Buffon, consented to accompany him. From October 1789 to July 1790 he was absent in England on a mission, and after his return he took a smaller share in political matters than before, while his efforts to come to an understanding with the court were still met with repulse. In September 1792 all hereditary titles being swept away, he demanded a new name from the Paris electors, and adopted that of Philippe Egalité, suggested by Manuel. He was elected the twentieth deputy for Paris to the Convention, and gave his vote of death for the king, which sent a shudder to the heart even of the Mountain. His eldest son, the Duke of Chartres, afterwards King Louis-Philippe, was a brave and active officer on the staff of Dumouriez, and rode over with his chief into the Austrian camp. Egalité was at once arrested with all the Bourbons still in France, and, after six months' durance at Marseilles, was brought to Paris for trial. He was found guilty of royalism and conspiracy and guillotined the same day, 6th November 1793, dying with courteous phrases on his lips and all the high courage of the old régime.

See Baschet's *Histoire de Philippe Egalité*, the elaborate work by Tournois (2 vols. 1840-43), and Mrs Elliott's *Journal* (1859).

Orloff, or **ORLOV**, a Russian family that first rose to eminence during the reign of Peter III., when one of its members, Gregory (1734-83), attracted the notice of the Grand-duchess Catharine, afterwards the Empress Catharine II., and succeeded Poniatowski as her favourite. It was this man who planned the murder of Peter III., and his brother Alexis (1737-1809) who committed the deed (1762). Both brothers were men of gigantic stature and herculean strength. The family of the Counts Bobrinski resulted from Gregory's intercourse with the empress. The legitimate line of Orloff soon became extinct; but Feodor, a brother of Gregory and Alexis, left four illegitimate sons, one of whom, Alexis (1787-1861), signalised himself during the French wars and in Turkey, negotiated the treaties of Adrianople (1829) and Unkiar-Skelessi (1833), and represented Russia at the London conference of 1832 on the affairs of Belgium and Holland. In 1844 he was placed at the head of the secret police, and stood high in favour with the Emperor Nicholas, who employed him in the negotiations with Austria previous to the Crimean war. In 1856 he sat in the congress of Paris as the representative of Russia, and on his return was made president of the grand council of the empire and president of the committee for the enfranchisement of the serfs.—For the Orloff diamond, see **DIAMOND**.

Orm, or **ORMIN**, versifier and spelling-reformer, born probably in Lincolnshire, was an Augustinian monk about 1200 A.D., author of the *Ormulum* (named after him), a series of homilies in verse on the gospel history, first printed by White in 1852 (new ed. by Holt, 1878).

Ormer. See **HALIOTIS**.

Ormerod, **ELEANOR ANNE** (1828-1901), entomologist, daughter of George Ormerod (1785-1873), the historian of Cheshire, in 1882-92 was consulting entomologist to the Royal Agricultural

Society. Her *Manual of Injurious Insects* (1881), *Guide to Methods of Insect Life* (1884), and *Agricultural Entomology* (2d ed. 1892) are well known. See her *Autobiography* (1904).

Or'molu, a name sometimes given to brass of a golden yellow colour.

Ormonde, an old name for what became afterwards East Munster, comprising Tipperary.

Ormonde, JAMES BUTLER, DUKE OF, of the ancient Anglo-Irish family of Butler, was born in London in 1610, and in 1632 succeeded to the earldom and estates of Ormonde. During the Strafford administration he greatly distinguished himself, and in the rebellion of 1640 was appointed to the chief command of the army; but when, in 1643, he concluded an armistice, his policy was condemned by both great parties. In the last crisis of the king's fortunes he retired to France, returned again to Ireland with the all but desperate design of restoring the royal authority, but after a gallant struggle was compelled (1650) to return to France. At the Restoration he was rewarded by the ducal title of Ormonde. He twice again returned to the government of Ireland. In 1679 an attempt was made on his life by the notorious Colonel Blood, supposed to have been instigated by the Duke of Buckingham. He escaped uninjured, and lived until 1688. See *Lives* by Carte (1736) and Lady Burghclere (1912).—JAMES BUTLER, second Duke of Ormonde, and grandson of the foregoing, was born in Dublin in 1665. As Earl of Ossory he served in the army against Monmouth. After his accession to the dukedom in 1688, he took his share in the Revolution conflict. He headed William's life-guards at the battle of the Boyne. In 1702 he commanded the troops in Rooke's expedition against Cadiz; in 1703 he was appointed lord-lieutenant of Ireland, and in 1711 commander-in-chief against France and Spain. Under George I. he fell into disgrace, and was impeached in 1715 of high-treason, his estates being attainted; he retired to France, spent years in the intrigues of the Pretender, and died abroad in 1746. Letters written by him in organising the attempt by Spain to invade England and Scotland in 1719 were in 1890 brought to light, and in 1896 published by the Scottish History Society.

Ormskirk, a market-town of Lancashire, 12 miles NNE. of Liverpool. It has a grammar-school (1612); a parish church, with embattled tower and spire, and the burial-vault of the Earls of Derby; and manufactures of cordage, iron, silk, cotton, &c. Pop. 7400.

Ormuz, or **HORMUZ**, a small town on the island of Jerun (12 miles in circuit), in the Strait of Ormuz, at the entrance of the Persian Gulf, 4 miles S. of the Persian coast. Three centuries before the Christian era there existed on the mainland, 12 miles east of the island, a city Ormuz; this in the 13th century was the headquarters of the Persian trade with India. But about the end of the century its ruler transferred his people to the site of the present town to escape the Mongols. The new city maintained its commercial supremacy even after it passed into the hands of the Portuguese, on its capture by Albuquerque in 1507. It was taken from the Portuguese in 1622 by an English fleet (Baffin, the Arctic navigator, being killed in the action), and given to Shah Abbas of Persia, who transferred the trade to his port of Bandar Abbas, 12 miles north-west on the mainland. The Portuguese fort still stands, but the town of Ormuz is a ruin. The island yields salt and sulphur.

Ormuzd (*Ahurô-Mazdâd*), the name of the supreme deity of the ancient Persians, and of their

descendants the Guebres and Parsees. It was at first emphatically employed in this sense by Zoroastrian. See **ZOROASTER**.

Orne, a department of France formed out of the old provinces of Normandy, Alençon, and Perche, is separated from the English Channel on the W. by La Manche and on the N. by Calvados. Area, 2353 sq. m.; pop. (1861) 423,350; (1921) 274,814. A range of wooded hills, nowhere rising above 1370 feet, extends across the south of the department from east to west, separating the streams that flow north to the English Channel from those that go south to the Seine and Loire. Although the soil is fertile, agriculture is not in an advanced state. Apple and pear trees abound, and great quantities of cider are made, as well as brandy. Cattle and horses of the purest Norman breed are reared. There are cotton and hemp spinning and cotton and linen weaving, dyeing, bleaching, and manufactures of gloves, iron, glass, &c. Fishing and bee-keeping are carried on. The department is divided into four arrondissements, Alençon, Argentan, Domfront, and Mortagne; capital, Alençon.

Ornithology. See **BIRDS**.

Ornithorhynchus, or **DUCKMOLE** (also called Duck-billed Platypus, the 'water-mole' of colonials), one of the lowest mammals, found in the rivers of Australia and Tasmania. Along with the Porcupine Ant-eater (*Echidna*, q.v.) and a neighbour genus, the duckmole is included in the sub-class Prototheria or Ornithodelphia, co-extensive with the order Monotremata. These three genera are of great interest as 'living fossils,' retaining the ancient characters of primitive mammals.

The duckmole, represented by a single species (*Ornithorhynchus paradoxus* or *anatinus*), is a flat animal, between a foot and 18 inches in length,



Fig. 1.—*Ornithorhynchus paradoxus*.

not including the broad beaver-like tail, which measures 4-5 inches. The thick, soft fur is dark-brown above, rusty yellow below. The very short legs have webbed digits in adaptation to the swimming habits, and are also equipped with strong claws, utilised in burrowing. The 'duck-bill' is due to the anterior expansion of the premaxillæ and mandibles, is covered with a horny sheath, bears the nostrils far forward, and is provided with curious tactile structures. Behind the 'bill' is a loose, naked, sensitive collar. The eyes are very small, and the ear pinnæ are inconspicuous. True teeth are present only in the earliest stages; their place is taken in the adults by eight horny plates, sharp-edged in front, broadened out behind. The tongue is not extensile. In the young of both sexes a curious perforated spur, associated with a gland, occurs near the heel, but this only persists in the males. The duckmole is imperfectly warm-blooded. The body temperature is peculiarly low. The voice resembles the

growl of a small puppy. No fossil forms are known.

This lowly mammal is essentially aquatic, living in rivers and 'ponds,' swimming and diving admirably. It is lively and active, diving when alarmed, and able to remain several minutes under water.

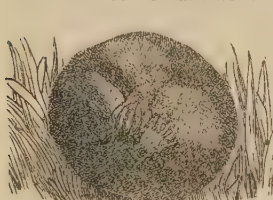


Fig. 2.
Ornthorhynchus asleep.

It constructs on the bank elaborate burrows (sometimes 20 to 50 feet in length) with two entrances—one above, the other under water. Like many other defenceless animals, it is most active in the twilight. It grubs in the mud for worms, water-insects, molluscs, &c., which it

can temporarily stow away in cheek-pouches. When frightened or asleep it often rolls itself up, in hedgehog fashion, into a living ball. It appears to live amicably with the water-rat, but is molested by carnivorous marsupials, and is often wantonly, though fortunately not easily, shot. The eggs—for the discredited oviparous habit has been confirmed—are laid in a rough nest within the burrow. The young appear to use their bills in breaking the tough shell. The animals have a fishy, oily smell. The flesh is eaten by the omnivorous natives, who are said especially to esteem the young forms.

Many of the enigmas about the duckmole's structure and affinities are still unsolved, but there is no doubt that along with its neighbours it links mammals back to reptilian or even amphibian types. It need hardly be stated that it has no close connection with birds. Some of the most important structural characters may be briefly summarised: The bones of the skull fuse and are polished as in birds; the halves of the lower jaw do not unite in front, and have no ascending process; the bones of the ear are in a primitive state. There are important technical peculiarities in the vertebræ, ribs, hip-girdle, &c. Epipubic bones, for instance, occur as in marsupials. The coracoids are remarkable in reaching the sternum, and the breastbone is like that of the lizard and some other reptiles. The brain is smooth, and old fashioned in having a small corpus callosum and large anterior commissure. There is a common cloaca, receiving the rectum and the urino-genital canal. The ureters do not open into the neck of the bladder, but farther down into the short urino-genital canal. The left ovary is larger than the right, and the testes are abdominal. The oviducts have no 'fimbriated' upper ends, are separate throughout their course, open into the urino-genital passage, and thence into the cloaca. The vasa deferentia open separately in the same way, and have only a temporary connection with the penis, which lies attached to the wall of the cloaca. The milk-glands have numerous openings on a flat patch of skin, and the young lick the milk. The eggs, like those of reptiles, undergo partial segmentation.

From the above it will be seen that the duckmole not only represents the lowest extant stage of mammalian evolution, but preserves, more markedly than the higher forms, traces of the far-off pedigree of the class.

See ECHIDNA, MAMMALS, MARSUPIALS; also Gould's *Mammals of Australia* (3 vols. 1845-63); W. K. Parker's *Mammalian Descent*; Flower's *Osteology of the Mammalia*; Spencer, *Nature*, xxi. (1884-85); Semon's *Zoolog. Forschungsreise in Australien*, vol. ii. (1897); Beddard, *Cambridge Natural History*, vol. *Mammalia*.

Orobanchaceæ, or OROBANCHEÆ, a family of parasitical herbs, generally with simple stems

clothed with brown, purplish, yellow, or blue, but never green scales, instead of ordinary leaves; terminating in a spike of flowers each in the axil of a scale or bract similar in colour and character to those of the stem. The species known considerably exceed one hundred in number, and are spread over the greater part of the globe, chiefly in temperate climates, but more abundant in the Old World than in the New. Eight species are natives of Britain, seven of which belong to the genus *Orobanche* (Broomrapes), and one species to *Lathræa* (Toothwort). In Britain they are all rather rare or purely local plants. High medicinal virtues ascribed to some of the species, especially to *Epifagus americanus* (see CANCER-ROOT), are now discredited. With *Cistanche lutea* the Egyptians dye the ropes made of the palm *Hyphæne thebaica* black.

Orobis, an old genus, now reckoned a section of *Lathyrus* (q.v.).

Orontes, the ancient name of a river in Syria, now called *Nahr-el-Asi*. It rises in the highest part of Cœle-Syria, near Baalbek, flows northward between the mountains of Libanus and Anti-Libanus, as far as the city of Antioch, and then westward to the Mediterranean Sea, through a total course of 147 miles. Its lower course is remarkably beautiful; its rocky banks are 300 feet high, and the windings of the river show them off to the greatest advantage. Myrtles, laurels, figs, wild vines, arbutus, dwarf-oaks, and sycamores grow up the cliffs in picturesque irregularity. The country through which the river flows is in many parts richly cultivated.

Orosius, PAULUS, a Spanish presbyter and historian, was born at Tarragona, and flourished in the 5th century. He visited Augustine in 415, and presented to him his work written against the heresies of Priscillian and Origen. He went thence to Palestine to study under Jerome at Bethlehem. His chief work, the *Historiarum adversus Paganos Libri vii.*, begins with the creation and goes down to 417 A.D. It is apologetic in design, intended as a complement to the great work of Augustine written to prove from historical evidence that the prevailing evils of the time were not due to Christianity. It is based on the chronicle of Eusebius-Jerome, and on Livy, Eutropius, Justin, Tacitus, and Suetonius; but the work is a trivial, inaccurate, uncritical miscellany of facts, although the style is elegant if watery, in Bacon's phrase. It was a favourite text-book of universal history during the middle ages, and had the honour of being translated into English by King Alfred (ed. Bosworth, 1851; Sweet, 1883 *et seq.*).

The editio princeps appeared at Vienna in 1471; the best edition is that by C. Zangemeister in *Corpus Script. Eccles. Latin.* (Vienna, 1882). The edition of Havercamp (1738) was reprinted in vol. ix. of Galland's *Bib. Pat.* (1773) and vol. xxxi. of Migne's *Patrol.* (1846); the history alone by Dr Brohm (Thorn, 1877). An English translation (1773) was reprinted in Bohn's 'Antiquarian Library' (1853).

Orotava, LA, a town on the north coast of Teneriffe, is situated below the Peak, in one of the pleasantest districts in the world; pop. 12,000.

Orpen, SIR WILLIAM, R.A., born on 27th November 1878 at Stillorgan, Co. Dublin, stands in the forefront of the portrait-painters of his day. While at the Dublin School of Art he attracted attention by his wonderful draughtsmanship, and already in his early twenties ranked as a master in the manipulation of his pigment. 'The Mirror,' an example of this period of his art, shows none of the hesitancy of the student, and although reminiscent of Whistler, it displays that power of painting interiors delightfully which became such a prominent

feature of his later work. Fine spacing, significant silhouette, and rich, gay colouring are prominent qualities in his painting. 'The Fracture' (1901) and 'The Valuers' (1902) are the best known of his earlier works, although in them a rather sombre key prevails. 'Charles Wertheimer' (1908) was the first of his paintings to be exhibited at the Royal Academy, of which he became an associate in 1910 and a full member in 1919. 'The Jockey,' 'Venus and Myself' (1910), 'A. W. Rich' (1910), 'On the Irish Shore' (1910), show a steady development in his style. In 1917 he went to France as an official artist, and painted a series of magnificent and very living portraits, 'Marshal Foch,' 'Lord Haig,' 'Lord Plummer,' &c., and many sketches of British soldiers and the conditions under which they lived. At the Peace Conference he added such figures as Lord Beatty and President Wilson, as well as a picture of the actual signing of peace. 1921 saw the appearance of a striking work, 'The Chef of the Hotel Chatham,' where Orpen's quite amazing dexterity in handling paint is displayed in a picture which for human appeal and brilliant painting deserves to rank with Moroni's 'The Tailor.' 'To the Unknown British Soldier in France' appeared in 1923, and is something more than a brilliant example of interior painting. 'Man versus Beast' was his exhibit for 1925. Besides these, Orpen has painted a large number of portraits, and in each it can be seen that his art has broadened and matured. His publications include *The Outline of Art* (1923) and *An Onlooker in France* (1924).

Orpheus, a Greek hero, a son of Apollo and the Muse Calliope, or of Cægrus and Clio or Polyhymnia. His native country is Thracia, where many different localities were pointed out as his birthplace. Apollo bestows upon him the lyre, which Hermes invented, and by its aid Orpheus moves men and beasts, the birds in the air, the fishes in the deep, the trees, and the rocks. He accompanies the Argonauts in their expedition, and the power of his music wards off all mishaps and disasters, rocking monsters to sleep and stopping cliffs in their downward rush. His wife, Eurydice, is bitten by a serpent and dies. Orpheus follows her into the infernal regions; and so powerful are his 'golden tones' that even stern Pluto and Proserpine are moved to pity, while Tantalus forgets his thirst, Ixion's wheel ceases to revolve, and the Danaids stop in their wearisome task. He is allowed to take her back into the 'light of heaven,' but he must not look around while they ascend. Love or doubt, however, draws his eyes towards her, and she is lost to him for ever. His death is sudden and violent. According to some accounts, it is the thunderbolt of Zeus that cuts him off, because he reveals the divine mysteries; according to others, it is Dionysus, who, angry at his refusing to worship him, causes the Mænads to tear him to pieces, which pieces are collected and buried by the Muses in tearful piety at Leibethra, at the foot of Olympus, where a nightingale sings over his grave. Others, again, make the Thracian women divide his limbs between them, either from excessive madness of unrequited love or from anger at his drawing their husbands away from them. The faint glimmer of historical truth hidden beneath these myths becomes clearer in those records which speak of Orpheus as a divine bard or priest in the service of Zagreus, the Thracian Dionysus, and founder of the Mysteries (q.v.); as the first musician, the first inaugurator of the rites of expiation and of the Mantic art, the inventor of letters and the heroic metre; of everything, in fact, that was supposed to have contributed to civilisation and initiation into a more humane worship of the deity among the primitive

inhabitants of Thracia and all Greece. A kind of monastic order sprang up in later times, calling itself after him, which combined with a sort of enthusiastic creed about the migration of souls and other mystic doctrines a semi-ascetic life. Abstinence from meat (not from wine), frequent purifications and other expiatory rites, incantations, the wearing of white garments and similar things were among their fundamental rules and ceremonies. But after a brief duration the brotherhood, having first, during the last days of the Roman empire, passed through the stage of conscious and very profitable jugglery, sank into oblivion, together with their 'orpheotelistic' formulas and sacrifices.

Orpheus has also given the name to a special literature called the Orphic, and was called the first poet of the heroic age, anterior to both Homer and Hesiod. The fragments current under his name were first collected at the time of the Pisistratidæ, chiefly by Onomacritus, and these fragments grew under the hands of the Orphic brotherhood, aided by the Pythagoreans, to a vast literature of sacred mythological songs sung at the public games, chanted by the priests at their service, worked out for dramatic and pantomimic purposes by the dramatists, commented upon, philosophised upon, and 'improved' by grammarians, philosophers, and theologians. Although authorities like Herodotus and Aristotle had already combated the supposed antiquity of the so-called Orphic myths and songs of their day, yet the entire enormous Orphic literature which grew out of them retained its 'ancient' authority from the 3d and 4th centuries down even to quite recent times, when it was irrefutably proved to be in its main bulk, as far as it has survived, the production of these very 3d and 4th centuries, raised upon a few scanty, primitive snatches. The most remarkable part of the Orphic literature is its Theogony, which is based mainly on that of Hesiod.

Besides the fragments of the Theogony which have survived, imbedded chiefly in the writings of the Neoplatonists, may be mentioned the *Argonautica*, a poem of the Byzantine period, consisting of 1384 hexameters; further, a collection of 87 or 88 liturgical hymns; and a work on the virtues of stones, called *Lithica*. Of other poems belonging to the Orphic Cycle, only names have survived in most instances. The hymns may be of the 1st or 2d century B.C. They have repeatedly been translated.

See the editions of the *Orphica* by Hermann (1805) and Abel (1885); Lobeck's *Aglaophamus* (1829); Gerhard, *Orpheus und die Orphiker* (1861); Dieterich, *De Hymnis Orphicis*; Kern, 'Die Herkunft des orphischen Hymnenbuchs' in the Carl Robert *Genethliakon* (1910).

Orpiment. See ARSENIC.

Orpine, a kind of Sedum (q.v.).

Orpington, a village of Kent, 12 miles by rail SE. of London, where Ruskin's books began to be published in 1873 (see E. T. Cook, *Studies in Ruskin*, 1890). Pop. 7000.

Orrery, a machine constructed for the purpose of exhibiting the motions of the planets round the sun, and of the satellites round their primaries, which was in high repute during the 18th and beginning of the 19th century, though now regarded as a mere toy. Made by Rowley in 1715 at the expense of Charles Boyle (q.v.), Earl of Orrery, it was a combination of the old Planetarium of the 16th century with other machines which showed the motions of the earth, moon, and planetary satellites. Though the construction of a machine which would exhibit accurately the motions, distances, and magnitudes of the planets is impossible, yet an orrery is in some degree useful as giving a general notion of the way in which the planetary

motions are performed. In making the machine a number of iron tubes equal in number to the planets, and of different dimensions, are placed one within the other; their lengths being arranged so that the innermost tube projects at both ends beyond the one next to it, that one similarly projects beyond the third, and so on. At one end of each tube a rod is fixed at right angles, and a ball or lamp attached to its end; the lengths of the rods being proportional (or at least supposed to be so) to the radii of the planetary orbits. The other ends of the tubes form the axes of toothed wheels, which are made to turn at angular velocities proportional to those of the planets.

Orris-root (probably a corruption of *Iris* Root), the root-stock (*rhizome*) of certain species of *Iris* (q.v.), natives of the south of Europe, belonging to the division of the genus having bearded flowers, sword-shaped leaves, and scapes taller than the leaves—viz. *I. florentina*, a species with white flowers; *I. pallida*, which has pale flowers; and *I. germanica*, which has deep purple flowers. The flowers of all these species are fragrant. *I. germanica* extends farther north than the other species, and its root is sometimes said to be more acrid. Orris-root was formerly used in many medicinal preparations as a stimulant, but is now almost entirely disused. It is sometimes chewed to sweeten an offensive breath. Its chief use is in perfumery. It has a pleasant smell of violets, which it acquires in drying. Hair and tooth powders, and oils, are often scented with it. A tincture of it also is used as a scent, and is often sold as *Essence of Violets*.

Orsay. See D'ORSAY.

Orsini, FELICE, conspirator, was born in 1819 at Meldola in Italy, in the States of the Church, and studied at Bologna. He belonged to a branch of a noble family, long famous as supporters of the Gueff party, which produced famous scholars, soldiers, and churchmen (including two popes, Nicholas III. and Benedict XIII.). Felice, the son of a conspirator, was early initiated into secret societies, and in 1844 was sentenced at Rome to the galleys for life. The amnesty of Pius IX. (1846) restored him to liberty, but he was soon again imprisoned for participation in political plots. When the revolution of 1848 broke out Orsini was elected a deputy to the Roman Constituent Assembly, and, invested with extraordinary powers, was sent to Ancona and Ascoli to suppress brigandage. He signalised himself by the violence with which he executed his commission. He also took part in the defence of Rome and Venice; agitated in Genoa and the duchy of Modena; and in 1853 was shipped by the Sardinian government to England, where he formed close relations with Mazzini. Furnished with money by the leaders of the revolutionary party, he appeared at Parma in 1854, and afterwards at Milan, Trieste, Vienna, everywhere agitating in the interest of insurrection; until at last he was arrested at Hermannstadt, and confined in the fortress of Mantua. In 1856 he succeeded in making his escape, and found refuge in England, where he supported himself by public lecturing, and wrote *Austrian Dungeons in Italy* (1856). Towards the end of 1857 he repaired to Paris, with the intention of assassinating Napoleon III., whom he reckoned the great obstacle to the progress of revolution in Italy. His associates were Pieri, Rudio, and Gomez, all more or less of the Mazzinian group. They took up their station in a house close by the Opéra, and on the evening of the 14th January 1858, just as the carriage containing the emperor and empress was drawing up, they threw three bombs under it. An explosion took place, and 10 persons were killed, 156 wounded, but Napoleon and the empress remained unhurt. The

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assassins were arrested, tried, and sentenced; Orsini, Pieri, and Rudio, to capital punishment, Gomez to penal servitude for life. Rudio's life was spared at the intercession of the empress, but Pieri and Orsini were guillotined on 13th March. See *Memoirs and Adventures of Orsini, written by himself* (Eng. trans. Edin. 1857); his *Letters* (2 vols. Milan, 1861); and a work by Montazio (1862).

Orșova, the name of two Rumanian towns (Hungarian till the Great War) on the Danube (q.v.) over against the Iron Gates. OLD ORȘOVA is 478 miles by rail SE. of Vienna. Pop. 5000.—NEW ORȘOVA, on an island in the Danube, is a fortified town. The Austrians were masters of it between 1716 and 1738; the Turks held it both before 1716 and after 1738. Pop. 3000.

Ortegal, CAPE, the north-west extremity of Spain (q.v.), in Galicia.

Ortelius, the Latin form of the name of ABRAHAM ORTELL, or ORTEL, who, born of German parents in 1527 at Antwerp, where he died in 1598, published the earliest atlas under the title *Theatrum Orbis Terrarum* (1570); a critical work on ancient geography, *Synonymia Geographica* (1578), re-issued, greatly improved, as *Thesaurus Geographicus* (1596); and other geographical works. He was also a frequent traveller to England, Ireland (1577), and Italy, and the countries between.

Orthez, a town in the French department of Basses-Pyrénées, on the right bank of the Gave de Pau, 41 miles by rail E. of Bayonne. The 'Tour de Moncade' (1240), the stately castle of the counts of Foix (q.v.), which Froissart visited in 1388, was reduced to a ruin by Richelieu. Near Orthez Wellington gained a decisive victory over Soult, 27th February 1814. Pop. 6000.

Orthoceras, a large genus of common fossil Cephalopods. The shells are quite straight, but a gradual series of forms lead on to the Nautilus type. Some species were gigantic—as much as six feet in length and a foot or more in diameter.

Orthoclase. See FELSPAR.

Orthoclase-porphry, a crystalline igneous rock, of variable colour, but generally reddish. It is fine-grained and compact in texture. The ground-mass is feldspathic, and micro- or crypto-crystalline; now and again it shows a little glassy or devitrified matter. Scattered through this ground-mass are porphyritic crystals of orthoclase, and usually some hornblende and biotite in small granules, crystals, and scales. The rock occurs in minor intrusions, dykes and sills, and is intermediate in texture between syenite and trachyte. See also IGNEOUS ROCKS.

Orthoclase-rocks. See PETROGRAPHY.

Orthodoxy (Gr. *orthos*, 'right,' and *doxa*, 'an opinion'), a name given by theologians to religious opinions in agreement with Scripture and historical tradition, or rather with the interpretation of these entertained by the particular church to which they themselves happen to belong. While it is true that the great cardinal and essential points of Christian dogma have been preserved by all sections of the Church of Christ, the gravest divergences have also arisen, alike in doctrine and practice, each fortified by an assumed infallible interpretation of the letter of Scripture or the line of historical descent in the usage of the church.—The antithesis of *orthodoxy* is *heterodoxy* (*heteros*, 'other'—i.e. 'wrong'). See also GREEK CHURCH.

Orthoepy (Gr. *orthos*, 'right'; *epos*, 'a word'), a branch of grammar that treats of the correct pronunciation of the words of a language.

Orthography. See SPELLING.

Orthoptera (Gr., 'straight-winged'), an order of Insects (q.v.).

Ortolan (*Emberiza hortulana*), a species of Bunting (q.v.) of the Finch family Fringillidae. The adult male is about six inches long; has the head, neck, and upper breast slate-gray suffused with yellow; bill reddish brown; chin, throat, and feathers round the eye yellow, with a narrow band of greenish gray descending from a little in



Ortolan (*Emberiza hortulana*).

front of the angle of the mouth; back, wing-coverts and secondaries fulvous brown with dark stripes; rump reddish brown. The plumage of the female is paler in colour. The ortolan in its summer migrations ranges as far north as the Arctic Circle in Scandinavia. In the south of Europe, where it is found in great numbers, and in the north of Africa, where it sometimes breeds, it is but a summer visitor. In winter it migrates as far south as to Abyssinia and North-western India, but its true winter-quarters have not yet been accurately ascertained. Though enormously abundant in certain localities on the Continent, it is rare in Britain, and many of the specimens captured have no doubt escaped from captivity, considering the large quantities imported alive from Holland and Belgium. It frequents bushy places, and builds its nest of dry grass always on the ground and generally in the open fields, though sometimes among herbage or under low bushes. It lays from four to six eggs, which vary in colour from very pale-bluish white to salmon colour, spotted with rich purple brown, with underlying spots of pale violet, not streaked as is usual with other buntings. The note of the male is rather metallic, and his song at times is incessant and very monotonous. The food consists of beetles and other insects and seeds. Large numbers of ortolans are netted during their migrations, and confined in dark or dimly-lighted rooms, where they are fattened upon oats and millet until ready for the table. Their flesh is considered a great delicacy.

Orton, ARTHUR. See TICHBORNE.

Ortona, a town of Italy, on the Adriatic, 104 miles by rail SSE. of Ancona. It has a cathedral and an improved harbour. Pop. 17,000.

Ortygia. See DELOS, SYRACUSE.

Ortyx. See VIRGINIAN QUAIL.

Oruro, capital of the department of Oruro, in Bolivia, stands on a saline plain 11,960 feet above the sea, near the salt lake of Aullagas, and possesses mines of silver, gold, copper, and tin. Founded in 1590, it had 70,000 inhabitants in 1650, but now, though connected by rail with Antofagasta, has only 32,400. The department, bordering on Peru, has an area of 20,657 sq. m. and a pop. of 141,000. The soil is saline, but the mineral wealth is great.

Orvieto, a city in the Italian province of Perugia, 78 miles NNW. of Rome, crowns an isolated tufa rock, which rises 765 feet above the river Paglia, and 1327 above sea-level. The cruciform cathedral (1290-1580), one of the most beauti-

ful and richly decorated specimens of Italian Gothic, is built of black and white marble, and measures 295 feet by 109. The façade (damaged by earthquake, 1915) is unsurpassed in richness of material, and in the beauty of its mosaics, sculptures, and elaborate ornamentation. The interior also is magnificently decorated with sculptures and with paintings by Luca Signorelli, Fra Angelico, &c. The bishop's palace and St Patrick's Well (1527-40), with its 250 steps, are also noteworthy. Pop. 20,000. Orvieto, called in the 7th century A.D. *Urbs Vetus*—whence its present name—is supposed to occupy the site of the Etruscan Volsinii (see ETRURIA). In the middle ages it gave shelter to thirty-two popes.

Orwell. See IPSWICH.

Oryx, a genus of antelopes, chiefly African, also Arabian and Syrian, with long slightly curved horns in both sexes. The *Leucoryx*, whose apparently 'unicorn' figure is frequent on ancient monuments, is *Oryx leucoryx*; the Beisa and the Beatrix antelope are two other species. The name is also applied to species of the nearly allied genus *Hippotragus*, and more widely still. See ANTELOPE.

Oryza. See RICE.

Osage Orange (*Maclura aurantiaca*), a North American tree of the Moraceæ, attains a height of 20 to 60 feet. It is of the same genus with *Fustic* (q.v.). The bright yellow wood is fine-grained and very elastic, and takes a high polish; it is much used for fence-posts, sleepers, paving-blocks, &c. The tree is largely employed in America, especially in the west, as a hedge-plant; it has also been tried in Britain for that purpose. Its fruit is about the size of a large orange, has a tuberculated surface of a golden colour, and is filled with radiating, somewhat woody fibres, and with a yellow milky juice, the odour of which is generally disliked, so that the fruit, although not unwholesome, is seldom eaten.

Osages, a tribe of American Indians, of the Siouan linguistic stock. Formerly very troublesome, they settled in Kansas in 1825, till in 1872 they removed to Oklahoma, where there are Quaker teachers. As a tribe they are rapidly approaching extinction by absorption. See monograph by F. la Flesche (1914-15).

Osaka, or OZAKA, the second city of Japan, situated at the head of the gulf of the same name, and at the mouth of the Yodo River. The city is intersected with canals. Its fine castle, the stones of whose walls are of astonishing size, was constructed by Hideyoshi's orders in 1583, and the palace, built afterwards in its precincts and destroyed in 1868, was perhaps the most magnificent structure in Japan. Osaka is the great commercial and industrial centre of the empire, and the headquarters of the rice and tea trade. Harbour improvements were begun in 1897 and again in 1906. There is a university of medicine (1880). In the earthquake of 28th October 1891, of which Osaka was the centre, nearly 10,000 lives were lost. There was a great fire in 1909. Pop. 1,253,000.

Osborn, SHERARD, admiral and Arctic navigator, was born at Madras, 25th April 1822, the son of an English officer, and entered the navy in 1837. He took part in the capture of Canton (1841), and of the defences of Woo-sung (1842); commanded vessels in two expeditions sent out in 1849 and 1852-55 respectively to search for Sir John Franklin; was head of the division of the British fleet that served in the Sea of Azov during the Crimean war; and took a leading share in the Chinese war of 1857-59, penetrating up the Yang-tsze-kiang as far as Hankow. After his retirement from active duty

he superintended the construction of a submarine telegraph between Great Britain and Australia, and was made rear-admiral in 1873. He died 6th May 1875. Besides publishing *Stray Leaves from an Arctic Journal* (1852), *Journals of Robert M'Clure* (1856), and *Career, Last Voyage, and Fate of Sir John Franklin* (1860), he proved his interest in Arctic exploration by inducing A. H. Markham to test the navigability of Baffin Bay in winter (1873) by steam-power, and by helping to fit out the expedition which sailed under Nares in 1875.

Osborne. See LEEDS (DUKE OF). For DOROTHY OSBORNE, see TEMPLE (SIR WILLIAM); for OSBORNE HOUSE, see COWES, NAVY; and for OSBORNE or ST HELEN'S BEDS, see OLIGOCENE SYSTEM.

Oscans (Lat. *Osci* or *Opisci*; Gr. *Opikoi*), the name of an Italian people, who at an early period occupied Campania, and were either closely allied to or the same race as the Ausones. Subsequently (about 423 B.C.) Samnites from the hilly districts to the north overran the country, and amalgamated with the inhabitants whom they had subjugated; and the names *Osci* and *Oscan language* were subsequently applied to all the other races and dialects whose origin was nearly or wholly the same. The Oscan language was not substantially different from the Latin, but only a ruder form of the same central Italic tongue. By the victories of the Romans over the Samnites, and the conferring of the *civitas* on all the Italians (88 B.C.), an end was put to the official use of the Oscan tongue; nevertheless, in the time of Varro (1st century B.C.) it was still used by the people. During its most flourishing period it was something more than a country *patois* (see ATELLANÆ). Besides a considerable number of coins with Oscan legends, there are still extant a number of Inscriptions (q.v.).

See Mommsen's *Oskische Studien* (1845), and *Unteritalische Dialekte* (Leip. 1850); Zvetiaeff's *Sylloge Inscr. Oscorum* (Petersb. 1878); grammars by von Planta (1892-97) and Buck (1904); and Conway's *Italic Dialects* (1897); also the article ITALY.

Osceola (*As-se-he-ho-lar*, 'Black Drink'), a Seminole chief, was born in Georgia in 1804, the son of an English trader, named Powell, and of a chief's daughter. With her he removed to Florida as a child, and there attained great influence among the Indians. In 1835 his wife, the daughter of a runaway slave, was seized as a slave. The outraged husband threatened revenge, and for his threats was imprisoned six days in irons by General Thompson: six months afterwards he killed the general and four others outside Fort King. This was the beginning of the second Seminole war. He then placed himself at the head of a band which had surprised and massacred Major Dade and a detachment of soldiers, and taking to the almost impenetrable Everglades with two or three hundred followers, he fought for nearly two years with great energy and skill the superior numbers sent against him. He was taken prisoner at last, in October 1837, by General Jesup, while holding a conference under a flag of truce—an act of inexcusable treachery, though represented as one of retaliation—and confined in Fort Moultrie until his death, 30th January 1838. Mayne Reid, in *Oceola*, has woven the story into a romance.

Oscott, a Roman Catholic college, near Birmingham; formerly a centre of the Roman Catholic movement in England. The name is first met with towards the close of the 17th century as the seat of a Catholic mission, which continued to be served by different priests till in 1793 it was formed into a college for the education of both laymen and ecclesiastics. In 1835 the development of the college led to the erection of the present fine buildings some two miles from the original site, the old

name being retained.—In 1889 the establishment was closed and reopened as a purely ecclesiastical institution for the diocese of Birmingham. In 1897 it became a central seminary for various midland and southern dioceses of England, but in 1909 again returned to its position of a diocesan establishment, though students from other dioceses are still on occasion admitted. It is now styled St Mary's College.

O'Shaughnessy, ARTHUR, minor poet, was born in London, 14th March 1844. He was employed in the natural history division of the British Museum, married a daughter of Dr Westland Marston, whom he lost in 1879, and followed to the grave on 31st January 1881. During his brief life he published *Epic of Women* (1870), *The Lays of France* (1872), and *Music and Moonlight* (1874); and soon after his death appeared *Songs of a Worker* (1881). As a poet he is somewhat diffuse, over-gorgeous in colour, and not sufficiently discerning in his admiration for modern French models; yet he reveals imagination, passion, tenderness, melody, and a mastery of lyrical forms. See an edition of his poems by Percy (1923).

Oshkosh, capital of Winnebago county, Wisconsin, on both sides of the Fox River, at its entrance to Lake Winnebago, 80 miles by rail NNW. of Milwaukee. The lake (30 miles by 12), with the Fox and Wisconsin rivers, which are connected by a canal, forms a water-route between Lakes Michigan and Superior. The city extends along the lake for 4 miles, and contains a number of handsome buildings. It carries on a great trade in lumber, and contains numerous sawmills, extensive door and sash factories, and large manufacturing of furniture, matches, carriages, and soap, besides pork-packing establishments. It is the seat of a state normal school, and close by is a state lunatic asylum. Oshkosh was incorporated in 1853, and burned down in 1859; it was again partially destroyed by fire in 1874 and 1875; and in 1885 a cyclone overwhelmed part of the suburbs. Pop. (1880) 15,748; (1890) 22,836; (1920) 33,162.

Osiander, ANDREAS, German reformer, was born on 19th December 1498 at Gunzenhausen, near Nürnberg. His name is a Græcised form of the original German Heiligmann or Hosemann. Educated at Ingolstadt, he declared himself an adherent of Luther, and became a preacher at Nürnberg (1522), persuaded that city to declare itself Lutheran, took part in the conference at Marburg (1529), and was present at the diet of Augsburg (1530), and at the signing of the Schmalkald articles (1537). In 1548 he was deprived of his office as preacher because he refused to agree to the Augsburg Interim; but was immediately afterwards invited by Albert, Duke of Prussia, to become professor of Theology in the newly-established university of Königsberg. He was hardly settled there when he became entangled in a theological strife that was greatly embittered by his vehement and arrogant temper. In a treatise, *De Lege et Evangelio*, Osiander asserted that the righteousness by which sinners are justified is not to be conceived as a mere justificatory or imputative act on the part of God, but as something inward and subjective, springing in a mystical way from the union of Christ with man. The most notable of his opponents was Martin Chemnitz (q.v.). Osiander's death in the midst of this fierce polemical war, on 17th October 1552, did not check it; the battle was continued by his followers, called Osiandrists, and led by his son-in-law Funk, who was executed for high-treason in 1566, and the entire party was banished from Prussia in 1567. See Lives by Wilken (1844), Möller (1870), and Hase (1879). Osiander's son Lukas (1534-1604)

and his son Lukas (1571–1638) won reputations as theologians of note.

Osier, the popular name of those species of Willow (q.v.) which are used chiefly for making Baskets (q.v.) and other wickerwork. They are of low bushy growth, few of them ever becoming trees, their branches long and slender; and they are the more valuable in proportion to the length, slenderness, suppleness, and toughness of their branches.

The Common Osier (*Salix viminalis*), a common native of wet alluvial grounds in Britain and many parts of Europe, is one of those which sometimes become trees, although when cultivated for basket-making it is not permitted to do so. It is often planted to prevent the banks of rivers from being washed away. Its branches are used for making hoops and coarse baskets. There are several varieties in cultivation, not easily distinguished except by a very practised eye, but much more useful than the original or wild kind, which is apt to break, and therefore of little value. More suitable for the finer kinds of basket-making are *Salix purpurea*, sometimes called the Fine Basket Osier, and *S. rubra*, known near London as the Green-leaved Osier or Ornard; *S. triandra*, a triandrous species, known to English osier-cultivators and basket-makers as the Spaniard Rod; whilst *S. alba*, var. *vitellina*, sometimes becoming a tree, is the Golden Osier or Golden Willow, remarkable for the bright-yellow colour of its branches, as well as for their pliancy and toughness. There are other species, not natives of Britain, which also are valuable.

Osiers are very extensively cultivated in Holland, Belgium, and France, on alluvial soils, especially near the mouths of rivers; and from these countries great quantities of 'rods' are imported into Britain. They are cultivated also to a considerable extent in some parts of England, particularly on the banks of the Thames and the Severn, and in the level districts of Cambridgeshire, Huntingdonshire, &c. Islets in the Thames and other rivers, entirely planted with osiers, are called *Osier holts*. Osiers grow particularly well on grounds flooded by the tide. Much depends on the closeness of planting of osier grounds; as when space is too abundant the shoots of many of the kinds do not grow up so long, slender, and unbranched as is desirable. The French cultivators, when they wish osiers for the finest kinds of basket-work, cut branches into little bits with a bud or eye in each, and plant these pretty close together, so as to obtain weak but fine shoots; but generally cuttings of 15 or 16 inches in length are used, and of tolerably thick branches, and these are placed in rows from 18 inches to 2 feet apart, and at distances of 15 to 18 inches in the row. Osier plantations in light soils continue productive for fifteen or twenty years, and much longer in rich alluvial soils. Osiers succeed best in rich soils, but not in clays. No cultivation is required after planting;

but the shoots are cut once a year, at any time between the fall of the leaf and the rising of the sap in spring. After cutting they are sorted, and those intended for brown baskets are carefully dried and stacked, care being taken that they do not *heat*, to which they are liable, like hay, and by which they would be rotted and rendered worthless. The stacks must be protected carefully from rain. The osiers intended for white baskets cannot at once be peeled, but, after being sorted, they are placed upright in wide shallow trenches, in which there is water to the depth of about four inches, or in rivulets, being kept secure in their upright position by posts and rails; and thus they remain till they begin to bud and blossom in spring, which they do as if they remained on the parent plant, sending forth small roots at the same time into the water. They are then, in ordinary seasons, easily peeled by drawing them through an instrument called a *break*, but in cold springs it may be necessary to lay them for a while under a quantity of litter. After being peeled, they are stacked for sale.

Osijek, the Croatian name of Essek (q.v.).

Osiris, greatest of Egyptian gods, is the son of Seb (the Earth—the father) and Nut (Heaven—the mother). He wedded Isis his sister while they were yet in the womb; was slain by Set, was avenged by his son Horus, and judges the dead in the nether world. The myth is generally interpreted by taking Osiris for the Sun, Set for darkness. Osiris had by Nephthys another son Anubis (i.e. Dusk), who is said to have swallowed his father. Osiris has also been identified with the god Ra, with the Moon, with the Nile, and with the annual sun-period or summer. See EGYPT, ISIS, SERAPIS, and works there quoted; also J. G. Frazer, *Adonis, Attis, Osiris* (1914, forming part iv. of *The Golden Bough*, 3d ed.); Wallis Budge, *Osiris and the Egyptian Resurrection* (1911).

Oskaloosa, capital of Mahaska county, Iowa, 104 miles by rail WNW. of Burlington. It possesses mines of bituminous coal, and manufactures flour, woollens, boilers, electric appliances, &c. Here are Penn College (Quaker) and two others. Pop. 9500.

Oslo, an old Norwegian town, founded, according to legend, by Harold III. (q.v.) of Norway, who made it his capital. In 1589 James VI. of Scotland braved the North Sea to meet his storm-bound bride Anne of Denmark in Oslo, and was married there with great splendour. Oslo was destroyed by fire in 1624, and Christian IV. founded near-by the new capital Christiania, making Oslo a suburb. The name of the suburb, however, was extended to the whole city on 1st January 1925. See CHRISTIANIA.

Osman. See OTHMAN.

Osmium (sym. Os; atom. wt. 190.9; atom. number 76) is a metal which occurs in association with platinum in the form of an osmium-iridium alloy. It may be obtained in the metallic condition by several processes which yield it either as a black amorphous powder or in hard bluish-white crystals. It is the least fusible of all the metals, the oxyhydrogen jet volatilising, but not fusing it. It is the heaviest substance known, its specific gravity being 22.477. Four oxides of osmium are known. Three of these—viz. the protoxide, OsO , the sesquioxide, Os_2O_3 , and the binioxide, OsO_2 , are black or grayish-black powders. The peroxide, OsO_4 , commonly called osmic acid, is the most important oxide. It is produced when the metal is heated strongly in air or oxygen, and forms colourless, glistening, acicular crystals, freely soluble in water, and very volatile. At about 100°C . this



Common Osier (*Salix viminalis*): a, male catkin; b, female catkin.

compound gives off an extremely irritating and irrespirable vapour; and hence the name of the metal (from the Greek word *osmē*, 'odour'). It produces a permanent black stain upon the skin, and at the same time causes an eruption which is difficult to heal. It violently attacks all the mucous membranes, and its vapour may cause partial or total blindness by depositing a film of metallic osmium on the eyes. A solution of the peroxide is employed in histological work for staining fat and nerve substance. Osmium also forms two chlorides; and osmates, corresponding to an unknown osmic acid, have been prepared. This metal was discovered by Tennant in 1803.

Osmose, the interdiffusion of two liquids through a septum, usually of bladder or of parchment paper. If a bottle, filled with one liquid, be closed by parchment paper, and be completely immersed in a vessel containing another liquid, increase or decrease of the contents of the bottle will occur according as the liquid contained in the bottle passes out through the septum less quickly or more quickly than the other liquid passes inwards. When the contents are increased the phenomenon has been called *endosmose*; when they decrease it has been termed *exosmose*. The distinction is obviously not a scientific one; for a reversal of the positions of the liquids will cause a reversal of the osmotic process, so that the process which was formerly denominated *exosmose* must now be called *endosmose*, and *vice versa*. The phenomenon is one of extreme importance, for it is constantly taking place in living bodies—both animal and vegetable.

Nollet was the first to record the occurrence of osmose. He placed a vessel, filled with alcohol and closed with a piece of bladder, inside a larger vessel which was filled with water. The rapid entry of the water almost burst the bladder; and the opposite effect took place when the water was placed inside the inner vessel and the alcohol was placed outside it. Nollet did not pursue his observations any further. Dutrochet first made careful investigations into the subject, which has since received numerous practical applications—notably in the method of dialysis, which is due to Graham. The phenomenon consists merely in the interdiffusion of two liquids complicated by the mutual molecular actions which take place between the liquids and the material of the membrane. The rate of interdiffusion depends greatly upon the nature of the membrane; sometimes the direction of the osmose is affected when the membrane is altered.

A process which is analogous to osmose occurs in the interdiffusion of two liquids through an intervening liquid layer. The difference between the rates of diffusion of colloids and crystalloids is even more marked when the substances are separated by parchment paper or animal membrane than when they diffuse directly into each other.

Osmund, St, a nephew of William the Conqueror, whom he accompanied to England as one of the royal chaplains. He became chancellor in 1072, and bishop of Salisbury in 1078, and was engaged in the preparation of Domesday Book. He built the cathedral of Old Sarum, and drew up in his 'Use of Sarum' an order of church service which in his time was universally adopted. He died in 1099, and was canonised in 1457.

Osmunda. See ROYAL FERN.

Osnabrück, a town in the Prussian province of Hanover, in the fertile valley of the Hase, 75 miles by rail SSW. of Bremen and 70 WSW. of Hanover. Its great Catholic cathedral, in the Transition style of the first half of the 13th century, is rich in relics and monuments; and the town-hall

(1486–1512) contains portraits of all the plenipotentiaries who here on 24th October 1648 signed the peace of Westphalia. By that treaty the bishopric of Osnabrück, founded by Charlemagne about 810, was to be occupied alternately by a Catholic prelate and a Protestant secular prince of the House of Brunswick-Lüneburg. After having last been held by Frederick, Duke of York, the district of Osnabrück came in 1802 to Hanover, and the chapter was dissolved, until the re-establishment of the bishopric in 1857. Osnabrück has important iron and steel works, and manufactures of railway plant, agricultural machinery, gas-meters, paper, tobacco, &c. Dating from 772, it suffered much in the Thirty Years' War, but recovered, thanks to its linen industry, during the 18th century. The name *Osnaburgs* given to coarse linens in England is derived hence. Pop. (1852) 13,718; (1890) 39,929; (1900) 51,573; (1919) 85,017, one-third Catholics.

Osprey (*Pandion haliaëtus*), or FISH-HAWK, a not infrequent autumnal visitor to British shores, estuaries, and lochs, where it feeds exclusively on fish. It has been known to breed in England, and several eyries still remain in Scotland. But its



Osprey (*Pandion haliaëtus*).

distribution is almost cosmopolitan, for it occurs on all the continents, especially where fish are common and men rare. The male bird is 22 inches in length, the female 24. 'The adult male has the head and nape white, streaked with brown; upper plumage umber, with a purplish tinge; under parts white, with a band of brown spots across the breast; cere, legs, and toes greenish blue.' The female has more brown on the breast. A large nest of sticks and turf, with a small moss-lined cavity for the eggs, is built on a tree or rock. The eggs (two or three) are laid in April or May, and have a 'ground colour of white or buff, with chestnut or claret blotches, and blurs of purplish gray.' In North America the osprey is gregarious. It never preys on other birds, and is not dreaded by them. It is, indeed, of a pacific and timorous disposition, and readily abandons its prey to the White-headed Eagle. In the days of falconry it was sometimes trained and used for catching fish. See Saunders, *British Birds*.

Osrhoene, ancient name of a district (now Turkish) in north-west Mesopotamia, containing Edessa (q.v.).

Ossa, the ancient name of a mountain on the east side of Thessaly, near Pelion (q.v.), and separated from Olympus by the vale of Tempe. The ancients placed the seat of the Centaurs and

Giants in the neighbourhood of Pelion and Ossa. See TITANS.

Ossetes. See CAUCASUS.—SOUTH OSSETIA is an autonomous territory in Georgia.

Ossian, the great heroic poet of the Gael. In form the name is a diminutive—*Oisean*, *Oisín*, the little *os* or deer. In Gaelic story Ossian was the son of Fionn MacCumhail, a celebrated hero who flourished in the 3d century A.D. Fionn gathered about him a band of warriors like himself, who were collectively termed the *Feinn*. The adventures and exploits of these heroes, and especially of the principal figures in the group—of Fionn himself, magnanimous and wise; of his grandson Oscar, chivalrous and daring; of his nephew Diarmad, handsome and brave; of his rival Goll, the one-eyed; and Conan, the villain of the band—their jealousies, dissensions, and final overthrow constitute the literature of the *Feinn*. The story goes that Ossian was carried away by his fairy hind-mother to *Eilean na h-Oige*, 'the isle of the ever young,' from whence he returned betimes; and now old, blind, and alone, 'Ossian after the *Feinn*,' he told the story of the heroes to St Patrick.

The legends of the *Feinn* are but a fragment of the heroic literature of the Gael, and in the oldest MSS. the deeds of Fionn and his companions occupy but little space. There were two earlier cycles. The first of these extended from unknown antiquity until the settlement of the Gael in Ireland. The legends of this period preserve traditions of the old divinities of the race, notably the *Tuatha de Danann*, under the guise of earlier colonists whom the Gael conquered and displaced. Several tales of this cycle are preserved, among which the Fate of the Children of Tuirenn and the Fate of the Children of Lir are the best known. The second, and by far the richest, epoch in Gaelic romance is that of Cuchullin, Connall Cearnach, Fergus, and the Sons of Uisneach. The date is about the commencement of the Christian era, when Conchobar MacNessa ruled Ulster and Queen Meave ruled Connaught. The great literary product of this period is the *Tain* or Cattle Spoil of Cuailgne, the Iliad of the Gael. Another noted Saga recounts the death of the Sons of Uisneach and suicide of the Lady Deirdre, the Darthula of James Macpherson. Eventually the legends of the *Feinn* partly absorbed and totally eclipsed the earlier traditions; so that Ossianic literature is now but another name for the heroic literature of the Gael.

These traditions have come down from the misty past in tale and ballad. They were early reduced to writing, and as time goes on we observe great development in incident and detail. In ballads preserved in the Book of Leinster (circa 1150 A.D.) Ossian is represented as old and blind, surviving father and son. A 15th-century MS. recounts the boyish exploits of Fionn. As we come down, the volume of tradition gets fuller, while cycles tend to become confused. The leader of the *Feinn* is at one time a god, at others a hero, a king, a giant, but usually a great warrior, as wise as brave. In the book of the Dun Cow his mother is Muirn 'of the Fair Neck;' in later traditions we hear of Fionn as the son of a sister of Cuchullin; at another time a Scandinavian princess is his mother. But the literary form in which the legends are preserved remains practically unchanged. A Gaelic tale is of a distinct type—narrative prose with verse interspersed. Gaelic poetry, older and later, is ever rhymed lyric verse.

To the majority of people Ossian is known through the publications of James Macpherson (q.v.). In 1760–62–63 this remarkable man published *Fingal*, an epic poem, in six books; *Temora*, another epic, in eight books; with a num-

ber of shorter pieces, epic and dramatic—all purporting to be translations of poems composed by Ossian, the son of Fingal. 'The translation,' Dr Blair is made to say in the preface to the *Fragments* printed in 1760, 'is extremely literal.' These publications, in the opinion of the most competent judges, possessed great literary merit. They brought wealth and fame to the author, and before the end of the century a translation of them appeared in nearly every European language. Encouraged by the success that attended Macpherson's venture, other publications of a somewhat similar kind followed. In 1780 Dr Smith of Campbelltown issued a volume of *Sean Dana*, or ancient poems, 'composed by Ossian, Orran, Ullin,' &c.; and in 1787 Baron Edmund de Harcourt, an Irishman in the service of the Elector Palatine, printed at Düsseldorf seventeen so-called Ossianic poems in English. The genuineness of Macpherson's *Ossian* was early called in question by Dr Johnson and others. An angry controversy followed. It was maintained that Macpherson had jumbled together persons and periods to an unwarrantable extent; that his originals, so far as he had any, were not Scottish, but Irish. If this were all that could be said one would feel justified in regarding, with Professor Windisch of Leipzig, Macpherson's *Ossian* as a legitimate development of the old traditions. For the legends of the *Feinn* are the common property of the Gael, whether in Ireland, Scotland, or Man. They are located in Scottish topography time out of mind, and within the last four hundred years quite as rich a harvest of ballad and tale has been recovered in Scotland as in Ireland. It is no doubt absurd to represent Fionn, whom Macpherson after Barbour calls Fingal, as a mighty Caledonian monarch, at one time successfully fighting the Roman legions in the 3d century, at another assisting Cuchullin, who lived in the beginning of the 1st century, to expel from Ireland the Norsemen who made their appearance for the first time in the end of the 8th. But Macpherson had warrant in genuine tradition for mixing up names and epochs. In the 'Battle of Ventry' Fionn defeats the kings of the world. According to a Gaelic tale, his father Cumhal sets up as king of Alba, and the kings of Ireland and Scandinavia combine to effect his overthrow; while the son is ever fighting Norsemen. Zimmer has propounded the theory that the whole of these *Finnsagen* are in their origin traceable to Teutonic sources, the very names by which the hero and his band are known being borrowed from the Norse. *Find*, *finn*, *Fionn* this distinguished Celtic scholar regards as a translation of *hwitr*, 'white;' while *fiann*, *feinn* are merely *fjanda*, 'foe,' later 'fiend.' Again, in genuine Gaelic ballad Fionn and Cuchullin are not directly brought together, but we find *Garbh* or the Rough, son of Starno, now fighting the latter hero, and again opposed to *Caoilte*, a distinguished companion of the former. According to some spirited verses composed in Perthshire before James Macpherson was born, the tailor of the *Feinn* passes, in the exercise of his calling, from the house of Goll to Dundalgan, the abode of Cuchullin, and back again to the palace of Fionn, without the least consciousness of anachronism.

But in Macpherson's *Ossian* there is a wide departure from genuine Gaelic literature and tradition. In his magnifying of the past, in his sympathy with nature, and in his powerful descriptions of the scenery of his own mountain-land James Macpherson is true to the genius of his people. But there he parts company with it. Gaelic literature supplies material for epics and dramas; but the epic and dramatic, as literary forms, were unknown to the people. The dim and shadowy characters of Macpherson are in sharp

contrast to the clear-cut features of the Gaelic heroes. Rarely does this author make a definite statement of fact; but when he does, as when, for example, he arms the old Gaels with bows and arrows, he blunders hopelessly. Macpherson is the most vague and abstract of writers; Gaelic poets are wearisome in detail, and revel in the concrete. In the opening of Book iii. of *Cathloda*, the author inquires regarding the origin and issue of things; but he is indebted for his answer rather to Bishop Berkeley than to the son of Fionn.

Macpherson was not a Gaelic scholar, and the fact is considered conclusive proof of his inability to compose the Gaelic text of *Ossian*. The only Gaelic printed in the author's lifetime was *Temora*, Book vii. *Ossian* was published in all the languages of Europe before he appeared in his own. And when at length the great edition of 1807 did appear, there were Gaelic texts for only one-half of the poems, and for about three-fourths of the matter published by Macpherson in English forty-five years previously. For the others, no 'original, ancient or modern, has ever yet been found. And it must be allowed that this truncated *Ossian* does not show to advantage in his native garb. The Gaelic-speaking people have never known him. There is not a single line of these Gaelic texts which can be proved to have been committed to writing before Macpherson's day. The diction is essentially modern. The loan-words are numerous, several of them borrowed from English. The idioms and constructions are colourless, and show traces of classical training rather than of the turns of phrase characteristic of native authors. The so-called blank verse in which the poems are written is unknown to Gaelic poetry. The archaic orthography of the seventh book of *Temora* was adduced by Dr Clerk of Kilmallie as proof of the antiquity of the writing. But in his frequent use of the *tenuis* (c, p, t), instead of the *mediae* (g, d, b), Macpherson merely followed Alexander Macdonald, who published his own poems twelve years previously. By the same gifted man he was led into the blunder of making *grian*, 'sun,' a masculine noun, contrary to invariable Gaelic usage, which has the sun as well as the moon of the feminine gender.

The truth seems to be that these so-called translations were essentially the compositions of James Macpherson, and that the Gaelic texts were prepared with or without aid from his friends, but how and when we do not now know. The only man who could explain things died and made no sign. One regrettable consequence of this famous episode in the history of Gaelic literature still remains. To many persons the discrediting of James Macpherson means the blotting out of existence of an extensive and interesting literature—the heroic literature of the Gael.

See the *Poems of Ossian* (1762-63); Brooke's *Reliques of Gaelic Poetry* (1789); *Ossian* (1807); *Transactions of the Ossianic Society of Dublin* (6 vols. 1854-61); *Popular Tales of the West Highlands* (1860-62); *Dean of Lismore's Book* (1862); Clerk's *Ossian* (1870); *Leabhar na Fíinne* (1872); *Folk and Hero Tales from Argyllshire* (1890); Windisch, *Irische Texte* (1880); *Ztschr. für deutsches Alt.*, vol. liii.; *Academy*, February 1891; William Sharp's Introduction to the centenary edition of *Ossian* (1896); and books noted at MACPHERSON (JAMES).

Ossification is the formation of bone. Most human bones are first represented by cartilage, which, by a complicated series of changes, becomes transformed into bone. The bones of the vault of the cranium and the face, part of the clavicle, and the 'sesamoid' bones occurring in tendons, on the other hand, are developed from fibrous tissue, without passing through a cartilaginous stage, and are distinguished as *membrane-bones*. In the

larger bones of the limbs at least three *centres of ossification* are found, one in the shaft, and one at each extremity. Growth of the bone takes place mainly at the lines between these elements, which long remain cartilaginous. Bony union becomes complete in each situation at a tolerably definite age (in some not till about twenty-five; see BONE). *True Ossification* sometimes occurs as a morbid process; but in many cases the term is incorrectly used (especially in the case of blood-vessels—see under ARTERIES) to designate a hard calcareous deposit, better called *calcification*, or *calcareous degeneration*, in which the characteristic microscopic appearances of true bone are absent. In one sense the osseous tissue that is formed in regeneration of destroyed or fractured bones (see FRACTURES) may be regarded as due to a morbid, although a restorative action. Hypertrophy of bone is by no means rare, being sometimes local, forming a protuberance on the external surface, in which case it is termed an *exostosis*; and sometimes extending over the whole bone or over several bones, giving rise to the condition known as *hyperostosis*. Again, true osseous tissue occasionally occurs in parts in which, in the normal condition, no bone existed, as in the dura mater, in the so-called permanent cartilages (as those of the larynx, ribs, &c.), in the tendons of certain muscles, and in some forms of tumours.

Ossining. See SING SING.

Ossoli. See FULLER (SARAH MARGARET).

Ossory, a diocese of the Roman Catholic Church of Ireland, embraces the county of Kilkenny and parts of King's and Queen's Counties. The bishop has his cathedral at Kilkenny. There is also an Episcopal diocese of Ossory.

Ostade, ADRIAN, painter and engraver, was born at Haarlem in December 1610, and in that city he died, 27th April 1685. His teacher was Franz Hals. Country dancing-grounds, farm-yards, stables, the interiors of rustic hovels and houses, and beer-shops are the places which he loves to paint; and his persons are for the most part coarse peasants, ugly, sordid, dirty, ragged. Vigour and close observation, with skilful management of lights, are perhaps his most noticeable characteristics; and humour and poetic appreciation are not unfrequently present. About 1639 he fell under the influence of Rembrandt's style. He was a prolific painter, and his works are to be found in the museums and collections of the Netherlands, Germany, Austria, Russia, France, and England. See works by Bode (1881) and Rosenberg (1900).—ISAAC OSTADE, brother of Adrian, also a painter, was born at Haarlem in 1621, and died at Amsterdam in 1649. Until 1644 he worked in the style of his brother, but then struck out a path for himself, and excelled in roadside scenes, winter landscapes, village street life, and similar subjects.

Ostend, a fashionable watering-place in the Belgian province of West Flanders, on the German Ocean, 77 miles by rail WNW. of Brussels. Its *Digue*, or sea-wall, 3 miles long, 40 feet high, and 35 yards broad, forms a favourite promenade, as also do the two *Estacades*, or wooden piers, projecting on both sides of the harbour's entrance. Harbour extensions were carried out in 1900-5, and other works have been found necessary. As a station for Dover and London steamers, and the terminus of various lines of railway, Ostend is a lively and active place of transport traffic (butter, rabbits, oysters, &c.), and the resort in the season (July to September) of 16,000 to 50,000 visitors from all parts of the Continent. It is, moreover, an important fishing-station, and has a good school of navigation, a monster Kursaal (1878), an hôtel-de-ville (1711), a fish-market, and a lighthouse

(1771; 175 feet). The place is now notorious for gambling facilities. Pop. 48,000. Dating from 1072, Ostend is memorable for the protracted siege by the Spaniards which it underwent from 7th July 1601 to 20th September 1604. It surrendered to the Allies in 1706, and to the French in 1745. It was held by the Germans from October 1914 to October 1918 as an outlet for submarines from Bruges. The fortifications have been demolished since 1865.—The 'Ostend Manifesto,' in American history, was a despatch forwarded to the United States government in 1854 by its ministers at the courts of Great Britain, France, and Spain, who had met here, by the government's request, to discuss the Cuban question. The despatch declared that if Spain would not sell Cuba, self-preservation required the United States to take the island by force, and prevent it from being Africanised like Hayti. Nothing, however, came of the 'manifesto.'

Ostensory. See **MONSTRANCE**.

Osteolepis (Gr., 'bone-scale'), a genus of fossil ganoid fish peculiar to the Old Red Sandstone. It is characterised by smooth rhomboidal scales, by numerous sharply-pointed teeth, and by having the first dorsal fin in front of the pelvic pair. The body is long and slender.

Osteology. See **BONE, SKELETON, &c.**

Osterode, (1) a town of Hanover, at the western base of the Harz Mountains, on the Söse, an affluent of the Leine, 30 miles by rail NW. of Nordhausen. Its church of St Giles (724; rebuilt 1578) contains the graves of the dukes of Grubenhagen, and there are also a fine town-hall, baths, large grain-stores, and cotton, woollen, and linen factories. Pop. 10,000.—(2) **OSTERODE**, in East Prussia, on the Drewenz, 77 miles NE. of Thorn, has a castle of the Teutonic knights (1270) and iron manufactures. The Germans defeated the Russians there, 31st August 1914. Pop. 15,000.

Osthoff, HERMANN (1847-1909), philologist, born in Westphalia, studied at Bonn, Tübingen, and Berlin, and became in 1877 professor of Sanskrit and Comparative Grammar at Heidelberg. He was one of the leaders of the 'new grammarians.'

Ostia, an ancient city of Latium, built at the mouth of the Tiber on its left bank, 14 miles SW. of Rome. Its origin is connected with the salt marshes (see **SALARIA VIA**), and it was said by the Romans to have been founded by Ancus Martius, but excavations have brought to light no remains earlier than the 4th century B.C. To this period belongs the nucleus out of which the city developed—a small rectangular fort, with walls of hewn stone, which probably inspired Virgil's description of the *castrum* established by Aeneas at the mouth of the Tiber; but it is not till the second Punic war that it is mentioned as the harbour of Rome. The wall of the 1st century B.C., which has been traced along its whole course, encloses a far larger area, which does not seem ever to have been greatly increased. The harbour was, however, exceedingly bad; its entrance, exposed to the south-west wind, was continually silted up, so that vessels were compelled to discharge their cargoes in the open roadstead. The Emperor Claudius, about 46 A.D., completed a large new harbour on the right bank, $2\frac{1}{2}$ miles to the north, and connected it with the Tiber by a canal. It was named *Portus Augusti*. In 103 A.D. Trajan was obliged to construct a hexagonal basin, with enormous warehouses and docks, further inland, connecting it with Claudius' canal. This to-day forms the right (navigable) arm of the Tiber; and the island between the two arms is still called *Isola Sacra*, as in Procopius' time. Notwithstanding this, the importance of Ostia continued to be great, and the

2d and 3d centuries after Christ were indeed its most prosperous period. Excavations now in progress have brought to light remains which vie with those of Pompeii for interest and for perfect preservation, and are far more solidly built, in concrete faced with brickwork and *opus reticulatum*. The main road from Rome merges into the *decumanus*, the main street of the town. This has been cleared for its full length of over half a mile down to the ancient coastline, which is some two miles behind the modern. A considerable part of it was flanked by porticoes. Along this street lie the public baths (behind which are the barracks of the *vigiles*, the police and fire-brigade) and the theatre, behind which lies a large area with a temple in the centre; this area is surrounded by colonnades, containing the offices of the various trading and shipping guilds, connected especially with Sardinia, North Africa, &c. The most conspicuous ruin is the so-called Temple of Vulcan (really the Capitolium), opposite which is the Forum with the temple of Rome and Augustus. The Basilica, Curia, and other public buildings have recently been brought to light. The area towards the river has also been cleared; it is occupied by large stores and by private houses—the latter remarkable for their complete divergence from the Pompeian type, and the surprising modernity of their planning—sometimes in blocks of flats three or four stories high, with or without a central courtyard.

In the 4th century portions of Ostia began to be abandoned; it lost some of its importance owing to the severance of it from Portus, to which trade was confined during the Gothic wars. In 313 A.D. we first hear of a bishop of Ostia, and Portus had one at about the same period. Both bishoprics still continue, and the former is held by the dean of the Sacred College of Cardinals. The ravages of pirates led to Ostia's gradual abandonment. It was fortified by Gregory IV. in 830. In the Middle Ages its remains became a quarry for the cathedral of Orvieto and other buildings. Later, owing to the silting up of the right arm of the Tiber (only reopened by Paul V.), it partly regained its importance; and in 1483-86 Pope Julius II., while yet a cardinal, erected a castle at the bend. The flood of 1557, however, changed the course of the river, and the place became malarious. An agricultural colony from Ravenna began operations in 1875; the marshes have been drained, and conditions are rapidly improving. Excavations were unsystematic until 1854, and were taken up again by the Italian government in 1880-89, and resumed in 1907 on a larger scale, on which they are still being successfully continued; while on the shore a rapidly growing seaside-resort (now reached by electric railway from Rome) has been built. See **MITHRA**.

See Ashby in *Journal of Roman Studies*, ii. (1912), 153 sqq. (with references to previous literature), and in *Year's Work in Roman Studies*, *passim* (where the official Italian reports, in the *Notizie degli Scavi* and *Monumenti dei Lincei*, are summarised); Carcopino, *Virgile et les Origines d'Ostie* (1919); Calza, *Guida di Ostia* (1925; English translation in preparation).

Ostiaks, or **OSTYAKS**, a Ural-Altaic people living along the lower course of the river Ob in western Siberia, where they struggle against chronic poverty, drunkenness, frequently famine, to get a living by fishing and hunting fur-bearing animals. They dwell in wretched and very dirty huts, eat flesh raw, use bows and arrows, and weapons of bone and stone. They are still in great part heathens, and are decreasing in numbers. Their language belongs to the Finnish division.

Ostmen, or **EASTMEN**. See **NORTHMEN**.

Ostraca. See **WRITING**.

Ostracion. See COFFER-FISH.

Ostracism, a right exercised by the people of Athens of banishing for a time any person whose services, rank, or wealth appeared to be dangerous to the liberty of his fellow-citizens, or inconsistent with their political equality. It was not a punishment for any particular crime, but rather a precautionary measure to remove such leaders as were obviously exercising a dangerous ascendancy in the state. Ostracism was introduced by Cleisthenes about the beginning of the 6th century B.C., after the expulsion of the Pisistratidæ. The people were annually asked by the Prytanes if they wished to exercise this right, and if they did a public assembly (*ecclesia*) was held, and each citizen had opportunity of depositing, in a place appointed for the purpose, a potsherd (*ostrakon*, also 'oyster-shell') or small earthen tablet, on which was written the name of the person for whose banishment he voted. Six thousand votes were necessary for the banishment of any person; but the greatest men of Athens—Miltiades, Themistocles, Aristides, Cimon, and Alcibiades—were subjected to this treatment. The banishment was at first for ten years, but the period was afterwards restricted to five. Property and civil rights or honours remained unaffected by it. Alcibiades succeeded in obtaining the final abolition of ostracism, of which, however, Plutarch and Aristotle speak as a necessary political expedient, and its utility has been very ably defended in modern times by Grote (*History of Greece*, vol. iv.).

Ostracoda. See CYPRIS, CRUSTACEA.

Ostrava, or OSTRU, two neighbouring towns of Czechoslovakia on opposite sides of the Ostrawitz, which till 1918-19 separated Moravia from Austrian Silesia. There are coal-mines and iron industries. The people are mostly Czechs. Pop. Mährisch-Ostrau or Ostrava Moravská, 42,000; Polnisch-Ostrau, 23,000.

Ostrich (*Struthio*), a genus of birds which was once included with the cassowaries, emu, rhea, and apteryx in a distinct order, the Ratitæ, but which is probably better regarded as forming a family apart. There are probably four living species: the Common or Northern Ostrich, *S. camelus*; the South African, *S. australis*; a third, *S. molybdophanes* from Somaliland and Central Africa; and *S. massaicus* from East Africa. The ostrich is the largest existing bird, reaching a height of from six to eight feet. As in the other 'struthious' birds (=Ratitæ), the wings are somewhat rudimentary and quite useless as organs of flight; but the bird spreads them out when running, and they appear to act as sails. The breast-bone or sternum has no keel—that is, no median ridge to which the great pectoral muscles in other birds are so largely attached; in the ostrich these pectoral muscles are but slightly developed, which fact is of course in relation to its small wing. The absence of the sternal keel was the chief reason which led to the association of all the struthious birds into one order, and the name of this order—Ratitæ—emphasised the character, signifying raft-like, as opposed to Carinatae or keeled. The ostrich is now confined to Africa, Arabia, and Syria, but the discovery of its fossil remains in India and elsewhere indicates that the genus formerly had a much wider range.

The ostrich shuns the presence of man, but is often to be seen in near proximity to herds of zebras, giraffes, antelopes, and other quadrupeds. It is gregarious, although the flocks of ostriches are not generally very large. It is polygamous, one male usually appropriating to himself, when he can, from two to seven females, which seem to make their nest in common, scooping a mere hole in the sand for this purpose. Each female is supposed to

lay about ten eggs. The eggs are all placed on end in the nest, which often contains a large number, whilst around it eggs are generally to be found scattered on the sand. It is said that these—



Ostrich (*Struthio camelus*).

perhaps mislaid—eggs are sometimes broken up by the parents as food for the newly hatched chicks. Selater and others have shown that the cock does most of the incubation, that he is occasionally relieved by the hens during the daytime, and that in some places the eggs are covered with sand and left to be hatched by the heat of the sun. The chicks are hatched in six or seven weeks. That the ostrich hides its head in the sand and thinks itself unseen is pure myth.

The ostrich feeds exclusively on vegetable substances, its food consisting in great part of grasses and their seeds; so that its visits are much dreaded by the cultivators of the soil in the vicinity of its haunts, a flock of ostriches soon playing terrible havoc with a field of corn. In South Africa the introduction of lucerne (from California) has produced feathers 20 to 30 per cent. higher in value. The ostrich swallows large stones, as small birds swallow grains of sand, to aid the gizzard in the trituration of the food; and in confinement it has often been known to swallow very indiscriminately whatever came in the way—pieces of iron, bricks, glass, old shoes, copper coins, &c. Its instincts do not suffice to prevent it from swallowing very unsuitable things; copper coins were fatal in one instance, and a piece of a parasol in another.

The speed of the ostrich, when it first sets out, is supposed to be not less than sixty miles an hour; but it does not seem to be capable of keeping up this speed for a long time. Twenty-five miles an hour may be considered a fair estimate of the speed at which it can travel. It is successfully hunted by men on horseback, who take advantage of its habit of running in a curve, instead of a straight line, so that the hunter knows how to proceed in order to meet it and get within shot. It is often killed in South Africa by men who envelop themselves in ostrich-skins, and, cleverly imitating the manners of the ostrich, approach it near enough for their purpose, without exciting its alarm, and sometimes kill one after another with their poisoned arrows. The strength of the ostrich is such that it can easily carry two men on its back. Its voice is deep and hollow, not easily distinguished, ex-

cept by a practised ear, from the roar of the lion; but it more frequently makes a kind of cackling, and, when enraged and striking violently at an adversary, hisses very loudly. The flesh of the ostrich is not unpalatable when it is young, but rank and tough when old. It is generally believed to have been prohibited as unclean to the Jews (Lev. xi. 16), although the name is translated *oual* in the English Bible. There are frequent references to it in the Old Testament.

The eggs of the ostrich, which are white or yellowish white in colour, are much esteemed as an article of food by the rude natives of Africa, and are acceptable even to European travellers and colonists. Each egg weighs about three pounds, and is thus equal to about two dozen ordinary hen's eggs. The egg is usually dressed by being set upright on a fire, and stirred about with a forked stick, inserted through a hole in the upper end. The thick and strong shell is applied to many uses, but particularly is much employed by the South African tribes for water-vessels. The reader will probably recollect the interesting plate in Livingstone's *Travels* of women filling ostrich-shells with water. In taking ostrich-eggs from the nest the South African is careful not to touch any with the hand, but uses a long stick to draw them out, that the birds may not detect the smell of the intruder, in which case they would forsake the nest; whilst otherwise they will return, and lay more eggs. The long plumes of the ostrich have been highly valued for ornamental purposes from very early times, and continue to be a considerable article of commerce (see below; also FEATHERS). The ostrich is often to be seen in Britain in confinement, and readily becomes quite tame and familiar, although still apt to be violent towards strangers. Great numbers were exhibited in the public spectacles by some of the Roman emperors; and the brains of many ostriches were sometimes presented in a single dish, as at the table of Helio-gabalus. See the articles CASSOWARY, EMU, RHEA; also *ÆPYORNIS*, *DINORNIS*.

OSTRICH-FARMING.—The domestication of the ostrich in South Africa, for the sake of its plumage, dates from about 1865, at which date there were 80 tame ostriches in the Cape Colony. So rapidly did the industry grow that by 1875 the number of birds was 32,000, by 1891 nearly 155,000, by 1904 over 360,000; and the Union census of 1911 recorded close upon 750,000. Speculation and a slump in prices ruined many ostrich-farmers in 1886 and the following years. Whereas in 1882 the 253,954 lb. of feathers exported were valued at £1,094,000, in 1893 the 259,933 lb. shipped oversea were declared at only £461,500. In the next two decades, however, the export figures mounted rapidly till the record year 1913, when over 1,000,000 lb. left South Africa, valued at well-nigh £3,000,000. Then the war (1914-19), combined with overproduction, the whims of fashion, and other causes, brought about another disastrous crisis in this luxury industry. The centre of the industry is the Oudtshoorn district of the Cape, in the Southern Karroo, but vast areas in all provinces of South Africa have been found suitable for ostrich-farming. Indeed, it has been proved that the ostrich will thrive and produce good plumage in almost any part of the world; farming has been carried on in regions as far apart as North Africa (Egypt, &c.) and California, Europe (e.g. Nice), Florida, East Africa, Australia, and the Argentine. South Africa, however, enjoys virtually a monopoly, and in order to retain this as far as possible has prohibited by law the export of live ostriches and eggs. The beautiful white plumes so highly prized by ladies all over the world grow in the ends of the wings of the male birds. A good bird in his prime will yield from

twenty to forty of these, besides a few black feathers also from the wings. The tail-feathers are not nearly so valuable or so beautiful. The plumes of the hen from her wing-tips are generally spotted and flecked with gray, and are called 'feminines.' From 120 to 130 good feathers go to a pound: they are always thus sold by weight. An ostrich yields on an average from 18 to 21 ounces per annum. The 'plucking-box' is a solid wooden box, in which the ostrich has only room to stand. The feathers are cut before the quills are quite ripe; the stumps remain for a month or two, and are then easily pulled out. Formerly the feathers used to be pulled out by the roots. The first crop of good feathers is clipped at seven or eight months; this is repeated at intervals till the birds take to breeding, after which (unless incubators are used) it is not desirable to deprive them of their feathers, as they require them to cover the eggs on the nest. The bird's plumage has reached perfection when three years old, and at four years the birds have reached maturity. The legs are easily broken. Adult birds are hardy, but chicks are rather delicate, being subject to many parasitic diseases. In the early days ostriches were allowed to roam at large in vast fenced camps of bushveld, hundreds—even thousands—of acres in extent, ten acres or more being allowed per bird. Soon, however, the Hon. Arthur Douglass introduced artificial incubation, and this naturally led on to selective breeding and new methods of rearing, feeding, and clipping, closer supervision being rendered possible by the subdivision of camps and the provision (with the aid of irrigation) of lucerne and other pasturage for hand-feeding purposes. For poorer-grade feathers the old system is still used to some extent. Scientific methods have unquestionably improved the average quality, but it is doubtful if the best feathers of stud-book ostriches are finer than those yielded by the original wild birds. Wild chicks are often added to flocks, especially in the Transvaal and British East Africa. In 'boom' times feathers have sold at as much as £100 per lb., and prize birds, even chicks, have fetched hundreds of pounds.

See books by Mosenthal and Harting (1876), Douglass (1881), Mrs Martin (1890); papers by Prof. Duerden.

Ostrog, a town in Volhynia, just within the 1921 frontier of Poland, 176 miles W. of Kieff; pop. 16,000, mostly Jews.

Ostrogoths. See **GOTHS**.

Ostrovsky, ALEXANDER NIKOLAIEVICH (1823-86), a Russian dramatist, of sombre biting humour, merciless realism, and special knowledge of the merchant class, was born at Moscow, and directed a theatre there. Tschaikowsky used some of his plays as libretti.

Ostuni, a city of South Italy, 22 miles NW. of Brindisi by rail; pop. 25,000.

Ostwald, WILHELM, a great German chemist born at Riga, 2d September 1853, studied at Dorpat, was professor of Chemistry at Leipzig 1887-1906, and director of the physico-chemical institute there. He was awarded a Nobel prize in 1909. Besides books on chemistry, he wrote on monism. See *Life by Walden* (1904).

Osuna, a town of Spain, 66 miles by rail ESE. of Seville; pop. 16,000.

Oswald, ST, king of Northumbria, was the son of the conquering Ethelfrith of Bernicia and of Acha, sister of the brave Edwin of Deira. He fought his way to the throne by the defeat, at Heavenfield near Hexham (635), of Cædwalla the Welsh king who had aided Penda to crush Edwin at Hatfield two years before. Under the reign of Edwin he had found shelter in Scotland, and been converted to Christianity at Hii or Iona; and now, when he

was hailed king by the whole of Northumberland, he established Christianity with the help of St Aidan, who settled on Holy Island. Oswald was acknowledged as over-lord by all the kingdoms save those subject to Penda. He fell fighting against the enemy at Maserfield (Oswestry) in 642.

Oswego, a port of entry and capital of Oswego county, New York, is situated at the mouth of Oswego River (here crossed by three bridges), on Lake Ontario, at the extremity of the Oswego Canal (to Syracuse, 35 miles by rail). It is a handsome city, with wide streets, a United States government building, court-house, city-hall, state armoury, state normal school, &c. It is the principal port on the lake, and carries on a brisk trade in grain, lumber, coal, &c. The river falls 34 feet, and gives abundant water-power. There are foundries, machine shops, oil, match, cotton, woollen and other manufactures. Pop. 24,000.

Oswego Tea, a name given to several species of Monarda, particularly *M. fistulosa* and *M. didyma*, natives of North America, because of the occasional use of an infusion of the dried leaves as a beverage. They belong to the Labiatae, somewhat resemble mints in appearance, and have an agreeable odour. The two species named are not uncommonly cultivated in gardens for ornament.

Oswestry, a thriving market-town and municipal borough (1397) of Shropshire, 18 miles NW. of Shrewsbury. It has an old parish church, restored in 1872; a fragment of the Norman castle of Walter Fitzalan, progenitor of the royal Stewarts; and a 15th-century grammar-school, rebuilt in 1810 and enlarged in 1863-78. Railway workshops were established in 1865. Oswestry derives its name from St Oswald (q.v.), who was slain there. In 1644 it was taken by the parliamentarians. Pop. 10,000.

Oswini, Oswin, kings of Northumbria (q.v.).

Osymandyas, the name of a great king of Egypt, mentioned by Diodorus and Strabo, who reigned, according to these authors, as the 27th successor of Sesostris. He is said to have distinguished himself by his victories, to have invaded Asia with an army of 400,000 men and 20,000 cavalry, and to have conquered the Bactrians, who had been rendered tributary to Egypt by Sesostris. In honour of this exploit he is said by Hecataeus to have erected a monument which was at once a palace and a tomb, and which, under the name of *Osymandeion*, was renowned for its size and splendour in later times. The *Osymandeion* is generally believed to be represented by the extant ruins of the Ramesseum at Medinet Habu (see THEBES), though great difficulty has been felt in reconciling the descriptions of its magnificence in ancient writers with the dimensions of the existing relic. *Osymandyas* was perhaps another name for *Rameses II.*

Otago, the most southerly provincial district of New Zealand, in the South Island. It was one of the original six provinces in the colony, but since 1876 these have been abolished and the county system has been adopted. The name is said to be derived from the Maori *Otakou*, 'red earth.' It was colonised in 1848 by the Otago Association connected with the Free Church of Scotland. It is bounded on the N. by Canterbury and Westland, and on the E. and W. by the sea. It has a coastline of 400 miles, is 160 miles long by 195 broad, and has an area of over 16,000,000 acres, of which 9 millions, chiefly in the centre and in the east, are fit for agriculture. Pop. 290,000. Gold was discovered in 1861, and now the goldfields comprise an area of 2½ millions of acres. Dunedin (q.v.) is the capital. See NEW ZEALAND.

Otaheite. See TAHITI.

Otalgia (Gr. *ous*, *ōtos*, 'ear,' and *algos*, 'pain') is neuralgia of the ear. See EAR.

Otaru, a seaport of Japan, 22 miles W. of Sapporo, exports timber, sulphur, &c.; pop. 100,000.

Otary (*Otarion*), a genus of the Seal family (Phocidae). See SEA-LION.

Otchakoff, a seaport of Ukraine, stands on the north shore of the estuary of the Dnieper, 38 miles ENE. of Odessa. It occupies the site of the ancient *Alector*, and has beside it the ruins of the once important Greek colony of Olbia. In 1492 the khan of the Crimea built here a strong fortress, which was taken by the Russians under Münnich in 1737, recovered in 1738, and again captured after a long siege by Potemkin in 1788, and annexed by Russia. After it had been bombarded by the Allied fleet in 1855 the Russians demolished the fortifications. Pop. 15,000.

Othman, or **Osman I.**, surnamed *Al-ghazi* ('the conqueror'), the founder of the Ottoman (Turkish) power, was born in Bithynia in 1259, and, on the overthrow of the sultanate of Iconium in 1299 by the Mongols, seized upon a portion of Bithynia. Then he forced the passes of Olympus, took possession of the territory of Nicæa, except the town of that name, and gradually subdued a great part of Asia Minor, and so became the founder of the Turkish empire, from his name called Ottoman or Osmanli. See TURKEY.

Othman, third khalif. See KHALIF.

Otho, MARCUS SALVIUS, Roman emperor for the first three months of 69 A.D., was descended from an ancient Etruscan family, and was born in 32 A.D. He was a favourite companion of Nero, who sent him as governor to Lusitania for his refusal to divorce his beautiful wife, Poppæa Sabina. Here he remained ten years, and ruled with wisdom and moderation. He joined Galba in his revolt against Nero (68), but, disappointed in his hope of being proclaimed Galba's successor, marched at the head of a small band of soldiers to the forum, where he was proclaimed emperor, and Galba was slain. Otho was recognised as emperor over all the Roman possessions, with the exception of Germany, where a large army was stationed under Vitellius, which at once began to march on Italy under the command of the lieutenants Valens and Cæcina. Otho showed vigour in his preparations, but his forces were completely defeated after an obstinately fought battle near Bedriacum. Next day, though things were still far from desperate, Otho set his house in order, and then stabbed himself, 16th April 69.

Otho I., or OTTO THE GREAT, son of the Emperor Henry I. of Germany, was born in 912, and was, on the death of his father in 936, formally crowned king of the Germans. His reign was one succession of eventful and generally triumphant wars, in the course of which he brought many turbulent tribes under subjection, acquired and maintained almost supreme power in Italy, where he imposed laws with equal success on the kings of Lombardy and the popes at Rome, consolidated the disjointed power of the German emperors, and established Christianity at many different points in the Scandinavian and Slavonic lands, which lay beyond the circuit of his own jurisdiction. He died in 973.

Otis, JAMES, American statesman, was born at West Barnstable, Massachusetts, 5th February 1725, graduated at Harvard in 1743, practised law, and became a leader of the Boston bar. He was advocate-general in 1760, when the revenue officers demanded his assistance in obtaining from the superior court general search-warrants allowing them to enter any man's house in quest of smuggled

goods. Otis, however, refused, resigned his position, and appeared for the people; and his speech, which took five hours in delivery, produced a great impression—John Adams afterwards declared that 'the child Independence was then and there born.' When the writs were granted, by the direction of the home authorities, in 1761, Otis was elected to the Massachusetts assembly; and he afterwards was prominent in firm resistance to the revenue acts. In 1769 he was savagely beaten by some revenue officers and others, and as a result of a sword-cut on the head he lost his reason. On 23d May 1783 he was killed by lightning. The publication on which his fame chiefly rests is *The Rights of the Colonies Asserted and Proved* (1764), a powerful and fearless defence of their right to control their own public expenditure. See the *Life* by W. Tudor (Boston, 1823).

Otitis, inflammation of the tympanic cavity of the ear. See EAR.

Otley, an urban district in the West Riding of Yorkshire, on the banks of the Wharfe, and at the north base of Otley Chevin (925 feet), 10 miles NW. of Leeds. Its church, restored in 1868-69, is mainly Perpendicular, but has fragments of Saxon and Norman work; and there are also a court-house (1875), a mechanics' institute (1869), and a grammar-school (1603; new buildings 1925). The making of printing-machines (see PRINTING) is the principal industry, with worsted and leather manufactures. Pop. 10,000 (before extension of boundaries).

Otocorys. See LARK.

Otocyon. See DOG.

Otoliths. See EAR, FISHES.

Otorrhœa, a purulent or muco-purulent discharge from the external ear. See EAR.

Otranto (the ancient *Hydruntum*), a town in the extreme south-east of Italy, 29 miles by rail SE. of Lecce, and on the Strait of Otranto, 45 miles from the coast of Albania on the opposite side. During the later period of the Roman empire, and all through the middle ages, it was the chief port of Italy on the Adriatic, whence passengers took ship for Greece—having in this respect supplanted the famous Brundisium of earlier times; but its port is now in decay. In 1480 it was taken by the Turks. At the present day its castle, which gives the title of Horace Walpole's well-known story, is in the same condition as its port. The town is the seat of an archbishop, and has a cathedral, restored after the siege by the Turks, with fine mosaics and an ancient crypt. Pop. 3000. In the province of Lecce (formerly called Terra di Otranto) many Albanians have long been settled. For the Duke of Otranto, see FOUCHÉ.

Ottava Rima, an Italian stanza of eight lines rhymed *abababcc*. Each line has eleven syllables; in its English form ten.

Ottawa, one of the largest rivers of British North America, rises nearly 300 miles due north of Ottawa city, flows west to Lake Temiscamingue, some 300 miles, and thence 400 miles south-east, and falls into the St Lawrence by two mouths, which form the island of Montreal. Its drainage basin has an area variously estimated at from 60,000 to 80,000 sq. m. During its course it sometimes contracts to 40 or 50 yards; elsewhere it widens into numerous lakes of considerable size. It is fed by many important tributaries, the chief of which are the Petawawa, Bonnechère, Madawaska, and Rideau on the right, and the Coulonge, Gatineau, and Rivières du Lièvre and du Nord on the left side. These, with the Ottawa itself, form the means of transit for perhaps the largest lumber

trade in the world. The passage of timber over falls and rapids has been greatly facilitated by the construction of dams and slides. See next article.

Ottawa, the capital of the Dominion of Canada, is situated upon the south bank of the Ottawa River, 120 miles from its influx into the St Lawrence at Montreal. The river Ottawa drains a vast stretch of country as far north-west as Lake Nipissing and beyond; all the lumber-products of this district, as well as all the local trade, are carried down to Ottawa, to the point at which the river forms the splendid Chaudière Falls (200 yards wide and 40 feet high). These falls, above which a suspension bridge spans the river, supply the motive-power for the numerous lumber-mills, flour-mills, factories, &c. To the east of the city the river Rideau forms a second fall, which, although inferior to the Chaudière, supplies further motive-power. The Rideau Canal, which was made in 1827-36, passes through the centre of the city, and affords connection with the Rideau Lakes, and so with the great lakes beyond. Opposite the city, to the north-east, the Gatineau River joins the Ottawa and affords further lumbering facilities. A few miles to the east, the Du Lièvre River opens up a rich phosphate country, which is being much worked. The industries of Ottawa are varied, and number among them some of the largest in the world, the lumber industry and its by-products, including pulp, paper, paper-bags, fibre-ware, and matches, being among the foremost. Other important manufactures include iron wares, furniture, pianos, cement, carbide, plaster, bricks, tiles, leather goods, electric cars, carriages, wagons, &c.

The Italian Gothic parliamentary buildings, 1860-66, were burned down in February 1916, and new buildings were erected in 1916-20 on the same site, a noble bluff on the bank of the Ottawa. The handsome library building escaped. The residence of the governor-general—an old-fashioned, picturesque building, called Rideau Hall—is about a mile off. The city hall, post-office, banks, and other public buildings are of stone, and, like many of the churches, are architecturally imposing. Ottawa is the place of residence of the Anglican bishop of Ontario and of the Roman Catholic bishop of Ottawa. The university of Ottawa is conducted by the Oblate Fathers. There are, besides, other important educational institutions. There are several public and private hospitals. Besides the rivers and canal already mentioned, Ottawa is the centre for the great railways of the Dominion and the New York Central from Cornwall on the United States border. Ottawa is governed by a mayor, board of control, and city council. The city was begun in the last years of the 18th century by a settler named Wright, of Boston, Mass., who built himself a residence near the Chaudière, and called the village he founded on the north side of the Ottawa Hull (q.v.). The southern bank lots on which Ottawa now stands were sold to one Sparks, who took them reluctantly in payment for labour. In 1823 Colonel By was sent by the British government to survey the Rideau Canal, the construction of which (1827) stimulated the settlement, which was called Bytown. In 1854 its name was changed to Ottawa, and the town was created a city. In 1861 the population was 15,000; in 1881, 27,412; in 1901, 59,920; in 1911, 87,063; in 1921, 107,843. In 1858 Ottawa was chosen as administrative capital of Canada. The first parliament met there in 1865.

Ottawa is the official seat of the governor-general, also of the Federal government. It has a national Victoria museum, geological museum, national art gallery, royal observatory, a parliamentary library, city public library, royal mint;

Canada experimental farm (467 acres), thirty miles of the most beautiful drive-way in North America, 2000 acres of park lands. Many beautiful summer resorts are in the district. Ottawa is the centre of one of the greatest water-power districts in the world.

Ottawa, (1) in Illinois, at the confluence of the Fox and Illinois rivers, 70 miles WSW. of Chicago, has a mineral spring rich in bromine and iodine, glass-furnaces, and manufactures of flour, tiles, &c. (pop. 11,000); (2) in Franklin county, Kansas, on the Osage River, 50 miles SW. of Kansas City, has a Baptist college, railway-shops, and manufactures of flour, furniture, iron, and soap (pop. 9000).

Otter (*Lutra lutra* or *L. vulgaris*), a carnivore of the order Mustelidae, which includes stoat and badger. The genus *Lutra* is represented by about ten species, widely distributed, and the Common Otter ranges over the whole of Europe and a large



Fig. 1.—Otter (*Lutra vulgaris*).

part of Asia. It still holds its own in Great Britain, notably in the Lake District and in the rocky parts of Somerset, Devon, and Monmouthshire. In some regions, as on the west coast of Ireland, it frequents the shore, and may swim well out to sea. It must not be confused with its very rare relative, the Sea-otter (*Enhydra lutris* or *Lutax*), which is confined to the shores of North Pacific, and has been seen swimming fifteen miles from land.

The Common Otter has a lithe, low-set body, about two feet in length, with sixteen more inches to the powerful tail, which is slightly flattened from above downwards. It often weighs a pound for each foot of body-length, but magnificent specimens of about forty pounds have been recorded. The general colouring is rufous brown, lighter below; and the dense under-fur is covered with long coarse hairs, which are 'plucked' when the skin is prepared for the market. Among the otter's adaptations to its secondarily acquired semi-aquatic habits may be mentioned the webbed feet, which still retain strong claws, the rudder-like tail, the reduction of the appressed ear-trumpets, the closeable nostrils, and the highly developed musculature, which is well suited for diving and for tortuous swimming after fishes. The hind-legs are of most importance in swimming.

The otter is characteristically a fish-eater, but its persistence is partly due to its long bill of fare. When one kind of food is not available, it can turn to another. It depends in the main on eels, trout, salmon, pike, and flat-fish, but it condescends to the mussels on the seashore (biting through their shells), the limpets on the rocks, and the frogs in the marsh; it rises to wild-duck and rabbit. Its severest trial in its inland haunts is when the lakes are frozen, but even then it shows its characteristic resourcefulness in swimming underneath the

ice, returning successfully to the hole where it entered.

Another characteristic of the otter is its nomadism. As Izaak Walton said, the 'fish-beast will walk upon land sometimes five or six or ten miles in a night.' Mr Tregarthen calls it 'the homeless hunter,' 'the Bedouin of the wild,' and says that 'it has been known to travel fifteen miles in a night, and not infrequently the holt where it lies up during the day are ten or twelve miles apart.' It passes from tarn to stream, from river to shore; it swims far out to sea and reaches isolated rocks; it wanders along the cliffs and explores the caves; it crosses the heather-covered hills, and even the mountain passes, sheltering for the day among the bracken or in the heart of a cairn; it neither stores nor hibernates, but is always on the move—a gipsy among carnivores. It is plain that this restlessness of habit must be of considerable survival-value. Of course the otters are stationary during the breeding-season.

The otter lives more or less alone, except at the pairing-time, and a favourite site for the 'holt' is underneath the excavated bank of the river, or among the root-fastnesses of a big tree. There are hints of monogamy, and there are sometimes fierce fights between two rival dog-otters. Early in the year, sometimes in January, sometimes about March, the female brings forth three to five cubs in the soft-lined nest. They are blind for towards two months. When they open their eyes, the mother takes them out into the sunshine, and begins to instruct them very definitely in the ways of life. Thus she teaches them to swim and dive, and it is of interest to note that the cubs do not at first take very kindly either to the water or to a diet of fish. They are very playful creatures, and both parents sometimes find it impossible to resist the appeal of situations that suggest a frolic. It is indeed a remarkable fact in regard to the otter that playfulness never quite leaves it. There is



Fig. 2.—Sea-otter (*Enhydra lutris*).

considerable longevity, even for over a dozen years; but although there may be signs of senescence in eyes and hairs, there is never any trace of senility.

Fossilised remains of the otter occur in later Tertiary deposits in England, so the animal is one of the oldest vertebrate inhabitants of the British Isles. The question rises: How it holds its own in a country that, apart from sport (!), is anything but friendly. The otter is abundantly strong; it has keen senses of sight, hearing, touch, and smell; it has almost no natural enemies; it is one of the most elusive of mammals, in great part nocturnal in its habits, shy of repeating itself, shifty in its hunting, and very thoroughly amphibious. We have referred to the catholicity of its appetite and to its roving habits, but enough has not been said of its resourcefulness. It is equally at home on land and in water; it can enter the water without

a splash and swim near the surface with scarce a ripple; it can dive in a spiral full fathoms five, and lie under the bank on a stream for hours with its nostrils in a space between water and earth. It knows its own footsteps in the thicket and will not retrace them; it never goes back to a kill, for that way danger lies; it will carry a water-trap on its shoulders and wrench it off among the alder-roots; it will dive at the flash of the gun and elude the bullet; it is an outlaw of unsurpassed alertness and resource. But it seems certain that the survival of the otter depends in great part on the intense parental, especially maternal, care, and on what has been proved by Mr Tregarthen and others, that the mother gives the cubs a detailed education in movements, in food-catching, in food-eating, in lying low, and in the long alphabet of danger-sounds, especially those proceeding from man and dog. It is of biological importance to realise that the prolonged youth and the detailed parental instruction must count for much in the otter's survival in a country like Britain.

Otter-hunting in Britain is practised in the early morning and with special hounds, bold, hardy, and rough-coated, nearly two feet high at the shoulder. The huntsmen's use of a barbed spear has almost come to an end. The seamy side of the sport is exposed in Joseph Collinson's *Hunted Otter*, but it is not necessarily very cruel; and it must be remembered that the ægis of sport has saved the otter from being exterminated in Britain for the sake of its fur. The best book on this interesting animal is J. C. Tregarthen's *Life Story of the Otter* (London, 1915).

Otterburn, a small village in Redesdale, Northumberland, about 16 miles south of the Border, and 32 miles from Newcastle, on the benty uplands a little to the west of which was fought, during the moonlit night of 19th August 1388, what Froissart calls 'the hardest and most obstinate battle that was ever fought.' Of a Scottish army of 50,000 men which had mustered on the Border, the greater part invaded England by Carlisle, while 2000 foot and 300 lances under the Earls of Douglas, Dunbar, and Moray, remained to carry fire and sword through Northumberland and Durham. On the march back, laden with spoil, they lay three days before Newcastle, and in one of the frequent passages of arms that occurred Douglas carried away Hotspur's pennon, and declared that he would plant it on his castle of Dalkeith. 'By God, Earl of Douglas,' said Hotspur, 'you shall not even bear it out of Northumberland.' The Scots marched up Redesdale, and, after failing in an attempt on Otterburn Tower, by the desire of Douglas entrenched themselves on a hill slope near, the exact site of which is somewhat uncertain, in order to give Percy an opportunity of coming to claim his pennon. The chivalrous Hotspur hastened after them with 600 horse and over 8000 foot, and came up while the Scots were at supper, whereupon a desperate hand-to-hand fight at once began. Douglas was greatly overmatched in numbers, and, seeing his men forced back, grasped his ponderous mace in both hands and hewed a way before him until he was borne down mortally wounded by three spear-thrusts. To some of his kinsmen anxiously asking how he did, Hume of Godscroft tells us the dying hero made answer, 'I do well, dying as my predecessors have done before; not in a bed of languishing sickness, but in the field. These things I require of you as my last petitions: first that ye keep my death close both from our own folk and from the enemy; then that ye suffer not my standard to be lost, or cast down; and last, that ye avenge my death, and bury me at Melrose with my father. If I could hope for these things, I should die with

the greater contentment; for long since I heard a prophecy that a dead man should win a field, and I hope in God it shall be I.' Towards morning the Scots gained a complete victory, losing 300 men, while the English lost 1880, and among the prisoners both Hotspur and his brother Ralph. The Scottish ballad of 'Otterburn' is almost as historical as Froissart's glowing narrative; the English 'Ballad of Chevy Chase' is a glorious effort of the imagination, which still stirs a modern reader, as it did Sir Philip Sidney, more than the blast of a trumpet. See Robert White's monograph, *History of the Battle of Otterburn* (1857).

Ottery St Mary, a town of Devonshire, on the river Otter, 11 miles (15 by rail) E. of Exeter. Twice the scene of a great conflagration, in 1767 and 1866, it retains its magnificent collegiate church, a reduced copy of the cathedral of Exeter (q.v.), with the only other transeptal towers in England. Begun about 1260 by Bishop Bronescombe, it is Early English, Decorated, and Perpendicular in style, and was restored by Butterfield in 1849-50. The old King's Grammar-school was demolished in 1884. Alexander Barclay was a priest here; Coleridge (q.v.) was a native; and 'Clavering' in *Pendennis* is Ottery St Mary, the Devonshire residence of Thackeray's stepfather. Silk shoe-laces, handkerchiefs, and Honiton lace are manufactured. Pop. 3500.

Otto of Bavaria (1815-67) was chosen king of Greece in 1832, and deposed in 1862. See GREECE. For the Emperor Otto I., see OTHO; for Otto of Saxony, see ITALY (*History*).

Otto, or **Attar**, of **Roses** is the volatile oil or otto of the petals of some species of rose, obtained by aqueous distillation, and highly prized as a perfume. It is a nearly colourless or light-yellow crystalline solid at temperatures below 80° F., liquefying a little above that temperature. It is imported from the East, where in the Balkan Peninsula, Syria, Persia, and India roses are cultivated to a considerable extent for its sake. It is probable that the oriental otto is the produce of more than one species of Rose (q.v.); it is uncertain what species is cultivated in some of the localities most celebrated for it, but *Rosa damascena* is known to be so employed in the north of India, and a kind of otto is sometimes obtained by the makers of rose-water from *Rosa centifolia* in Europe. Ghazipur, near Benares, is celebrated for its rose-gardens, which surround the town, and are in reality fields occupied by rows of low rose-bushes, extending over 160 acres. Kashmir is noted for its extensive manufacture of otto, as are also the neighbourhoods of Shiraz and Damascus. Kazanlik is the centre of the rose-growing district in the Balkans, which is 40 miles long; *Rosa moschata* affords the chief supply. The gathering is commenced on the third year, and is carried on chiefly in May and June. About 7200 lb. of petals are required to produce 2½ lb. of otto, or about the gathering of 2½ acres. The manufacture is practised much more scientifically and profitably in parts of France and of Germany. Otto is said to have been first procured by what may be called an accidental distillation of rose-petals exposed with water to the heat of the sun, and to have been found floating on the surface of the water; it is still sometimes obtained in India by such a process. During the distillation of rose-petals a small quantity of a solid volatile oil comes over, which crystallises and floats on the water in the receiver; this is sometimes called *English Oil of Roses*. The odour of otto itself is too powerful to be altogether pleasant, and frequently gives headache. Otto of roses is a mixture of two volatile or essential oils; the one solid at ordinary temperatures, and the other liquid. The

solid oil of roses (rose camphor, stearopten of oil of roses) possesses of itself very little odour. The liquid oil of roses (eleopten of oil of roses) is a very fragrant liquid. The otto of roses may be regarded as a solution of one part of the solid oil in two parts of the liquid.

Ottoman Empire. See **TURKEY**.

Ottrelite, a silicate of alumina with protoxides of iron and manganese and water. It occurs in the form of thin hexagonal plates or tables in certain more or less metamorphosed slates, which are hence termed *Ottrelite-slate*.

Ottumwa, capital of Wapello county, Iowa, on both sides of the Des Moines River, 75 miles by rail W. by N. of Burlington, in the heart of the state's bituminous coalfields. The residence portion extends along the high bluffs. A number of railways meet here. Extensive dams concentrate the river's water-power for numerous industries. Ottumwa has large pork and beef packing works and a normal school. Pop. 23,000.

Otway, THOMAS, one of the greatest masters of English tragedy, of whose life, says Dr Johnson, 'little is known, nor is there any part of that little which his biographer can take pleasure in relating.' He was born at Trotton in Sussex, March 3, 1652, son of the rector of Woolbeding in that county, and entered Christ Church, Oxford, as a gentleman-commoner in 1669. He was a brilliant and impulsive youth—'charming his face was, charming was his verse,' says Dryden, but his life throughout was darkened by the shadow of misfortune. He made a wretched failure as an actor in Aphra Behn's *Forc'd Marriage* in 1671, declined the church, and left the university without a degree in 1672, and next year obtained a cornetcy in a troop of horse. A year later he was settled in London, and had a tame and conventional tragedy, *Alcibiades*, accepted at the Duke's Theatre, which was managed first by Davenant, then by Betterton. In it the beautiful Mrs Barry made her first appearance, and with her the hapless poet quickly fell in love. In 1676 Betterton accepted *Don Carlos*, a good tragedy in rhyme, nervous and full of pathos, dedicated to the Duke of York. Its plot, like that of his greatest play, he owed to the Abbé St-Réal. The year after Otway translated Racine's *Titus and Berenice*, as well as Molière's *Cheats of Scapin*. The intrigue between Rochester and Mrs Barry now became more than he could bear, and through the influence of the Earl of Plymouth, a college friend, and one of the king's bastards, he received a cornet's commission again, and went a-soldiering to Flanders. It proved a complete fiasco, and he soon came back to his infatuation, miserable and unpaid, a butt for Rochester in his poor and spiteful *Session of the Poets*. In 1678 he had produced a poor comedy, *Friendship in Fashion*; in 1679 another, *The Soldier's Fortune*, full of touches of autobiographic detail. He was ever improvident and dissipated, and his affairs by this time had become desperate, but the death of his rival in 1680 seems to have nerved him to make a brave effort to shake off his burden of debt. That year yielded two tragedies, and his one important poem, *The Poet's Complaint of his Muse*, a rough, but firmly drawn satirical portrait of himself and his principal enemies, Rochester, Shadwell, and Settle. Of the plays, the first was *The Orphan*, a tragedy in blank verse, marred by many faults in plot besides its radical indelicacy, but stamped throughout with power and sovereign pathos, over whose central figure, Monimia, Sir Walter Scott said he believed more tears had been shed than over any other stage-heroine. The other was *The History and Fall of Caius Marius*, confessedly a kind of cento from Shakespeare's *Romeo and Juliet*, with touches from

Julius Caesar. The year 1682 saw his greatest work, *Venice Preserved, or a Plot Discovered*, a noble masterpiece of tragic passion, admirably constructed, its heroine Belvidera a delightful creation of almost the highest order of dramatic genius. The only blot upon its perfection is the comic passages, which Taine alone among critics finds Shakespearian. Otway's mistress was now at the height of her fame, and in the parts of Monimia and Belvidera had taken the town by storm. Six letters of his to her are extant, written apparently about 1682, which tell us the touching story of his faith and of her cruelty, how she played with his passion for seven years, and at last broke his heart. From this time he sinks out of sight, drowned in dissipation, debt, and misery. He reappears again in 1684 with *The Atheist*, a feeble comedy, and, on the death of Charles II. in February 1685, with *Windsor Castle*, a poem addressed to the new king. But his claims were neglected, and he wore out the ruins of his wasted life in abject misery in a sponging-house or tavern on Tower Hill. Here he died, April 14, 1685, choked, it is said, after a long fast, with a piece of bread, which he had rushed in the eagerness of hunger to buy with a guinea given him by a passing stranger from whom he had begged a shilling.

In 1719 a badly edited tragedy, *Heroick Friendship*, was published as his, and Sir Edmund Gosse thinks that, imperfect as the execution is, the plot and ideas are characteristic of Otway. Otway owed much to Corneille, and was long popular in France, despite the severe and unjust judgment of Voltaire. His life recalls the tragic history of Marlowe, just as his greatest play reminds a reader of *Othello*. Strong without bombast, its exquisite love-scenes between Jaffier and Belvidera tender without weakness, 'it is simply,' says Sir Edmund Gosse, 'the greatest tragic drama between Shakespeare and Shelley. Out of the dead waste of the Restoration, with all its bustling talent and vain show, this one solitary work of supreme genius arose unexpected and unimitated.'

See Thornton's editions of the *Works* (3 vols. 1813); Roden Noel's of the 'best plays' ('Mernaid Series,' 1888); McClumpha's of the two great tragedies (1909); Johnson's *Lives*; Ward's *History of English Dramatic Literature* (vol. ii. 1875); Gosse's excellent essay in *Seventeenth Century Studies* (1883).

Ouabain is a crystalline glucoside separated from the wood and roots of *Carissa Schimperi*, a plant growing on the east coast of Africa. It is intensely poisonous, a twelfth of a grain being sufficient to kill a rabbit. It acts upon the heart in the same way that digitalis does, and has been employed in medicine as a substitute for digitalis, and also to lessen the violence of the paroxysms in whooping-cough. The Somalis make an extract of the wood and roots for an arrow-poison.

Oubliette (Fr., 'place of forgetfulness'), a dungeon in which persons condemned to perpetual imprisonment were confined—especially a perfectly dark underground dungeon—into which the prisoners were let down from above by ropes.

Oudenarde (*Audenarde*), a town of Belgium, on the Scheldt, 37 miles W. of Brussels. It has a fine flamboyant Gothic town-hall (1535) and two interesting churches. Margaret of Parma was born here. Pop. 7000. In 1706 Oudenarde was taken by Marlborough; and an attempt made by the French to retake it brought on the famous battle of Oudenarde, the third of Marlborough's four great victories, which was gained, on the 11th July 1708, with the aid of Prince Eugene, over a French army under the Duke of Burgundy and Marshal Villars.

Oudh, or AWADH, a great plain sloping southward to the Ganges and watered by the Gumti, Gogra, and Rapti rivers, was made a British commissionership in 1858, and from 1877 was administered by the lieutenant-governor of the North-west Provinces; but since 1901 the latter term is disused, the two areas being jointly known as the United Provinces of Agra and Oudh. In 1921 the United Provinces were placed under a governor, with an executive council and ministers. Area, 24,000 sq. m. Pop. (1881) 11,387,741; (1911) 12,558,004; (1921) 12,166,642. The bulk of the inhabitants are Hindus, though the dominant native race for centuries has been Mohammedan. The Brahmans are the most numerous class, about one-eighth of the whole population. The principal towns are Lucknow (the capital), Faizabad, Bahraich, Shahabad, Rai Bareilly, Ajodhya. Oudh is believed to have been one of the oldest seats of Aryan civilisation in India. After being the centre of a long native Hindu dynasty it was subjugated by the ruler of Kanauj, and in 1194 was made subject to the Mussulman empire of Delhi. In 1732-43 it became virtually an independent state, and the dynasty of the Nawabs lasted until the annexation of the province by the British in 1856. During the Mutiny of 1857 Oudh was one of the centres of rebellion and the scene of highly dramatic events.—The city of Oudh or AJODHYA has been treated of under the second title.

Oudinot, CHARLES NICOLAS, Duke of Reggio and Marshal of France, was born at Bar-le-Duc, Meuse, 25th April 1767. At the age of seventeen he entered the army, and in the revolutionary wars distinguished himself in various actions with the Prussians and Austrians. In 1805 he obtained the Grand Cross of the Legion of Honour, and about the same time received the command of ten battalions of the reserve, afterwards famous as the 'grenadiers Oudinot.' At the head of this corps he did good service in the Austrian campaign. He was present at Austerlitz and Jena, gained the battle of Ostrolenka (16th February 1807), and greatly contributed to the success of the French at Friedland. He sustained his now brilliant reputation in the second Austrian campaign of 1809, and was created Marshal of France and Duke of Reggio. In 1810 he was charged with the occupation of Holland, was engaged in the disastrous Russian campaign, and subsequently took part in the various battles of 1813 between the French and the Russians and Austrians. He was one of the last to abandon Napoleon, but he did so for ever, and spent the period known as the 'Hundred Days' on his own estates. At the second restoration he became a minister of state, commander-in-chief of the royal guard and of the national guard, and was created a peer of France, Grand Cross of St Louis, &c. In 1823 he commanded the first division of the army of Spain, and was for some time governor of Madrid. After the revolution of July 1830 Oudinot retired to his estates; but Louis-Philippe in 1842 appointed him governor of the Invalides. He died at Paris, 13th September 1847. See his *Life* by Nollet (Paris, 1850).—His son, CHARLES NICOLAS-VICTOR OUDINOT, Duke of Reggio (1791-1863), was a general in the French army. He first distinguished himself in Algeria, and was general of the French expedition against Rome in 1849.

Ouida, the pseudonym of LOUISE RAMÉ, or DE LA RAMÉE, who was born 1st January 1839, her father being French, her mother English. By 1861 she was in London writing industriously for the magazines; after 1874 her home was at Florence or Lucca, and there she produced most of her fifty novels, not to speak of dramatic sketches and

stories for children. She died (in poverty) on the 26th January 1908. Her stories have verve and go; she often attains to the picturesque, is at times powerful as well as tender, and created one or two attractive characters. But, though she could envelop in glamour her handsome rakes and women with a past, her characters are conventional, her ideals unwholesome, and her style without distinction. See *Memoir* by Miss Elizabeth Lee (1914).

Oulachan. See CANDLE-FISH.

Ouless, WALTER WILLIAM, portrait painter, was born 21st September 1848, at St Helier, Jersey. He began to study art in London in 1864; four years later first exhibited at the Academy; and became an A.R.A. 1877, an R.A. in 1881. Of his portraits perhaps that of Darwin is most generally known on account of the very fine etching from it by Rajon. Mr Ouless never paints a commonplace portrait; his work is sober and manly. His portraits of Justice Manisty and Cardinal Newman are fine examples of his different methods.

Oulu, Finnish name of Uleåborg (q.v.).

Ounce (Lat. *uncia*), the twelfth part of the *as* or *libra* (pound), or indeed the twelfth part of any magnitude, whether of length, surface, or capacity. Hence *inch*, the twelfth part of a foot. In Troy weight the ounce is divided into 480 grains, and 12 ounces make a pound; the ounce in Avoirdupois weight contains 437½ grains Troy, and 16 of them go to the pound.

Ounce (*Felis uncia*), a feline carnivore like the leopard, but with lighter, longer fur, and with a skull unusually broad for one of the Felidae. It frequents the mountains of central Asia. It may also be noted that a somewhat similar title, *Felis onca*, belongs to the jaguar.

Oundle, a small but ancient and pleasant town of Northamptonshire, 13 miles SW. of Peterborough by rail, has an old church, partly Early English and partly Decorated in style, restored in 1864. Here St Wilfrid died. Laxton's Grammar-school dates from 1550. Lace is made here. Pop. 3000.

Ourari. See CURARI.

Ouro Preto ('Black Gold'), former capital of Minas Geraes, Brazil, stands among barren mountains, 3780 feet above sea-level, and 200 miles N. by W. of Rio de Janeiro. It contains several handsome official buildings, but consists mainly of narrow and irregular streets. The gold-mining is now reduced to comparatively unprofitable washings. Pop. 10,000.

Ouse, a river of Yorkshire, formed by the union of the Swale and the Ure in the immediate vicinity of the village of Boroughbridge, and flowing south-eastward past York, Selby, and Goole. About 8 miles below the last town it joins the Trent, and forms the estuary of the Humber (q.v.). The length of its course from Boroughbridge is 60 miles, for the last 45 of which (from York) it is navigable for large vessels. Its principal affluents are the Wharfe and the Aire from the west, and the Derwent from the north-east. The basin of the Ouse, or the Vale of York, commences about the northern boundary of the county near the river Tees, from whose basin it is separated by a low ridge of hills, and extends southward, including almost the whole of Yorkshire (q.v.).—The GREAT OUSE, rising close to Brackley, in the south of Northamptonshire, flows north-eastward through the counties of Buckingham, Bedford, Huntingdon, Cambridge, and Norfolk, till it falls into the Wash, 2½ miles below Lynn. It is 160 miles in entire length, and is navigable for about 50 miles. It receives the Ivel, Cam, Lark, and Little Ouse.

Useley, SIR FREDERICK ARTHUR GORE, musician, was born on 12th August 1825, and at nineteen succeeded his father, Sir Gore Useley (1770-1844), the celebrated Orientalist and first baronet. He graduated at Christ Church, Oxford, and took orders, his first curacy being at St Paul's, Knightsbridge. In 1855 he followed Henry Bishop as professor of Music at Oxford, and in 1856 became vicar of St Michael's, Tenbury. He had an immense knowledge of music, extending from St Ambrose to Wagner. His mastery of the literature of music is seen in his edition of Neumann's *History of Music*, and his treatises on harmony have taken their place as standard works. He was an accomplished linguist, and collected a magnificent library. His oratorios *St Polycarp* and *Hagar* are too solid and severe to be popular, but will always command respect. Haver-gal's *Memorials of F. A. G. Useley*, published after his death in 1889, is a collection of contemporary opinions pronouncing him a perfect gentleman, a skilled musician, and a churchman who devoted the whole of his fortune to building and endowing St Michael's College, Tenbury, for the training of chorists. See Life by Joyce (1896).

Outcrop, in Geology, the name given to the edges of strata as they appear or crop out at the surface. The same term is applied to the line along which a mineral vein or lode comes to the surface—although other terms, such as 'outgoing,' 'back,' are also employed by miners.

Outlawry, in English law, means putting one out of the protection of the law, for contempt in wilfully avoiding execution of legal process. Formerly, in the common law courts, if the defender would not enter an appearance certain proceedings were taken to outlaw him, so as to allow the action to go on without his appearance. These proceedings, however, were abolished in 1879, and, in the majority of cases, it is immaterial as regards the action whether the defendant appear or not, provided he was properly served with the original writ of summons. After judgment a defendant against whom a *capias* was granted might be outlawed if the sheriff failed to find him. These forms of process are now obsolete. In criminal proceedings it is still possible to outlaw a person who cannot be found and arrested. But a criminal who flies the country may now, as a general rule, be made amenable to justice by applying to a foreign government for his Extradition (q.v.). Outlawry therefore is practically obsolete. See Stephen's *Criminal Procedure*. The effect of outlawry was that a man forfeited his rights, and was precluded from suing or defending in any English court; but the outlawry might be reversed by means of a plea or of proceedings in Error (q.v.).

Outram, SIR JAMES, the 'Bayard of India,' was born 29th January 1803, at Butterley Hall, Derbyshire, the residence of his father, Benjamin Outram (1764-1805), a well-known engineer. His mother in 1810 removed with her five children to Aberdeen, where and at Udney James was educated. After one session at Marischal College, in 1819 he received an Indian cadetship, and became lieutenant and adjutant in the Bombay native infantry. Between 1825 and 1835 (in which latter year he married his cousin, Margaret Anderson) he successfully organised a corps of the wild Bhils; from 1835 to 1838 he was political agent to the Mahi Kantha district in Gujrat. In 1839 he attended Sir John Keane as aide-de-camp into Afghanistan (q.v.); and his eight days' ride of 355 miles, disguised as an Afghan merchant, from Kelat, through the perilous Bolan Pass, to the sea, will long be famous in eastern annals. Appointed in 1840 political agent in Sind, he distinguished himself by his heroic defence of

the British Residency at Hyderabad against 8000 Beluchis (15th February 1843), as also by his manly opposition to what he deemed Sir Charles Napier's aggressive policy towards the Ameer. He was afterwards resident at Satara and Baroda, and in 1854, on the eve of the annexation of Oudh, was selected by Lord Dalhousie for the highest political office in India—the Residency of Lucknow. In 1857, after a third brief furlough to Europe, he commanded the Persian expedition—a short, brilliant campaign, whose objects triumphantly attained, he returned to India a G.C.B. (he had been knighted sixteen months before). When he landed in July the Mutiny was raging; and Lord Canning tendered him the command of the forces advancing to the relief of Lucknow. He chivalrously waived that glory in favour of his old lieutenant, Havelock (q.v.), who already had fought eight victorious battles with the rebels; and accompanied him only as chief-commissioner of Oudh, whilst tendering his military services as a volunteer. Lucknow (q.v.) was relieved, and Outram took the command, but only to be in turn himself besieged. He held the Alum-bagh against almost overwhelming odds, until Sir Colin Campbell advanced to his relief. He then made a skilful movement up the left bank of the Gumti, which led to a final and complete victory. For his services he was in 1858 promoted to the rank of lieutenant-general, thanked by parliament, and created a baronet. He took his seat as a member of the Supreme Council at Calcutta, but in 1860 had to return to England, already stricken by the hand of death. He spent the winter of 1861-62 in Egypt, and, after a short stay in the south of France, died at Paris, 11th March 1863.

See the Life by Sir F. J. Goldsmid (1880), and *The Bayard of India*, by Captain L. J. Trotter (1903).

Outremouse, JEAN D'. See MANDEVILLE (SIR JOHN).

Outrigger. See BOAT.

Ouvirandra. See LATTICE LEAF, AQUATIC PLANTS.

Ouzel, or OUSEL (O.E. *ōsle*; cf. Germ. *amsel*), an old name of the blackbird (as in *Midsummer Night's Dream*). But it is also applied to other birds. Thus, one British thrush (*Turdus torquatus*) is called the Ring Ouzel, and the Dipper (q.v.) is very generally known as the Water Ouzel.

Ovamos, or OVAMBO; also called Otjiherero, an industrious and peaceable Bantu people of the west coast of Africa, inhabiting the country south of the Cunene. Ovampoland extends from Damara-land northward to the Portuguese frontier. Some 50 miles from the coast the country rises into a lofty tableland, which is moderately fertile, and then declines to the south and east into the deserts of the Kalahari and the region of Lake Ngami.

Ovariectomy. The treatment of ovarian disease by the removal of the offending organ is one of the triumphs of 19th-century surgery. Formerly relief in cystomata was only obtained temporarily by tapping—i.e. withdrawing some of the fluid by means of a trocar and canula. But the tumour almost always filled again, and, though tapping might be repeated time after time, the patient ultimately succumbed. Now the abdominal wall is laid open, the tumour emptied as much as possible of its contents, the collapsed sac drawn through the incision, its neck secured by ligature or otherwise, the mass cut away, the stump returned to the abdomen, and the wound carefully closed by stitches.

Towards the middle of the 19th century the operation was performed by a few surgeons, under

the protest of the great majority of the medical profession; now it takes its place as a routine operation, demanded in any suitable case, and performed with results as regards the saving of life and restoration to health, together with an immunity from risk, which can be claimed by no other major operation. The operation for extirpation of ovarian cystoma was first performed by Ephraim M'Dowell of Kentucky in 1809, but was established in England as a regular operation by Charles Clay of Manchester, who operated on his first case in 1842. Clay operated on nearly 400 cases with 69 per cent. of recoveries. Since then the operation has been performed many thousands of times, and the mortality has been reduced to a figure which renders the operation, while always one of the gravest, yet, in competent hands, one of the safest in surgery. To this result the labours in Britain of Spencer Wells, Thomas Keith, and Lawson Tait have mainly contributed. With the best operators the mortality at this moment is probably less than 5 per cent., and some have had series of over 100 cases without a death. This result has been ascribed to various causes, such as the mode of treating the pedicle, or stump, the use of antiseptics, &c., but is probably most due to the experience acquired in dealing with the various complications and difficulties arising in the operation.

Within more recent years the removal of the ovaries and Fallopian tubes for other than cystic disease has come to be recognised as a regular operation, and is now frequently performed. When the ovary is removed for conditions other than acystic tumour the operation is usually known as 'oophorectomy.' Such conditions are severe inflammation of the ovary, pregnancy occurring outside the uterus, and the development of a solid tumour in the ovary.

Ovary. The ovaries in the female are analogous to the testes in the male, and are two oblong flattened bodies (about an inch and a half in length, three-quarters of an inch in width, and nearly half an inch thick in the human subject), situated on either side of the uterus, to which they are connected by ligaments and by the Fallopian tube. The ovary is composed of two well-defined portions, a superficial or 'cortical' portion, and a deep or 'medullary' portion. The whole is enclosed in a tough fibrous coating, which is, however, closely blended with the cortical portion, and cannot be stripped off. It is termed the *tunica albuginea*. The medullary portion is highly vascular, and of a reddish colour. The cortical portion in the adult ovary contains an enormous number of vesicles, varying greatly in size. These are the *Graafian follicles*, and contain the ova or germs—the female element of reproduction. Their number is estimated at 30,000. From ten to twenty large and more or less mature vesicles are found near the surface, to which they gradually approach as they become developed. The structure of these ovisacs and their contained ova is somewhat complex, and cannot be described here. More or less coincident with menstruation is the process of *ovulation*, by which is meant the rupture of the wall of Graafian follicle, and the escape of the contained ovum. On its escape from the ovary the ovum enters the end of the Fallopian tube, by which it is conveyed into the uterus.

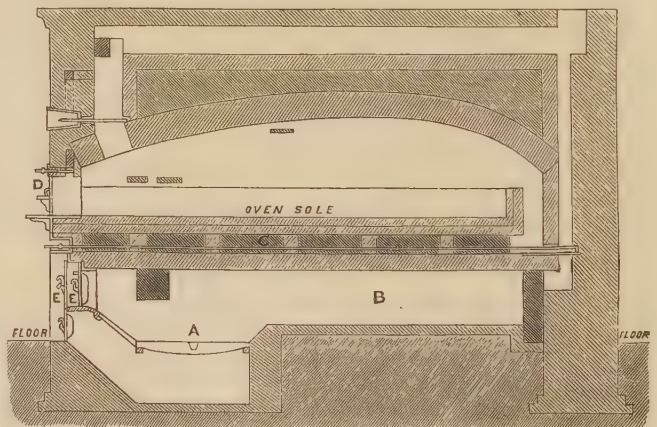
The ovary is the subject of several diseased conditions. (1) It is the seat of acute and chronic

inflammation. This may arise from injuries during labour, operations in the pelvis, but very frequently is the result of gonorrhoeal infection, spreading from the vagina. Such inflammations cause great organic changes in the structure, often leading to sterility, and they are usually associated with severe pain, frequently so intense as to unfit the subject for all active duty. (2) The ovary is the seat of new growths, which may be of several varieties. Some represent enlargements of one or more Graafian follicles, and attain an enormous size, sometimes weighing 100 lb. or more. They contain fluid which is usually of a viscid, ropy nature, and brownish colour, but sometimes presents other characters. They are known as *ovarian cysts*. Other tumours are of a more or less solid nature, and contain portions of hair, teeth, bone, &c., and are known as *dermoid tumours*. Moreover, the ovaries may become the seat of cancerous disease as well as of various forms of simple tumour. See OVARIOTOMY.

Ovary, in Botany, the part of the Pistil (q.v.) containing the Ovule (q.v.). See FLOWER, FRUIT, SEED.

Ovation. See TRIUMPH.

Oven.—The old type of baker's oven, still very largely used, is a low arched chamber either of brick with a tile or stone sole, or built entirely of stone. A common size of sole is 11 feet 6 inches by 9 feet 6 inches (some are smaller), with sides 18



Bailey-Baker Oven—Longitudinal Section :

A, furnace bars; B, main flue; C, air chamber; D, door of oven; E, E, doors of furnace.

inches high, from which the crown or arch springs. The door is in front, and the dough is put in with a long wooden spade called a 'peel.' In one class of these ovens the fireplace or furnace is placed in the front corner, with an opening admitting the products of combustion directly into the oven, while there is an exit flue on the other side. This furnace is fired from the bakehouse; coke or coal is used for fuel, and any smoke is mostly cleared away during the heating up of the oven. Sometimes the plan of having a fixed fire within the oven itself is adopted, and another way is to have a movable iron furnace, called a chaffer, which can be shifted from place to place, so as to heat the oven evenly. For this inside firing wood is the best fuel. Picrite, quarried near Bathgate and elsewhere, makes a better and more durable sole than tiles or bricks.

Many newer forms of ovens have been introduced; the Bailey-Baker, though not the newest, may serve as an illustration, and is shown in longi-

tudinal section in the annexed figure. The furnace is placed below the oven sole, and the heated gases pass, by flues, entirely round the oven without actually entering it, if it is to be worked solely by external heat. But by openings, regulated by valves or dampers, they can be led into the oven, and so heat it internally. The construction of the oven is such that, even when it is worked in the latter way, fragments of fuel rarely get inside, so that comparatively little cleaning is necessary, and baking can go on continuously with the exception of the time required to fill and discharge the oven.

Some ovens are heated with hermetically-sealed iron pipes containing water, which is converted by heat into superheated steam (see STEAM). The pipes are placed inside the oven, but a portion, or portions of them, project through its back wall into a furnace. Perkins was the originator of this method of heating. The delay due to the use of a peel is avoided by having a draw-plate, or movable sole, fixed on wheels, so that it can be drawn out in front of the oven and loaded or unloaded very quickly. With such ovens there is little time required for raising the heat between the batches. Another way of heating ovens is by gas-burners. Ovens for army use in barracks or the field are generally arranged so as to be serviceable for cooking meat, roasting potatoes, coffee, &c., as well as baking bread. In those for the field portability is a main essential. For biscuit ovens, see BISCUITS. Coke-ovens are described under COKE.

Oven-bird, a genus (*Furnarius*) and subfamily (Furnariinae) of Passerine birds, family Dendrocolaptidae. The name is given because some of the species build nests resembling an oven or beehive. The genus, which consists of nine species, is exclusively South American, ranging from Guiana and Ecuador to La Plata. The habits of these birds have been described chiefly by Mr Edward Bartlett, and by Darwin in his *Voyage of the Beagle*. The name oven-bird is also applied, for a similar reason, to the willow-wren (*Phylloscopus trochilus*).

Overbeck, JOHANN FRIEDRICH, painter, was born at Lübeck, 4th July 1789, and commenced his art studies at Vienna in 1806 as a pupil of the pseudo-classical school of David; but, having adopted notions on art essentially different from those inculcated in the academy, he was expelled along with some like-minded friends, and in 1809 set out for Rome. His principle was to abjure the classical Renaissance and its sensuousness, and to 'abide by the Bible.' In Rome he was joined by Cornelius, Schadow, Schnorr, and Veit; and these five laid the foundation of a school that influenced the taste for art in Europe, though they were scoffed at as 'Pre-Raphaelites,' 'Nazaries,' 'Church-Romantic painters,' and had long to struggle with poverty. A picture of the Madonna, which Overbeck painted in 1811, brought him into marked notice. He was next employed by the Prussian consul, Bartholdy, to execute for his house at Rome frescoes illustrating the history of Joseph, the 'Selling of Joseph' and the 'Seven Lean Years' being the subjects assigned to Overbeck. After completing these he painted in fresco, in the villa of the Marchese Massimo, five large compositions from Tasso's *Jerusalem Delivered*. In 1813 he abjured Lutheranism, and embraced the Roman Catholic religion. Overbeck's chief work is a fresco at Assisi, 'The Vision of St Francis.' His oil-pictures are inferior to his frescoes, being dry and weak in colour. Among his famous pictures are 'Christ's Entry into Jerusalem,' at Lübeck; 'Christ's Agony in the Garden,' at Hamburg; 'Lo Spozalizio,' at Berlin; 'The Triumph of Religion

in the Arts,' at Frankfort; the 'Incredulity of St Thomas,' in London. He executed a great many drawings and cartoons remarkable for devotional feeling, most of which, like his frescoes and paintings, have been engraved. One of his last undertakings was a series of designs from the Evangelists, delicately engraved in the line manner. Amongst the characteristics of the school are devout feeling, hardness of outline, scholastic composition, and the avoidance of merely sensuous beauty both in colour and form. Overbeck died at Rome on 12th November 1869. See Life by J. B. Atkinson (1882), in 'Great Artists' series.

Overbury, SIR THOMAS, was born in 1581 at Compton-Scorpion, in Ilmington parish, Warwickshire, his father being squire of Bourton-on-the-Hill in Gloucestershire. After three years at Queen's College, Oxford (1595-98), he studied awhile at the Middle Temple, and travelled then on the Continent, returning an accomplished gentleman. In 1601 at Edinburgh he met Robert Carr, then page to the Earl of Dunbar, and the minion afterwards of James I., who knighted him in 1607, and in 1611 made him Viscount Rochester. The two became inseparable friends, and Overbury himself was, through Carr's influence, knighted in 1608, the year before his second visit to France and the Netherlands. Meanwhile, in 1606, the lovely but profligate Frances Howard (1592-1632) had married the third Earl of Essex (q.v.), and during his two years' absence had intrigued with more than one lover—Carr the most favoured. Overbury had played pander to their guilty intercourse; but Carr now telling him that he purposed to get Lady Essex divorced from her husband, and then to marry her, he strongly deprecated the idea, declaring she might do for a mistress but not for a wife. Carr informed Lady Essex what Overbury had said of her; she became furious for revenge, and offered Sir Davy Wood (between whom and Sir Thomas there was a standing feud) £1000 to assassinate him—an offer prudently declined, except under royal assurance of pardon. So on 21st April 1613 Overbury, on a most trivial and illegal pretext—his contemptuous refusal to go on an embassy—was thrown into the Tower, where on 15th September he was poisoned. Three months later Carr (just created Earl of Somerset) and his paramour were married with great pomp, and the whole affair was soon to appearance forgotten. But in the autumn of 1615, after Villiers had largely supplanted Somerset, an enquiry was instituted, and four of the humbler instruments were promptly hanged—among these Mistress Anne Turner in her starched yellow ruff. In May 1616 the countess pleaded guilty, and the earl was found guilty; but by an amazing stretch of the royal prerogative they were pardoned. In 1622 they were even released from the Tower; and Somerset survived till 1645.

Overbury's works, all published posthumously, include *The Wife* (1614), a didactic poem; *Characters* (1614; partly by others), whose conceits are not lacking in epigrammatic point; and *Crumms fall'n from King James's Table* (1715; doubtful). They were collected with Life by Rimbault (1856). See also Andrew Amos, *The Great Over of Poisoning* (1846); Whibley's *Essays in Biography* (1913); Judge Parry, *The Overbury Mystery* (1925); and works cited at JAMES L. BACON, and COKE.

Over Darwen. See DARWEN.

Overland Route to the East is now understood to be that from England across France to Marseilles, or (by the Mont Cenis tunnel) to Brindisi, thence through the Levant, the Suez Canal, Red Sea, and Indian Ocean. This makes the journey to India only about half as long as the voyage round by the Cape of Good Hope. In 1838

a monthly service was started to carry the mails across Egypt; but to Lieutenant Waghorn (1800-50) belongs the credit of first showing how the voyage from India could be still further shortened. On 31st October 1845 he arrived in London with the Bombay mail of the 1st October (*via* Austria, Bavaria, Prussia, and Belgium). The railway from Suez to Alexandria by Cairo was opened in 1858; but the Suez Canal in 1869 rendered the Overland Route available for passengers generally. Marseilles has superseded Brindisi for passenger traffic. See also EUPHRATES.

Overlap, in Geology. When the upper beds of a conformable series of strata extend beyond the bottom beds of the same series, the former are said to overlap the latter. Hence strata showing this structure constitute an *overlap*.

Overman, or SUPERMAN (Ger. *übermensch*), a higher type to be evolved from man. See NIETZSCHE.

Overseers. See PARISH, POOR-LAWS.

Overstone, SAMUEL JONES LOYD, BARON, an economist and financier, was born in London, 25th September 1796, being the only son of Mr Lewis Loyd, descended from a respectable Welsh family, and a leading partner in an eminent banking-house. From Eton he passed to Trinity College, Cambridge. On leaving Cambridge Loyd entered his father's banking-house, afterwards merged in the London and Westminster Bank. He entered parliament in 1819 as Whig member for Hythe, which he continued to represent till 1826, and in 1850 was raised to the peerage by the title of Baron Overstone and Fotheringhay. The first of Lord Overstone's famous tracts on the management of the Bank of England and the state of the currency was published in 1837, and was followed by others between that period and 1857. The proposal for making a complete separation between the banking and issue departments of the Bank of England, introduced by Peel into the Act of 1844, was first brought forward in these tracts. Lord Overstone was currently believed to have been worth £6,000,000 or £8,000,000, but after his death, without male issue living, on 17th November 1883, his personal estate was sworn under £2,118,803. He zealously opposed the principle of limited liability, and the introduction of the decimal system.

Overture (Fr. *ouverture*) was originally an instrumental prelude to an opera, oratorio, &c. It first received definite form from the composer Lully (q.v.), whose pattern was followed by most succeeding writers, including Handel, up to the time of Gluck and Mozart. The somewhat different Italian form, styled *Sinfonia*, was developed by Scarlatti. Modern overtures almost defy classification. Two leading styles may be indicated—the *medley* form, in which various melodies from the succeeding opera are interwoven, and the finest examples of which are by Weber and Wagner; and the independent concert overture, usually in the form of a first movement of a sonata, without repeat, of which Mendelssohn's are the type. Mozart's *Magic Flute* overture is a triumph of constructive skill, combining the forms of sonata and fugue. Beethoven's *Leonora No. 3* is considered the greatest of all; while foreshadowing the events and music of the opera, it has an individual form of its own, as has also his *Egmont* overture. Operas—e.g. Wagner's—now often begin with a short *Introduction* or *Prelude*, leading without break into the first scene.

Overijssel, a province of the Netherlands, lying on the east side of the Zuider Zee, and separated from Guelderland on the south by the river Yssel. Area, 1291 sq. m.; population, 450,000.

Rich meadows cover almost one-third; moors are extensive; the province is well intersected by canals. The chief cities are Zwolle, Deventer, and Kampen.

Ovid (PUBLIUS OVIDIUS NASO), born March 20, 43 B.C., at Sulmo, the present Solmona, in the Abruzzi, was the younger of two sons, both of whom were brought early to Rome by their father, a well-to-do *eques*, who placed them under the most famous rhetoricians of the day, to be trained for the bar. His brother Lucius died in his twentieth year, and Publius, in spite of extraordinary forensic aptitude, gave up his whole time and energies to poetry. He filled, indeed, a few legal posts, but soon abandoned them, and, like other young Romans of his class, repaired to Athens, whence he crossed to Asia Minor, and on the return journey lingered a while in Sicily. While still a youth he married, but almost immediately separated from his wife, only to take another, with whom he lived scarcely more happily. By her he had a daughter, Perilla, herself a poetess. He married yet again, and this, his third wife, Fabia, gained and returned his best affections, and, unlike her two predecessors, survived him. His life at his country-seat, among congenial friends and in correspondence with the most distinguished of his contemporaries, was an enviable one. Messala Corvinus, a highly cultured poet, exercised on his rapidly developing powers a salutary influence, reinforced by that of the younger Macer, author of the *Ante-Homerica* and *Post-Homerica*, of Propertius, the epic poet Ponticus, and others. He had no acquaintance personally with Tibullus or Virgil, both of whom died 19 B.C.

His first literary success was his tragedy *Medea*, of which Quintilian had a high opinion. Then came his *Epistolæ* or *Heroides*, imaginary love-letters from ladies of the heroic foretime to their lords: but in his next publication he touched the sphere he has made peculiarly his own—his *Amores*, so called from their subject-matter. Here he had Gallus, Tibullus, and Propertius for exemplars, and in wit and wayward fancy, less often in soul and passion, he excelled them all. His *Medicamina Faciei* (a practical poem on artificial aids to personal beauty) seems to have been preliminary to his true master-work, the *Ars Amandi*, or *Ars Amatoria*, in three books, which appeared about 1 B.C., followed by a subsidiary book entitled *Remedia Amoris*—the former teaching how to win and preserve the love of woman, the latter how to relieve the rebuffs and disappointments encountered in the attempt. These publications close the first period of the poet's activity: the second opens with the *Metamorphoses*, in fifteen books, and with the *Fasti*, designed to be in twelve, of which six only were completed. The *Metamorphoses*, according to Bernhardt, surpasses all that antiquity has to show in brilliant and felicitous metrical narration. The *Fasti*, a contemporary work, forms in elegiac distichs a poetic commentary on the calendar, wherein the origin of Roman feast-days, divinities, and religious observances is set forth. Midway in its composition he was banished (8 A.D.); but shortly before he died he worked at a revised version of it in order to dedicate it, thus recast, to Germanicus—the original having been inscribed to Augustus. But he did not carry out this project. As it stands the *Fasti* seeks to ennoble the policy of Augustus, and, by revivifying their forgotten religious ceremonies, to re-awaken in the Roman people the sentiment out of which these ceremonies sprung.

Posterity has failed to fathom the true ground of Ovid's banishment—the poet himself refraining studiously from all but the vaguest allusions to it. He admits that he deserved to be so punished, but he also declares that he was more the witness than

the author of the offence. Whether he was concerned in some intrigue of the licentious Julia, or in one of the many scandals connected with Agrippa Postumus, will never be cleared up. Nothing could move Augustus to a reprieve of the sentence; so in the late autumn, 9 A.D., he left Rome, as 'relegatus, non exul,' for Tomi, on the Euxine (close to the present Constantza). There, at the outskirts of Roman civilisation, severed from wife, daughter, relatives, and friends, with only the nomadic Scythians for neighbours, he languished out the last years of his life. Tiberius remained as deaf to his appeals for mercy as Augustus, and there he died in 17 A.D. This period constitutes the third of his poetic activity—in which his genius, bereft of its gaiety, responds to his invocation only in the minor notes of melancholy. Already on his last journey from Rome he began the elegies which he published in five books, by name the *Tristia*. Similar in tone and theme are the four books of the *Epistolæ ex Ponto*, differing only in this from the *Tristia* that they are addressed to a particular friend in Rome—a step he did not venture on in the composition of the latter. His *Ibis*, written in imitation of Callimachus, in which he invokes destruction on an enemy unknown, and his *Hali-eutica*, a poem, extant only in fragments, on the fish of the Euxine, complete the list of his remains.

In mastery of metrical form and in creative fecundity Ovid outsoars all the poets of the Augustan cycle. From his youth up he was so favourably circumstanced that he passed quickly through the successive stages of his development till he reached the highest perfection of which he was capable. The struggle between the new poetry and the old had issued in the subjection of the latter, and he entered immediately on the inheritance prepared for him by others. This he carried to its culmination, in finish as in form. He stands at the limit of the Augustan without by a hair's breadth encroaching on the Silver age. The poetic circle in which he lived, the *beau monde* of Rome in which he moved, the favour of the court in which he basked, all contributed to mould his genius and stamp its products with the hall-mark of 'society.' In that world he has always been a favourite, contriving as he did to combine learning with lightness of touch, force with finish, variety with order. He knew the *vie intime* of the contemporary world, in its real as in its conventional forms, and he could sweep the collective chords of human passion, from love to hate, with the assured boldness of a master. He is the most voluminous of Latin poets, and in this characteristic may be found the cause of his chief defects—his self-repetition, his too frequent echoings of former felicities, the monotony of his cadences, particularly in the elegiac distich. In this metre, where the thought rarely overflows the two-line limit, he has developed a sententiousness in which Quintilian traces his forensic education.

There are old translations of the *Metamorphoses* by Golding (1565), Sandys (1632), and Garth (q.v.); and an admirable one by King (1871). Complete editions are by Merkel (1853), Riese (1872-74), and Magnus (1914).

Oviedo, the capital of the Spanish province of Oviedo, 14 miles SSW. of Gijón on the Bay of Biscay. Standing in a plain between the rivers Nalón and Nora, and sheltered to the north by a hill 470 feet high, it has four main streets, branching off from a central square, and possesses a cathedral, a university (1604), a theatre, a botanic garden, a fine aqueduct, &c. The cruciform cathedral, dating from 781, but mainly rebuilt between 1388 and 1528, is a noble specimen of richly ornamented Gothic, with a tower of 284 feet high, the

remains of fourteen early kings and queens of Asturias, many much-prized relics, and a fine old library. In or near the city there are several ancient Romanesque churches. Linens, woollens, hats, and firearms are manufactured; whilst in the neighbourhood are many ironworks, and at Prutia (12 miles W.) a government foundry. Population, 70,000. Oviedo (ancient *Asturum Lucus* or *Ovetum*) now gives its name to the old province of Asturias; it was known during the middle ages as *Civitas Episcoporum*, because many of the Spanish prelates, dispossessed of their sees by the Moors, took refuge there. It was twice plundered by the French of its ecclesiastical and other treasures, in 1809 and 1810.—The province is a rugged mountainous country, seamed with deep valleys and chasms, between the Cantabrian range and the Bay of Biscay. Like the Galicians, the people are hardy mountaineers and fishermen. Area, 4200 sq. m.; pop. 744,000.

Oviedo y Valdes, GONZALO FERNANDEZ DE, born at Madrid in 1478, was sent by Ferdinand to St Domingo, in the West Indies, in 1514, as inspector-general of the gold-mines, and subsequently was appointed historiographer of the Indies. After his return to Spain he published a history thereof (1526). Of a second edition (21 vols. 1535) an English translation was made by Eden in 1555; a complete edition of the entire work appeared at Madrid in 4 vols. 1851-55. Oviedo died at Valladolid in 1557. He likewise wrote *Las Quincuagenas*, a valuable gossiping account of the principal personages of Spain in his time.

Oviparous is an objectionable term applied to the great majority of female animals, whose eggs are first laid and then hatched. *Ovoviviparous* is a corresponding term applied to animals in which the eggs are hatched within the body of the mother, and where there is no nutritive connection between parent and offspring. Some reptiles, amphibians, fishes, &c. which do not lay their eggs illustrate this mode of parturition. In regard to the terms oviparous and ovoviviparous it should be noted (1) that all animals are in one sense viviparous, for whatever is born is normally alive; (2) that 'viviparous' animals *par excellence*—viz. the placental mammals—differ from 'ovoviviparous' animals, such as the brown lizard (*Zootoca vivipara*), the blindworm, the black salamander (*Salamandra atra*), one of the blennies (*Zoarces viviparus*), and many invertebrates which bring forth already hatched young, not so much in the manner of birth as in the relation between mother and offspring before birth; (3) that oviparous and viviparous parturition often occur in the same class—witness the oviparous Monotremes among mammals; (4) that oviparous and ovoviviparous parturition often occur in nearly related forms among reptiles, fishes, amphibians, and invertebrates—that they even occur in the same animal: e.g. the grass-snake (*Tropidonotus natrix*), which usually lays eggs, but may in artificial conditions bear already hatched young; or some aphides in which the parthenogenetic generations are usually born as young insects, while the fertilised eggs are laid as such. In short, the distinctions are for the most part differences of degree.

Ovoca. See AVOCA.

Ovule, a little egg; in Botany the rudimentary seed. It needs to be fertilised by the pollen tube before it can develop and grow into the seed. The ovule has a complicated structure which can only be properly understood by comparing it with the corresponding parts of the lower plants known as the Vascular Cryptogams. In the common Ferns (q.v.), when a spore is sown a small green plant, the prothallium, grows from it; this bears male and

female organs called antheridia and archegonia. A male sperm from an antheridium fertilises the egg-cell of an archegonium, and a plant which we call the fern grows from it. In other plants called heterosporous ferns, because the differentiation has been carried further back in the life-history, and the spores, and prothallia, are of two kinds, the archegonium-bearing prothallium grows inside its spore-case, bursting it, but not leaving it. In Conifers the prothallium is still more reduced, is surrounded by a mass of tissue called the nucellus, and also by an 'integument.' In ordinary flowering plants the history of the ovule is as follows: On a special leaf called a carpel a mass of tissue grows called the nucellus; this becomes covered in by two integuments which grow up from its base, but leave an opening at the top called the micropyle. A cell near the top of the nucellus represents the mother-cell of the female spore of the vascular cryptogams. It divides into two and then into four; one of these becomes the female spore; it is called the embryo-sac because the embryo will be formed within it. The male spores of the vascular cryptogams are represented by the pollen grains contained in special leaves called stamens; a pollen grain being placed on a part of the ovary sends out a tube which enters the micropyle. The nucleus of the embryo-sac now divides into two, one daughter-nucleus travels to each end of the sac; it there divides into two, then into four, daughter-nuclei. One of these from each end travels back to the centre of the sac; they fuse and form the secondary nucleus of the sac. The three remaining nuclei at the end near the micropyle are supposed to represent three archegonia; the three at the other end are supposed to represent the rest of the prothallus. Only one of the three archegonia—the inner one, called the oosphere—will develop into the embryo if fertilised; the other two merely aid in that process. Fertilisation is effected by the pollen tube entering by the micropyle and touching one of the outer archegonia, which then breaks up and becomes attached to the oosphere; this is now called oospore, and grows into the embryo, while the secondary nucleus of the embryo-sac by repeated division gives rise to a tissue which fills up the embryo-sac, called endosperm, rich in food materials upon which the embryo feeds. The embryo-sac at the same time grows, displacing the tissue of the nucellus. This is a generalised description. There are variations in the different orders of flowering plants. See CHALAZA.

Ovum, or EGG-CELL, the female germ-cell or gamete, whose union with the sperm-cell (male gamete) forms the zygote, the first stage of the young plant's or animal's existence. See EMBRYOLOGY, HEREDITY, REPRODUCTION, SEX, and also such articles as FERNS, MOSSES, as well as OVULE.

Owain ap Gruffydd, prince of Gwynedd or North Wales, fiercely resisted Henry II., but ultimately submitted, and died in 1169.—For another (Owain Glyndwr), see GLENDOWER.

Owen, JOHN, epigrammatist, was born at Llanarmon, in Carnarvonshire, in 1560, and had his education at Winchester and New College, Oxford, where he became a Fellow in 1584. He was afterwards a schoolmaster at Warwick, died in 1622, and was buried in St Paul's Cathedral. He had a great reputation in his day as a writer of Latin verse, and as the 'British Martial' his fame as an epigrammatist was widely spread also on the Continent. His robust Protestantism sharpened into stinging wit placed his book on the *Roman Index* in 1654. Three books of the *Epigrammata* appeared in 1606; additions were made in later editions.

The best edition is that by Renouard (Paris, 2 vols. 1795). An English translation was published as early as 1619. See EPIGRAMS.

Owen, JOHN, a great Puritan divine, was born at the vicarage of Stadhampton, Oxfordshire, in 1616. At twelve he was admitted at Queen's College, Oxford, where he worked with amazing diligence, for years taking no more than four hours' sleep a night. In 1632 he took his B.A. degree, and M.A. in 1635, and two years after was driven from Oxford by dislike to Laud's new statutes. The next three or four years of his life were spent in a state of anxious and melancholy introspection, as chaplain first to Sir Robert Dormer of Ascot, next to Lord Lovelace of Hurley; but the outbreak of the war left him without a patron, and about the same time his zealous Puritanism cost him the estate a wealthy Welsh uncle meant to bequeath him. He now removed to London, where a casual sermon, preached by a stranger in Calamy's church, brought to his heart that peace he had long laboured after in vain. In 1642 he published *The Display of Arminianism*, a work for which the 'Committee for Purging the Church of Scandalous Ministers' rewarded him with the living of Fordham in Essex. Here he married a lady named Rooke, who bore him eleven children. In 1646 he removed to Coggeshall, and here made public his growing aversion to Presbyterianism, and preference for a moderate form of Independent church government. The Presbyterian ministers fell upon him at once for his apostasy, but all their acrimony, dogmatism, and intolerance failed to perturb his sober temper. At Coggeshall he wrote his *Salus Electorum*, *Sanguis Jesu*, the result of seven years' study, and of which he himself said that 'he did not believe he should live to see a solid answer given to it.' On April 29, 1646, he preached before parliament, and to his discourse, when printed under the title of *A Vision of Free Mercy*, he added an Appendix in which he pleads for liberty of conscience in matters of religion. He was again chosen to preach before the House of Commons the day after the execution of King Charles I. (January 31, 1649), but discreetly avoided a vindication of the act by making no reference to it whatever. About this time Cromwell made his acquaintance, and thought so highly both of his preaching and character that he carried him to Ireland as his chaplain. Here he remained about half a year, regulating the affairs of Trinity College. Next year (1650) he went with Cromwell to Scotland, and resided in Edinburgh for several months. In 1651 the House of Commons appointed him dean of Christ Church, Oxford, and in 1652 he was admitted vice-chancellor of the university. The manner in which he discharged his duties reflects the highest credit on his moderation and impartiality. Most of the vacant livings in his patronage were bestowed on Presbyterians; and Episcopalians were allowed to celebrate divine worship in their own way, nor could the vice-chancellor ever be induced to offer them the slightest molestation. While at Oxford the 'Atlas of Independence,' as Wood styles him, wrote his *Diatriba de Divina Justitia*, his *Doctrine of the Saints' Perseverance*, his *Vindicia Evangelicæ*—against Biddle and the Socinians—and his *Mortification of Sin in Believers*. He was one of the well-known Triers appointed to purge the church of scandalous ministers, and in this capacity signalised himself by his friendly offices on behalf of men of learning and merit like Dr Edward Pocock, Laud's professor of Arabic. Owen opposed the giving the crown to the Protector, and it appears that a coldness arose between the two. In 1657 he was succeeded as vice-chancellor of the university by Dr Conant, and the year after Cromwell's death he was ejected

from his deanery. He retired to Stadhampton, in Oxfordshire, where he had purchased an estate, and here he formed a congregation, to which he ministered until his removal to London shortly after the Restoration. The writings belonging to this period of retirement are *Communion with God; On the Divine Original, Authority, Self-evidencing Light and Power of the Scriptures; Theologoumena, or De Natura, Ortu, Progressu, et Studio Veræ Theologiæ*; and an uncritical and irreflexive diatribe against Walton's *Polyglott*. In 1662 he published, at Clarendon's request, *Animadversions to Fial Lux*, a treatise written by a Franciscan friar in the interests of Roman Catholicism. It was followed by works on *Indwelling Sin*, on the 130th Psalm, and on the Epistle to the Hebrews, the last of which began to appear in 1668, and is usually reckoned Owen's greatest work. In 1669 he published *Truth and Innocence Vindicated*, a reply to Samuel (afterwards Bishop) Parker's *Discourse on Ecclesiastical Policy*, and in 1673 became pastor of a large congregation in Leadenhall Street. His last publications of importance were a *Discourse Concerning the Holy Spirit* (1674); *Doctrine of Justification by Faith* (1677), a treatise still much admired by many; and *Christologia, or Glorious Mystery of the Person of Christ*.

Already in 1663 he had declined a call to Boston in New England, as he did an invitation in 1670 to become president of Harvard. In his later years he was held in the highest esteem by many of the most influential personages in the land, and he had repeatedly long conversations with both Charles II. and the Duke of York on the subject of Nonconformity. In his controversies with Sherlock and Stillingfleet he came off triumphant, and to the end of life he preached and wrote incessantly, notwithstanding the torments of the stone and asthma. He died at Ealing, 24th August 1683, and was buried in Bunhill Fields, being followed to the grave we are told by as many as sixty noblemen. Owen was learned, considerate, and generous.

For his life, see the Rev. W. Orme's *Memoirs* (1820), and the *Life*, by the Rev. A. Thomson, prefixed to the most complete edition of Owen's more than eighty works, that edited by Dr Goold (24 vols. Edin. 1850-55).

OWEN, JOHN, born at Pembroke in 1833, was educated at Lampeter, and in 1870 was appointed rector of East Anstey in Devonshire, where he died, 6th February 1896. A profound student, he wrote much for the *Edinburgh Review* and the *Academy*, but is best known for *Evenings with the Skeptics* (1881), *Skeptics of the Italian Renaissance* (1892), and *Skeptics of the French Renaissance* (1893). He edited Glanville's *Sceptis Scientifica* (1885), and published a volume of *Verse Musings*.

OWEN, SIR RICHARD, one of the most eminent of zoologists, was born at Lancaster, July 20, 1804. From the grammar-school of that town he passed (1824) to Edinburgh University and extra-mural School of Medicine, and thence (1826) to St Bartholomew's Hospital in London, where he completed his course. He had barely started medical practice when he was called (1830) to help in cataloguing the Hunterian collections in the museum of the Royal College of Surgeons, to the curatorship of which he afterwards succeeded. In 1835 he married the only daughter of Clift, his colleague in the museum. Till 1856 he continued to produce a marvellous series of descriptive catalogues, while for more than twenty years (1834-55) he lectured as professor of Comparative Anatomy, for two years at Bartholomew's, and afterwards as Sir Charles Bell's successor at the College of Surgeons. Some of the results of his research and teaching are embodied in several well-known volumes on comparative anatomy and physiology. Meanwhile he had helped to give new life to the Zoological

Society of London, of which he was for a time the unpaid prosector, while he had also worked willingly in various public interests—e.g. as a commissioner of health (1843-46), and for the Great Exhibition of 1851. In 1856 he became superintendent of the natural history department of the British Museum, where he continued his investigations on living and fossil animals, energetic moreover in such practical matters as the fit housing of this magnificent collection. He also continued to teach periodically at the Royal Institution and elsewhere, until his resignation of official duties in 1883. But even thereafter the veteran of fourscore years and more persisted at work.

As a student Owen had also visited Paris and seen Cuvier, of whose school he became a prominent disciple, yet in his theoretical conclusions he rather supported Geoffroy St-Hilaire, against whose principle of the unity of organic structure he had heard Cuvier argue in 1831 before the French Academy. Marvellous industry and width of knowledge, anatomical insight and enthusiasm for palæontology, were as characteristic of Owen as of Cuvier, and their names will be linked while zoology lasts. Owen's anatomical and palæontological researches number towards four hundred, and concern almost every class of animals from sponge to man; he helped to elucidate the structure of many rare and interesting types, such as the Venus-flower-basket (*Euplectella*), the Brachiopod *Lingula*, the King-crab (*Limulus*), the Pearly Nautilus and the Argonaut, the Mud-fish Protopterus, many extinct reptiles and birds, the recently-lost Moa and the persistent Apteryx, the Aye-Aye and the Gorilla; he greatly advanced morphological enquiry by his clear distinction between *analogy* and *homology*, as well as by his concrete studies on the nature of limbs, on the composition of the skull, and on other problems of vertebrate morphology; while his essay on *Parthenogenesis* was a pioneer work of much historical importance in connection with theories of sex and reproduction. As a Pre-Darwinian, much influenced by the conception of 'archetypes,' Owen maintained a cautious, though by no means hostile, attitude to the more detailed evolutionist theories; his convictions, in short, are those of a Platonic anatomist. He died 18th December 1892. See the *Life* by his grandson (1894).

OWEN, ROBERT, social reformer, was born a saddler and ironmonger's son, at Newtown, in Montgomeryshire, 14th May 1771. He had a poor education, and was put at ten into a draper's shop at Stamford, but a few years later shifted to Manchester, and by nineteen had risen to be the enterprising manager of a cotton-mill with five hundred hands. In 1799 he married the daughter of David Dale (q.v.), the philanthropic owner of the celebrated cotton-mills at New Lanark, on the Clyde, and, having induced his firm to purchase the concern, settled there next year as manager and part-owner. Here he laboured with constant zeal to teach his workpeople the advantages of thrift, cleanliness, and good order, and organised with a wisdom far before his time a system of infant education. In 1813 the business was reorganised, so as to give Owen a freer hand for his philanthropic schemes, under a firm content with a profit of 5 per cent., of which Jeremy Bentham and the Quaker William Allen were members. By this time Owen had thought out a religious creed for himself, and he now began his social propagandism in *A New View of Society, or Essays on the Principle of the Formation of the Human Character* (1813). His works at New Lanark quickly became famous, and attracted visitors from all parts of the world, while his advice on social questions was sought, if not always followed, by statesmen. Owen's thoughts on the

pressing social questions of the day finally drove him to socialism rather than co-operation as a solution, but he lost much of his influence on the wider community by utterances on religion that were at least honest, if not discreet. His socialistic theories were put to the test of practice in experimental communities at Orbiston near Bothwell, and later at New Harmony in Indiana, at Ralahine in County Clare, and at Tytherly in Hampshire, but all were completely unsuccessful. In 1828 his connection with New Lanark finally ceased; and, his means having been exhausted in the American experiment, the remainder of his days were spent in restless secularist and socialistic propagandism. In his old age his mind fell into the comfortless vagaries of spiritualism. He died at his native town, 17th November 1858.—His son, ROBERT DALE OWEN, was born in Glasgow, 9th November 1801, and went to America in 1825 to help his father in founding his short-lived colony at New Harmony, Indiana. He finally settled in America in 1827, edited the *Free Inquirer* in New York, acted as a member of the Indiana legislature, and entered congress as a democrat in 1843. Later he helped to remodel the constitution of Indiana; acted first as *chargé d'affaires*, next as minister at Naples (1853-58); debated divorce with Horace Greeley; supported the cause of emancipation by vigorous and able pamphlets; and made his name widely known as one of the chief advocates of spiritualism in the United States. He died on Lake George, New York, 17th June 1877. Of his books need only be mentioned the spiritualistic *Footprints on the Boundary of another World* (1859), and *Debatable Land between this World and the Next* (1872); and *Threading my Way*, an autobiography (1874).—Two other sons, David Dale Owen (1807-60) and Richard Owen (1810-90), achieved contemporary eminence as geologists.

See SOCIALISM; G. J. Holyoake, *History of Co-operation in England* (1906); A. Cullen, *Adventures in Socialism* (1910); Owen's Autobiography (1857), and further that of his son (1874); also the Lives by A. J. Booth (1869), W. L. Sargent (1860), Lloyd Jones (ed. by W. C. Jones, 1890), H. Simon (in German, 1905), Podmore (1906), and G. D. H. Cole (1925); Bibliography (Nat. Lib. of Wales, 1914).

Owen ap Gryffydd. See OWAIN AP GRUF-FYDD.

Owen Glendower. See GLENDOWER.

Owens, JOHN, founder of Owens College. See MANCHESTER.

Owensboro, capital of Daviess county, Kentucky, on the Ohio, 160 miles below Louisville. The chief trade is in tobacco. Pop. 17,500.

Owens College. See MANCHESTER.

Owenson, SYDNEY. See MORGAN (LADY).

Owen Sound, a city of Ontario, at the head of Georgian Bay, 122 miles NW. of Toronto, with a deep sheltered harbour, and a large trade in lumber and grain; pop. 12,000.

Owen Stanley Range, a mountain range of the south-east corner of Papua, reaches 13,000 feet in Owen Stanley (or Victoria) Peak.

Owl (*Striges*), a sub-order of birds, constituting with two other sub-orders—the Pandionces (ospreys) and Falcones (hawks, falcons, and eagles)—the order Accipitres or Raptores (birds of prey). The owls vary in size from 5 inches to 2 feet in length, the females being as a rule larger than the males. The head is very large; the skull is broad, the cranial bones highly pneumatic, and the facial region flattened; the beak is short, hooked, strong, and sharp, but never notched. The eyes are very large, directed forwards, only slightly movable; the upper eyelid is very large, and both eyelids

are ciliated with barbed plumelets, and have a broad, thin, bare margin; the third eyelid, or nictitating membrane, is conspicuous; the iris is unusually broad, and is capable of being greatly expanded and contracted. A disc of feathers surrounds the eye, either completely or partly. The ear is peculiar and variable; it has an external meatus, unusual in birds, generally of large size, and sometimes provided with a special flap of skin or operculum. The head often bears a pair of tufts known as feathered horns. The plumage is generally spotted or barred with different shades of brown and yellow. In nearly all owls two phases of colour, a lighter and a darker, can be distinguished. The wings are always broad and long and loose; the tail usually short and even, or slightly rounded. The legs are not long, and are almost completely feathered. The toes are often covered with feathers, and are always terminated by strong talons; the first and fourth toes can be opposed to the second and third. The mouth is very wide; the gullet is large; there is no crop; the stomach is large, roundish, and somewhat compressed; the intestine is short, and has two wide caeca connected with it. The indigestible portions of food are regurgitated in the form of pellets as in other Accipitres.

Owls range over the whole globe, from the extreme polar regions to the remotest oceanic islands. No birds are more cosmopolitan in their distribution. In habit they are generally nocturnal; their flight is noiseless and buoyant; their eyesight is very acute, as is also their sense of hearing. They are either solitary or live in pairs, and although so often regarded with superstitious aversion and animosity, they are nearly always harmless and very useful birds. Their food consists of small mammals, birds, insects—especially nocturnal lepidoptera; and some species prey on fish, either habitually or occasionally. They pounce upon their prey noiselessly, and, striking their talons into it, kill it and carry it off. Small animals may be carried in their bill, and are swallowed whole; larger animals, torn in pieces, are eaten in morsels. The disgorged pellets of indigestible materials—bones, fur, and feathers—produce a characteristic fetid odour near the owl's abode. The examination by Dr Altam of remains found (communicated to the German Ornithologists' Society) gives a good idea of the food and utility of the three commonest species of British owls.

	No. of ejected pellets.	Bats.	Bats.	Mice.	Voles.	Shrews.	Moles.	Birds.	Birds.
Tawny Owl.....	210	..	6	42	296	33	48	18	48
Long-eared Owl..	25	..	..	6	35	..	..	2	..
Barn-owl.....	706	16	3	237	693	1590	..	22	..

The nesting habits of owls vary considerably. The nest is rudely made of twigs and grass, in holes of trees, crevices of rocks, dark corners of buildings, or on the ground; sometimes there is no nest at all, or only the forsaken one of some other bird. The eggs are usually white, either pure or yellow or blue tinted, and almost spherical, commonly four to six in number, but some species lay eight or ten, others not more than two. The young remain long in the nest, and are helped by their parents for some days after going abroad. Some owls are diurnal in habit, and these have more compact plumage, smaller ears, and incomplete discs; but the habits of owls in general are too little known to allow of many general statements being made regarding the adaptation of structures to particular habits. Though the small and unspecialised ear is said to characterise diurnal species, it is found in the eagle-owl, whose habits are nocturnal. Unfeathered legs are sometimes associated with fishing

habits; but some feather-legged species catch fish, while other species with unfeathered legs do not. And again, feathered horns, which have sometimes been considered characters sufficiently important to serve as a basis for classification, have no known function, occur in widely-different species, vary much in size and form, and are not peculiar to either males or females. During the day nocturnal owls repose in some secluded spot, generally in a tree, but often on rocks and bushy cliffs, while some prefer the ground. If found abroad they are persecuted by other and smaller birds, being bewildered and rendered helpless by the unaccustomed glare of the daylight. When surprised, owls hiss like a cat and make a clicking noise with their bills; some have a harsh shrieking cry, others a not unmusical *hoot*.

The classification of the owls has always been a fruitful matter of discussion, owing to the difficulty of estimating properly the classification value of the various anatomical characters. According to the most generally received method (Sharpe's, in the *Catalogue of Birds in the British Museum*, vol. ii.), the sub-order Striges is subdivided into two families—(1) Strigidae, containing only the two genera *Strix* and *Phodilus*, which embrace six species; (2) Bubonidae, containing all the other owls—17 genera and about 190 species. (Newton subdivides the owls, which he reckons as a family of Accipitres, into two sub-families—(1) Aluconinae, corresponding to the Strigidae of Sharpe; and (2) Striginae, corresponding to the Bubonidae.) In the Strigidae the sternum has no manubrium, and its margin is entire behind; the clavicles meet to form a furcula or merrythought, which is firmly united with the keel of the sternum; the tarsus is without a bony arch over the extensor tendon of the toes; and the claw of the mid-toe has its inner margin serrate. In the Bubonidae, on the other hand, the sternum has a distinct manubrium, and has its margin notched behind; the clavicles are small and do not form a furcula, nor are they united with the sternum; the tarsus has a bony arch or ring over the groove which contains the common extensor of the toes; and the inner margin of the middle claw is not serrate.

The only British representative of the family Strigidae is the Barn-owl, White Owl, Screech-owl, or Church-owl (*Strix flammea* of Linnæus). This, although the commonest British owl, is really a tropical bird, not ranging more than 40° north or south of the equator, except in western Europe, where it breeds as far north as Denmark and the south of Sweden. In Scotland it is found in the Inner Hebrides, Caithness, and the Shetland Isles. The adult male is about 13 inches long; the bill is white; the claws purplish gray; the face discs, which are oval in form and complete, are white. The general colour, which is light reddish yellow, mottled with gray on the upper parts, and white with small dusky spots on the under parts, distinguishes it from all other

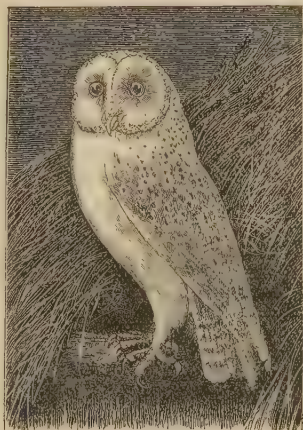


Fig. 1.—Barn-owl (*Strix flammea*).

but differs little in colour, except that the upper parts are darker. This owl is pre-eminently nocturnal in habit. It frequents villages, homesteads, and ruins, where it carries on its depredations among rats, mice, and other animals—as many as twenty rats have been found in the nest of one, all freshly killed. It has also been known to catch fish. Its cry is a discordant scream, and it also produces a snoring and hissing noise. If a nest is made it is merely a loosely-arranged collection of twigs and straws. The eggs number two to five, and are large and smooth and white. Several broods of young may be produced annually. *Phodilus*, the other genus of the Strigidae, consists of only one species (*P. badius*), which ranges from the eastern Himalaya to Burma and Pegu, and is also found in Ceylon, Java, and Borneo. This genus possesses characters common to both families, and is really an intermediate form belonging properly to neither. A species from Madagascar, described by Alphonse Milne-Edwards under the name of *Heliodilus soumagnii*, has been placed in this sub-family.

Among the Bubonidae the Tawny Owl, Wood-owl, Ivy-owl, Brown Owl (*Strix stridula* or *aluco*, or *Syrnium aluco*) is a very common British species. It is found chiefly in wooded parts of England, and in the midland and southern districts of Scotland, but also as far north as Caithness and the Inner Hebrides. Its cry *hoo-hoo*, or *tu-whit, tu-whoo* at night makes it easily recognised. Although a species deserving to be preserved, it is rapidly declining in numbers. It ranges from the southern parts of Scandinavia through temperate Europe, in some parts of which, however, it is very local, to Asia Minor, Palestine, and Barbary. The Snowy Day-owl, the *Harfang* of the Swedes (*Strix* or *Surnia nyctea* or *Nyctea scandiaca*), is a circumpolar bird, breeding chiefly within the Arctic Circle, and common in parts of Greenland and Iceland. Its home is on the fields of Lapland, the tundras of Russia and Siberia, and the prairies of Arctic America, where it feeds on lemmings and other small rodents, sometimes on ptarmigan



Fig. 2.—Heads of *a*, Short-eared Owl; *b*, Long-eared Owl; and *c*, Snowy Owl.

and willow-grouse, and even on the Arctic hare and on fish. In Shetland, where it has been known to breed, forced from its home by exceptional cold, and in other parts of the British Islands it is found generally in solitary, stony, and elevated places, preying chiefly on sandpipers. It is a diurnal bird of large size and vigorous rapid flight, with strong limbs, toes completely feathered, and large talons. Its white plumage, generally marked with dusky-brown spots, distinguishes it from every other owl. The Long-eared and Short-eared Owls of Europe, Asia, and America (*Asio otus* and *A. accipitrinus*), which are also common British species, have the ear peculiarly developed, the opening on one side looking upwards, and on the other downwards. The Long-eared owl, which frequents wooded localities, is about the size of the Barn-owl, and generally carries its horns erect; while the Short-eared, known also as the Woodcock-owl, from the coincidence of its time of appearance, prefers moors and open country, and carries

its horns depressed. The specialisation of ear-structure is carried to its greatest known limit in Tengmalm's owl (*Nyctala tengmalmi*), a rare visitor to Britain from the northern regions; in it the bones of the head are developed differently on each side.



Fig. 3.
Foot of Snowy Owl.

The Eagle-owl (q.v., *Bubo maximus*), the Little Owl (*Athene noctua*), the Hawk-owl (*Surnia funerea*), and the very small Scops-owl (*Scops giu*) are also visitors to Britain, and the Little Owl, introduced by enthusiasts, has become common.

Of foreign species belonging to this family one of the most noteworthy is the Burrowing Owl (*Speotylo* or *Athene cunicularia*) of America. On the prairies of North America it shares the burrows of the prairie-dog and other mammals, while on the pampas of South America it lives in the holes of the viscacha, armadillos, and large lizards, or makes a hole for itself, which is often invaded by rattlesnakes. Another interesting species is Pel's Fish-owl (q.v., *Scotopelia peli*).

Owlglass. See EULENISIEGEL.

Ownership. See POSSESSION.

Owosso, or OWASSO, a city of Michigan, on the Shiawassee River, 78 miles by rail NW. of Detroit. The river supplies abundant water-power, and there are flour and planing mills, beet-sugar, furniture, sash and blind factories, foundries and railway-shops. Pop. 12,600.

Ox. See CATTLE and BOVIDÆ.

Oxalic Acid, $H_2C_2O_4 + 2H_2O$, occurs in colourless, transparent, oblique, rhombic prisms, which have an intensely sour taste, and are soluble in nine parts of cold water, and much more freely in boiling water. When heated to 212° (100° C.) the crystals lose their two equivalents (or 28.5 per cent.) of water, and the residue, consisting of the anhydrous acid, $H_2C_2O_4$, becomes opaque. When the crystallised acid is rapidly heated to about 300° (149° C.), or when it is warmed with strong sulphuric acid, it is decomposed into carbonic acid and carbonic oxide gases, and into water. Oxidising agents, such as binoxide of manganese, peroxide of lead, nitric acid, &c., convert oxalic into carbonic acid, and on this property is based a good method of determining the commercial value of the black oxide of manganese. One of the most powerful of the organic acids, it expels carbonic acid and many other acids from their salts. The acid itself, which, like its soluble salts, is poisonous, is very widely diffused throughout the vegetable kingdom, sometimes in the free state, but more frequently as a salt of lime, as in rhubarb and many lichens. In the animal kingdom it never occurs except in minute quantity, and in combination with lime. It is produced by the action of either caustic potash or nitric acid upon most organic compounds of natural occurrence. Its most common mode of preparation is by the oxidation of cellulose in form of sawdust, by means of caustic potash. The most important salts are the oxalate of ammonia, $(NH_4)_2C_2O_4 + H_2O$, used as a test for lime, and the binoxalate of potash or salt of sorrel, $KHC_2O_4 + H_2O$, also known as essential salt of lemons, and which is popularly used for removing ink-stains or for cleaning brass.

The best test for this acid is the production of a white precipitate (of oxalate of lime), on the addition of any soluble salt of calcium. The precipitate is insoluble in water, in solution of potash, and in acetic acid, but dissolves in the mineral acids. A solution of nitrate of silver also gives

a white precipitate of oxalate of silver, which explodes when heated.

In consequence of its employment in cotton-printing, bleaching straw, &c., oxalic acid is more accessible to the general public than many other poisons; and on this account instances of suicide from the swallowing of this acid are by no means uncommon. Cases of accidental poisoning, moreover, sometimes occur from its being sold by mistake for Epsom salts. Large doses destroy life very rapidly. With the view of converting the free acid in the stomach into an insoluble and inert salt, chalk, whiting, or lime-water, with full draughts of milk, should be administered with the least possible delay. Salt of sorrel is almost as poisonous as the pure acid.

Oxalidaceæ, or OXALIDÆ, a family of dicotyledons, allied to Geraniaceæ; including herbaceous plants, shrubs, and trees; with generally compound alternate leaves; calyx of five equal persistent sepals; corolla of five equal unguiculate petals, spirally twisted in bud; ten stamens; the ovary five-celled, with five styles; the fruit a capsule of five cells opening by five valves, or more rarely a berry with five one- or many-seeded cells. Temperate North America and the Cape of Good Hope may be said to be the headquarters of the order. The herbaceous parts of almost all the species are distinguished by a strong acidity, which is owing to the presence of oxalate of potash; some, however, are bitter and slightly stimulating. The fruit of some is pleasantly acid and cooling—as Carambola—and reputed to be antiscorbutic and antiseptic. The tubers of several of the typical genus (*Oxalis*) are eatable, and contain a considerable quantity of starchy matter. The leaves of all the species are more or less sensitive. The Wood-sorrel (*O. acetosella*) is a native of Britain, and one of the most elegant of the wild flowers, carpeting woods and shady places with its bright trifoliate leaves and white or rose-tinted flowers. Its leaves, resembling as they do those of the clover, have led to the surmise that it may be the true Shamrock (q.v.). The plant, which is antiscorbutic and refrigerant, is widely distributed throughout Europe, Russian and central Asia, and northern America. It is much used in salads on the Continent; and in Lapland, where it is very abundant, it is the favourite herb of the inhabitants. The expressed juice of the plant abounds in binoxalate of potash. Twenty pounds of fresh leaves yield about six pounds of juice, from which is obtained about two ounces of the pure salt.—*Salt of Sorrel* and *Essential Salt of Lemons* (see OXALIC ACID). The preparation is carried on mainly in Switzerland and Germany; not, however, exclusively from this species of *Oxalis*, but from several other species of the same genus and of the true sorrels (*Rumex*), which contain the same salt. The numerous species of *Oxalis* strongly resemble each other in their general appearance and properties. Several of them, such as *O. crenata* and *O. tuberosa*, natives of Peru and Bolivia, and *O. Deppei*, a Mexican species, are cultivated in those countries for the sake of their tuberous roots, which are eatable. These species have all been recommended for culture in Britain as substitutes for the potato, but their produce is too meagre to deserve attention; besides, the plants are constitutionally adapted only to the most favourable parts of England. The yellow-flowered *Oxalis cernua*, from the Cape, introduced in Italy about 1800, has now spread over nearly all the Mediterranean countries, being in many places one of the most conspicuous flowers. *Averrhoa Bilimbi*, or Cucumber-tree, indigenous to the East Indies, and now cultivated in some parts of South America, produces a green fleshy fruit of the shape and size of a small cucumber, which is

esteemed for its grateful acid juice when ripe. The unripe fruit is also pickled.

Oxaluria, the occurrence of crystals of oxalate of lime in the Urine (q.v.).

Oxenstjerna, AXEL, COUNT, Swedish statesman, was born at Fånö, north of Stockholm, 16th June 1583. He was originally educated for the church, and studied theology as well as jurisprudence at Rostock, Jena, and Wittenberg, and, although he entered (1602) the public service of his country, he continued all his life to take a deep interest in religious questions, and laboured zealously for the extension of the Protestant doctrines. Charles IX. despatched him in 1606 as ambassador to the court of Mecklenburg, and made him senator in 1609. Having displayed great prudence and wisdom in the settlement of disputes between the Livonian nobles and the town of Reval, he was appointed by Charles—now infirm from age—guardian of the royal family and head of the regency. On the accession of Gustavus Adolphus (q.v.) in 1611 Oxenstjerna was created chancellor; and in 1613 acted as minister-plenipotentiary in the negotiations for peace between Sweden and Denmark, and in 1617 in those which terminated hostilities between Sweden and Russia. In 1621, on the departure of the king for the Polish war, Oxenstjerna was charged with the administration of affairs at home, but five years later was summoned to act as governor-general of the conquered districts in Prussia. In 1629 he concluded peace with the Poles on highly favourable conditions. Although he strongly opposed the desire of Gustavus to take part in the Thirty Years' War, yet, when he found that the Protestant sympathies of the king were irrepressible, he supported his master most faithfully and ably; Gustavus in return charged him with the difficult business of managing the diplomatic relations of Sweden in central Germany. After the king's death it was Oxenstjerna who not only kept the Swedish armies together, but sustained the Protestant cause and prevented it going to pieces on the jealousies of the German Protestant princes, displaying masterly diplomatic ability, great courage, resource, and moderation. Having in four arduous years reorganised the Protestants and reanimated their courage by gaining French and Dutch assistance, he went back to Sweden (1636). He had already drawn up a constitution, which the estates accepted and ratified in 1634. After his return he resumed the duties of chancellor, adding to them those of guardian to the young queen Christina, who, however, did not accept the advice of her father's wise friend and counsellor as it beseemed her. Oxenstjerna continued to direct the policy of the Protestants in Germany till the peace of Westphalia in 1648 put an end to the war. He humiliated the Danes and forced them to sign the treaty of Brömsebro (1645), and opposed the abdication of Christina and the succession of Charles X. This king, nevertheless, retained him in office until he died, 28th August 1654. See Lundblad's *Svensk Plutarch* (2 vols. Stock. 1824); Fryxell's *History of Gustavus Adolphus* (1852); Geijer's *History of the Swedes* (London, 1845); Bulstrode Whitelocke's *Journal* (1772); also Oxenstjerna's *Writings and Correspondence* (1888 *et seq.*).—His eldest son JOHAN (1611–57) carried through several diplomatic missions, his greatest service being to act as Sweden's plenipotentiary at Osnabrück (1648). It was in a letter to this son, who felt himself unequal to the office, that the chancellor used the famous phrase, 'Nescis, mi fili, quam parva sapientia regitur mundus.' This aphorism is current, however, in an extraordinary number of versions (*Notes and Queries*, 7th July 1888).—

The younger brother ERIK (1624–56) was governor of Esthonia (1640), and succeeded his father as chancellor of the kingdom.

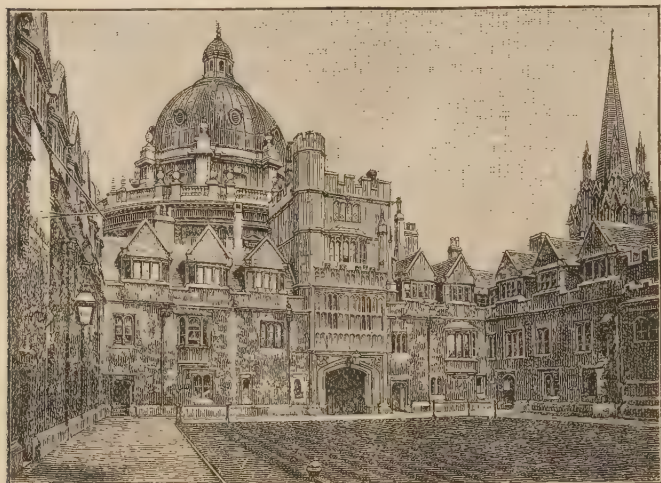
Ox-eye. See CHRYSANTHEMUM.

Oxford, the capital of the county, the home of the university, and the seat of the bishopric of the same name, stands about the confluence of the rivers Cherwell and Thames, 52 miles (63 by rail) WNW. from London. The city, under the Act of 1889, is governed by a council, comprising a mayor, fifteen aldermen, and forty-five councillors, of whom three aldermen and nine councillors are elected by the university. Up to 1885 the city returned two members to parliament; since that date only one. The university returns two members. Until about 1830 the area and population of the city remained almost stationary, extending only a little beyond the limit of the old city wall as reconstructed in the reign of Henry III., and very little beyond the area represented in Loggan's bird's-eye view (1675). But since then the city boundaries have been considerably extended. Pop. (1801) 11,000; (1851) 27,843; (1901) 49,335; (1911) 53,049; (1921) 57,052.

The topography of Oxford is simple in the extreme. The river Thames (locally called the 'Isis'), which has flowed from north to south, takes here a sharp bend to the east, and about a mile from the angle receives the Cherwell, flowing from the north, parallel with its former course. All the old part of the town stands in the rectangle thus formed by the rivers. The centre of the town is at a place called 'Carfax' (derived from *quadri-furcus*, 'four-forked'), from which four main streets run to the four points of the compass. Taking in rotation these four lines of streets, we shall be able to pass quickly in review all the chief buildings and places of interest. *North* runs Cornmarket Street ('the Corn'), passing the Oxford Union Society's rooms (the club, library, and debating-hall of the undergraduates, founded in 1823). At the end of Cornmarket Street is St Michael's Church, the tower of which (c. 1070) is a characteristic specimen of Saxon masonry. Here formerly was the north gate of the city, the chambers over which (taken down in 1771) were used as a prison, and called Bocardo. From the end of Cornmarket Street, George Street runs west, containing theatre (1886), corn exchange (1895), High School for boys (1881); Broad Street runs east, containing Balliol, Trinity, and Exeter Colleges, the Old Ashmolean Museum, the Sheldonian (the University 'Theatre'), the Clarendon Building (used for the Clarendon Press till 1830, now as university committee-rooms), and the Indian Institute. Broad Street was the place where the Oxford martyrs were burned (Ridley, Latimer, and Cranmer). The Martyrs' Memorial, a cross in their honour, was built in 1841, at the end of Magdalen Street, the continuation of Cornmarket Street. Beaumont Street leads west from this point, past the Taylor Institution (for modern literatures, built 1845), Ashmolean Museum of Art and Archaeology (containing the Ruskin Drawing-school, the Arundel Marbles, presented to the university in 1667, and other relics of classical antiquity, a valuable collection of paintings and engravings, and 190 original drawings by Michelangelo and Raphael), to Worcester College. Thence northwards, by Walton Street, access is got to the University or Clarendon Press, to St Barnabas Church (1868), to Port Meadow (an extensive flat ground beside the river, being the common of the freemen of the city), and the 'Upper River' or part of the Thames north of Oxford, and so to Godstow, a ruined nunnery, famous as the burial-place of Fair Rosamond. Returning to the Martyrs' Memorial, and looking north, we see St

Giles' Street, containing St John's College and the Pusey House (a library and clergyhouse, in support of Anglican principles, established 1884 in memory of Dr Pusey, and containing his library). In the

College and the Canterbury gate of Christ Church into Merton Street, where are Corpus Christi and Merton Colleges. From St Mary's Church, Catherine or Cat Street leads north, having on



Brasenose College, Oxford—The Quadrangle (showing also Spire of St Mary's and Dome of Radcliffe Library).

Woodstock Road continuation of St Giles' Street are the church of St Aloysius (Roman Catholic) (1875), the Radcliffe Infirmary (1770), and the Radcliffe Observatory (1795). In the Banbury Road continuation of St Giles' Street are Somerville College (1879), the High School for girls (1884), and Wycliffe Hall (a Church of England theological college, in the interests of the Evangelical party, 1877). *West*.—Returning to Carfax we find Queen Street to the west, continued by New Road, leading past the Castle (including the court-house and gaol) to the railway stations, and so along the Seven Bridges Road (across cuts from the Thames) to Cumnor. *South* from Carfax runs St Aldate's Street, past the town-hall and public library (rebuilt 1893–97), and post-office (1881), St Aldate's Church (rebuilt since 1863), Pembroke College, the front of Christ Church, the entrance to Christ Church Meadow and Broad Walk, to Folly Bridge across the Thames. This bridge was rebuilt in 1815. Over the old bridge was a watch-tower (taken down in 1779) known as 'Friar Bacon's Study.' From near Folly Bridge, for about a quarter-mile along the north bank of the river, are moored the Barges (q.v.) of the university and college boat-clubs.

East from Carfax runs High Street in a graceful curve. In the High Street itself, or just off it, stand these buildings, in this order from Carfax: the city market (1773), the Mitre Hotel (extant, as Dagville's Inn, before 1470), the church of All Saints (built in 1706 from designs by Dean Aldrich), the new front of Brasenose, the University Church (St Mary the Virgin), where are preached the university sermons (including the 'Bampton Lectures,' q.v.), All Souls, University, and Queen's Colleges, the Examination Schools (1882), with the Non-collegiate Students' buildings, Magdalen College School (founded 1480), Magdalen College, and the Botanic Gardens (laid out in 1632). The street ends with Magdalen Bridge over the Cherwell. At the Church of All Saints, Turl Street runs north from the High, leading to Lincoln, Jesus, and Exeter Colleges, and so into Broad Street at Trinity College. From opposite St Mary's Church, Oriel Street leads south past Oriel

College and the Canterbury gate of Christ Church into Merton Street, where are Corpus Christi and Merton Colleges. From St Mary's Church, Catherine or Cat Street leads north, having on

the east the Codrington Library (built 1716–60 by All Souls College to receive the library of Christopher Codrington, and maintained by the college as a law library), and on the west the Radcliffe Library (built in 1737 as a library for medicine and natural science; since 1861 a reading-room in connection with the Bodleian); and farther on the Old Schools (including the Bodleian Library and the Divinity School) on the west, and Hertford College on the east. Past Hertford College a street leads to New College. Cat Street, after crossing Broad Street, is continued by Park Street, which leads northwards past Wadham College and the garden front of Trinity College to the University Museum, Keble College, and Lady Margaret and St Hugh's Halls. Here are the University Parks, laid out and kept up by the university, containing the university observatory, erected in 1874. Here also is the ground of the University Cricket Club, one of the finest, in itself and

in its surroundings, in England. A walk leading from the Parks, east and south, is known as 'Mesopotamia,' being between two cuts of the Cherwell. ALL SOULS COLLEGE was founded in 1437 by Archbishop Chichele as a chantry for the souls of those who had fallen in the wars with France. It remains still a college entirely of fellows; several of the fellowships have been attached to university professorships. The front quadrangle is practically as the founder left it; the fine chapel (consecrated 1442) contains a beautiful reredos, partially destroyed in 1577 and in 1664, but restored in 1876. The hall (built in 1720) contains the Codrington Library and some good portraits of former fellows, among them those of Sir William Blackstone, Reginald Heber, Sir Christopher Wren, Thomas Tanner, John Linares, Jeremy Taylor, and Robert Herrick.

OLD ASHMOLEAN MUSEUM, the earliest public museum in England, built in 1682 to receive the antiquities, &c. of Sir Elias Ashmole (q.v.). The original collections have since 1860 been dispersed; the books and MSS. going to the Bodleian, the natural history specimens to the Museum, the anthropological (including curiosities brought home by Captain Cook) to the Pitt-Rivers collection, various antiquities to the New Ashmolean. BALLIOL COLLEGE, founded about 1268 by Devorguilla Balliol, mother of John Balliol, king of Scotland. The buildings are chiefly modern, the hall (1877) being a favourable example of Oxford building of its time. This hall contains portraits of John Wyclif, formerly master of the college; of Archbishop Tait; of Robert Browning, honorary fellow; and of Benjamin Jowett, master. By means of the Snell and Warner exhibitions, Balliol has had since the 17th century a close connection with Scotland, including among its members Adam Smith, John Gibson Lockhart, Sir William Hamilton, and Andrew Lang. Colet, Parsons the Jesuit, John Evelyn, Robert Southey, Dean Stanley, Matthew Arnold, A. C. Swinburne, and Cardinal Manning were members of the college.

BODLEIAN LIBRARY (q.v.), founded in 1602 by Sir Thomas Bodley, in a room (built about 1460) over the Divinity School for the old library of the university, augmented by Humphrey, Duke of Gloucester. Duke Humphrey's Library had been plundered by King Edward VI.'s commissioners. The library has grown to be one of the great libraries of the world (see LIBRARY), and now occupies the whole of the Old Schools (built 1618) of the university. The library contains a fine portrait of the founder. The picture-gallery attached is one of the finest extant examples of an 'ambulacrum,' or

room for walking in, found in old great houses. On its walls hang portraits of many benefactors and famous members of the university; also many historical portraits.

BRASENOSE COLLEGE, founded in 1509 by William Smyth, Bishop of Lincoln, and Sir Richard Sutton. The gateway tower (1520) is the most striking feature of the old building. The old 'brassen nose' knocker of Brasenose Hall, on the site of which the college was built, was (it is claimed) acquired in 1890, and is now found in the hall. John Foxe, Robert Burton, Dean Milman, Bishop Heber, Barham, and F. W. Robertson were students.

CHRIST CHURCH is both the cathedral of the diocese of Oxford and a college of the university. The cathedral was instituted in 1546 by King Henry VIII. in the church of the old priory of St Frideswide (q.v.). This church contains many remains of Norman architecture (1120-80), and (it is claimed) some fragments of the older Saxon church. The college was founded by Cardinal Wolsey in 1525 as 'Cardinal College,' the priory of St Frideswide being suppressed by him; was remodelled by the king as 'King Henry VIII.'s College,' in 1532; and finally settled, as 'Christ Church,' in 1546. The hall and the kitchen (1529) are Wolsey's work, and surpass any building of the kind in Oxford, or even in England. The great quadrangle ('Tom' Quad.) begun by Wolsey was not completed till 1668. Peckwater Quadrangle was rebuilt in 1705-61. The entrance tower (finished in 1682 by Sir Christopher Wren) now contains 'Great Tom,' one of the largest bells in England, being the great bell of Osney Abbey recast (see BELL; also *Letters of Sir Christopher Wren to Bishop Fell*, ed. W. D. Caroe, 1923). The 'Broad Walk' of elms leading from the Meadow Gate to the Cherwell, planted by Dean Fell (q.v.) in 1670, was long one of the finest avenues in England. The library contains a valuable collection of paintings, especially by great Italian masters, with a few of the Dutch masters. The hall contains many portraits of eminent statesmen and divines by great painters, from Holbein to Millais. Sir Philip Sidney, Camden, George Peele, John Locke, Sir George Cornewall Lewis, Dr Liddon, Gladstone, John Ruskin, and Lord Salisbury are a few of the famous names of Christ Church men.

CORPUS CHRISTI COLLEGE, founded in 1516 by Richard Fox, Bishop of Winchester, in the interests of Renaissance learning. Cardinal Pole was a student here, Richard Hooker a fellow, John Keble a scholar.

DIVINITY SCHOOL, built 1445-80, a splendid example of Perpendicular architecture. The university was too poor to finish it, portions of the work showing that the carving of the interior was designed to be much more elaborate than it is. The rich colours of the roof and the stained windows were destroyed in Edward VI.'s reign. Wren restored the whole building.

EXETER COLLEGE, founded in 1314 by Walter de Stapledon, Bishop of Exeter. The buildings are nearly all modern. The chapel (1858) is a fine example of Sir Gilbert Scott's work, and contains good specimens of modern painted glass and tapestry. Members have been Grocyin, Glanville; Bishops Bull, Prideaux, and Secker; Lyell, Maurice, and Frondie.

HERTFORD COLLEGE, founded in 1874 by T. C. Baring, M.P., in the interests of the Church of England. This college was erected out of Magdalen Hall (founded 1487), which had been removed to this site in 1822 from its former site near Magdalen College. The site had previously been occupied by Hart Hall, founded about 1284, which had been created Hertford College by act of parliament in 1740, but dissolved in 1818 for lack of funds. The 'learned' John Selden was a member of Hart Hall; so also was Charles James Fox. William Tyndall, Hobbes, and Clarendon were members of Magdalen Hall.

JESUS COLLEGE, founded in 1571 by Queen Elizabeth at the instance of Dr Hugh Price, and its revenues greatly augmented by Sir Leoline Jenkins, principal of the college (1661). Until 1855 the college had an exclusively Welsh connection. It has good portraits of Queen Elizabeth, the nominal foundress, of Charles I., and of Charles II. The library has many valuable Welsh MSS. James Howell was a member.

KEBLE COLLEGE, founded in 1870 by subscription, in memory of John Keble and in the interests of the Anglican Church. The ornate chapel is the chief object of interest. The hall contains a portrait of Keble. In the library is Holman Hunt's picture, 'The Light of the World.' The college has no fellows and is governed from without by a council.

LINCOLN COLLEGE, founded in 1429 by Richard Fleming, Bishop of Lincoln, and refounded in 1478 by Thomas Rotherham, Archbishop of York, to check the progress of Lollardism. The chapel (1631) is a good specimen of Stuart work, containing fine cedar panelling and painted glass. Among its fellows have been Robert Sanderson, George Hickes, John Kettlewell (the non-juror), John Wesley, John Radcliffe.

MAGDALEN COLLEGE, founded in 1458 by William Patten of Waynflete, Bishop of Winchester. This college, in its original quadrangle, cloisters, hall, and chapel, built 1474-81 in the founder's lifetime, possesses the finest buildings of any college in the world. The tower, built 1492-1505, on whose top the choir sing a Latin hymn on May Day, is ascribed, questionably perhaps, to the initiative of Cardinal Wolsey when bursar here. The buildings in the Grove or Park, built 1736, were at one time regarded in Oxford as the perfection of architecture. A quadrangle to the west (called St Swithin's Buildings) was added in 1885. The musical services in chapel have for centuries been famous. Among the members of this college have been Colet, Latimer, John Hampden, Joseph Addison, Edmund Gibbon. The college has a fine walk round an island formed by two branches of the Cherwell, the northern side of which is called 'Addison's Walk.' The heroic age of the college was the period 1685-88, when its resistance to the arbitrary measures of James II. gave it a foremost place in the history of England.

MAGDALEN HALL, see above, Hertford College.

MANCHESTER NEW COLLEGE, a college (not of the university) for the study of theology independent of creed, was removed from Manchester to London in 1853, and thence to Oxford in 1889. Buildings for it were erected in 1891 in Holywell.

MANSFIELD COLLEGE, the chief theological college of English Nonconformity (not of the university), was transferred to Oxford in 1886. It has large buildings at the back of Wadham College.

MERTON COLLEGE, founded in 1264 at Malden in Surrey, and transferred to Oxford in 1274 by Walter de Merton, Bishop of Rochester, was the first institution in Oxford organised as a college; and is therefore the type which has been imitated by all existing foundations in Oxford or Cambridge. The old quadrangle ('Mob Quadrangle,' 1278) and the library (1376) of this college are the most ancient college buildings in Oxford. The 13th-century chapel is a fine building, with some good early brasses. Members of Merton College have been remarkable benefactors to the university; Sir Thomas Bodley, who founded the university library, and Sir Henry Savile, who founded professorships in geometry and astronomy, were both fellows. Duns Scotus is said to have been fellow here; William Harvey was warden; and other members were Bishops Hooper, Jewel, and Patten; Anthony Wood, the great Oxford antiquary (buried in the ante-chapel, 1695); and Steele.

MUSEUM, the 'New Museum,' was opened in 1860, for the reception of the university medical and natural science collections, and the medical and scientific library of the Radcliffe trustees. Large additions have since been made, particularly in the departments of chemistry, electricity, anatomy, and physiology. A wing was added in 1887 to receive the remarkable anthropological collection of General Pitt-Rivers. The School of Rural Economy and Forestry stands near the museum.

NEW COLLEGE, founded in 1379 by William of Wykeham, Bishop of Winchester. Walter de Merton's college had so far been the only well-established society in Oxford, and was 'the college' *par excellence*. Wykeham's college therefore became known as 'the new college;' a name which it has retained to the exclusion of the name the founder gave it, 'St Mary of Winchester College.' Wykeham also founded Winchester College to be a school to supply his Oxford college. The hall, chapel, cloisters, bell-tower, and other buildings were on a scale hitherto unknown in Oxford, and, except at Magdalen and Christ Church, have had no rivals. The gardens are very beautiful, and are bounded by the only perfect segment of the city wall. The best-known names of members of this college are Archbishop Warham; William Waynflete, founder of Magdalen College; Henry Chichele, founder of All Souls; Bishop Ken; Sydney Smith; Augustus Hare; and Lord Milner.

NEW INN HALL, founded about 1369, was closed in 1887. During the Civil War, when Charles I. held

Oxford, in 1642, the royal mint was set up here, and the old plate of the colleges was coined for the king's use.

ORIEL COLLEGE, founded in 1326, nominally by King Edward II, but really by Adam de Brome, his almoner, in a house on the High Street, removed in 1329 to 'la Oriole,' a house on the present site, whence it has its modern name. For a long time it was known as 'King's College' (Collegium Regale). The buildings are modern, the hall and chapel dating from 1637. Sir Walter Raleigh was probably commoner for a short time. In the first half of the 19th century Oriel College possessed most fellows—Kemble, Pusey, Thomas Arnold, Archbishop Whately, Cardinal Newman, Arthur Hugh Clough. Cecil Rhodes was a great benefactor.

PEMBROKE COLLEGE, erected in 1624 by Thomas Tesdale and Richard Wightwick, out of Broadgates Hall, a most ancient place of academical study, in which Bishop Bonner, Beaumont the dramatist, and Sir Thomas Browne had been students. The name was given in compliment to the Earl of Pembroke, then chancellor of the university, and in hope of a godfather's gift from him, which his death soon after prevented. Members of this college (and hall) have filled the three Anglican primatial sees of Canterbury (Moore, 1783), York (Yong, 1561), Armagh (Newcome, 1795). Dr Johnson was a student here.

QUEEN'S COLLEGE, founded in 1340 by Robert de Eglesfeld, chaplain to Philippa, queen of Edward III. He arranged that the queen-consort of England for the time being should be patroness of the college; hence its name, and several donations by queens of England when the college was in difficulties. The college was rebuilt in 1707-14. Henry V. is said to have been a student here for a short time; and other members were Cardinal Beaufort, Wycherley, Addison, and Collins. The college retains the old ceremony of bringing in the 'Boar's Head,' with the traditional song, on Christmas Day.

ST ALBAN HALL, founded about 1230, was united to Merton College by a statute of 1881.

ST EDMUND HALL, founded about 1260, the only survivor of the multitude of halls of mediæval Oxford. Queen's College appoints the principal, but otherwise St Edmund Hall remains a distinct institution. Thomas Hearne, the antiquary, was long resident here.

ST JOHN'S COLLEGE, founded in 1555 by Sir Thomas White, a London alderman. The chapel, hall, entrance tower, and part of the street front of the outer quadrangle are substantially those of St Bernard's College, a house of the Cistercian monks, built here 1437-1530. The garden front of the inner quadrangle was built by Archbishop Laud (q.v.) in 1631. Members of this college have deserved well of the university, Archbishop Laud and Dr Richard Rawlinson having been principal benefactors to the Bodleian. Edmund Campion, Shirley the dramatist, Edmund Calamy, and Dean Mansell are other St John's names.

ST MARY HALL, founded in 1333 by Oriel College, retained a close connection with Oriel, and was in 1896 incorporated with it.

SHELDONIAN THEATRE, completed in 1669 by Sir Christopher Wren at the order of Archbishop Sheldon for the holding of the great university degree ceremonies, hitherto held in St Mary's Church. The 'act' (the degree-ceremony in which all M.A. degrees and doctors' degrees granted during the year were supposed to be completed by 'inception') is now superseded by the Encenia, in which prize compositions are recited (among them the 'Newdigate,' q.v.), honorary degrees are conferred, and a Latin oration delivered. The University Press was originally situated in the Sheldonian Theatre.

TRINITY COLLEGE, founded in 1554 by Sir Thomas Pope. The library is part of Durham College which stood here (see DURHAM); the hall dates from 1620; the chapel, with its fine carved cedar, from 1694; the garden quadrangle was built 1665-1728; and large new buildings were added in 1887. The 'Lime Walk,' planted in 1713, is the feature of the garden. Kettel Hall, on Broad Street, near the college, built in 1615 by Ralph Kettel (president of Trinity), is a characteristic example of Oxford architecture of the period. Chillingworth, Selden, Denham, Aubrey, Thomas Warton, Landor, Newman, Freeman, and Stubbs were members.

UNIVERSITY COLLEGE had its origin in an endowment left in 1249 by William of Durham for the maintenance of some graduates of the university. This was at first administered by the university itself, and the institution called the university's Great Hall, 'Magna Aula Universitatis,' in distinction probably from some smaller

'halls' which the university owned. Afterwards the administration of the trust was committed to the beneficiaries themselves; and, under the influence of the example of Walter de Merton's foundation, the society became a college. In the 14th century there grew up a legend that the building occupied the site of a college founded by King Alfred, destroyed in the Danish invasion: King Alfred was even said to have founded University College in 872 A.D. University College was a great power in Oxford in 1686-88, when its master, Obadiah Walker, was the chief agent in the Roman Catholic effort to reconquer Oxford. The lawyers Lord Eldon and Lord Stowell, Sir William Jones, and the poet Shelley were members of this college.

WADHAM COLLEGE, founded by Dorothy, widow of Sir Nicholas Wadham, in 1613, on the site of the old Austin Friary. The beautiful gardens of this college perhaps owe something to the labours of the friars. The college buildings are an exquisite specimen of Jacobean work; the street front in particular is one of the prettiest bits in Oxford. Admiral Blake and Sir Christopher Wren were students here. The Royal Society took its origin in meetings in the rooms of Dr John Wilkins, warden of Wadham.

WORCESTER COLLEGE, founded by Sir Thomas Cookes of Worcestershire in 1714, in Gloucester Hall. Gloucester Hall had in 1560 succeeded Gloucester College, a college for Benedictine monks, founded in 1283, dissolved at the Reformation. Each monastery had its own building; and a row of these, forming one side of Worcester College quadrangle, each with the coat of arms of its monastery carved in stone over the door, is one of the most interesting bits of old Oxford. During the earlier part of Elizabeth's reign Gloucester Hall was filled with Roman Catholic students, their tutors being graduates who had been ejected from their fellowships in various colleges for refusing the oath of allegiance. Lovelace, Sir Kenelm Digby, and De Quincey were members of this college.

There are four recognised colleges and halls for women students:

LADY MARGARET HALL, founded in 1878, and called after Lady Margaret Beaufort, mother of Henry VII. Several enlargements have been made, notably the Wordsworth Building (1896) and the Toynbee Building (1915).

ST HILDA'S HALL, founded in 1893 by Miss Dorothea Beale, LL.D., and since then considerably enlarged, especially by the addition in 1921 of St Hilda's South.

ST HUGH'S COLLEGE, founded in 1886, but accommodated in new buildings in 1915. The membership is about 150.

SOMERVILLE COLLEGE (1879), originally Somerville Hall, has been very greatly extended, especially in 1886 and 1913.

The university of Oxford is a corporation under the title of 'the chancellor, masters, and scholars of the university of Oxford.' It consists of a body of graduates (masters of arts and graduates in law, medicine, divinity, &c.) who are the governing members of the corporation, and of a body of undergraduates (and bachelors of arts) who are *in statu pupillari*, that is, subject to the government of the officers of the university and without voice in university business. The statutes by which the university is governed are partly the code promulgated in the chancellorship of Archbishop Laud, partly the body of enactments issued by a parliamentary commission in 1877. The business of the university is formally transacted in three houses: (1) the Ancient House of Congregation, consisting of masters of arts of less than two years' standing, heads of colleges, deans of degrees of colleges, professors, examiners, &c., in which the ceremonial business of conferring ordinary degrees is conducted; (2) the House of Congregation, constituted by act of parliament in 1853, consisting of university officers, professors, and resident graduates, in which proposed statutes are submitted for discussion and vote; (3) the House of Convocation, consisting of all graduates who have kept their names on the books, which is in theory the supreme governing body of the university. Practically, however, the business of the university is in the hands of the Hebdomadal Council and of small committees, called delegacies

(or curators). Council began as a committed of heads of houses, invented under Stuart absolutism to control the free spirit of the university. It now consists of the chancellor, vice-chancellor, and ex-vice-chancellor and proctors, and eighteen persons elected by convocation, three being heads of houses, six professors, and nine members of convocation. Council retains the initiative in all legislation, the control of most of the negotiations in which the university takes part, the nomination of persons to receive honorary degrees, and the like. Committees govern the institutions of the university, such as the Bodleian Library, the University Chest, the University Press, and the Museum. The chief officers of the university are (1) the chancellor, the official head of the university, generally a peer of the realm, elected for life by convocation; (2) the vice-chancellor, nominated by the chancellor from the heads of houses in rotation, and holding office (as a rule) for four years; (3) the two proctors, holding office for a year, elected by the graduates of the colleges according to a cycle, each college getting its turn to elect a proctor every eleventh year. The proctors are specially charged with the discipline of the university as regards its junior members. Each college of the university is a distinct corporation, self-governed according to its own statutes under sanction of the parliamentary commissions of 1852 and 1877.

The earliest historical notice of Oxford shows also its importance in early times. In 912 A.D. the Saxon Chronicle records that, on the death of Ethelred, Edward (the son of Alfred) took possession 'of London and Oxford and all the lands obedient to those cities.' The remarkable Castle mound, now included in the precincts of the county gaol, was heaped up at this period, being part of the great system of fortifications which were then raised against the Danes. During the troubled years which follow Oxford is frequently mentioned, its position just between Mercia and Wessex rendering it important as a citadel against invasion, and as a place of parley between Danes and Saxons. It may be inferred that at the Norman Conquest Oxford offered a stubborn resistance to the invader (1) from the great number of 'waste' houses mentioned in the Domesday survey; (2) from the vastness of the work erected by the conqueror's governor, Robert D'Oyley, to overawe the city and district. Two portions of this work remain, the tower (now of St Michael's Church) which commanded the approach to the assailable North Gate of the city, and the great keep of the Castle (now in the precincts of the gaol). In the contest for the crown between the Empress Maud and Stephen (1142) Oxford was again a place of capital importance, Maud taking refuge in Oxford when driven from London, and escaping over the frozen Thames when the castle was about to surrender to Stephen after ten weeks' siege. Here in 1258 the 'mad parliament' enforced on Henry III. the scheme of reform known as the Provisions of Oxford (see MONTFORT). From this date Oxford as a town ceases to be of national importance, except for a few years in the heat of the great Civil War, when Charles I. made it the centre of his operations, the station of his court, and the meeting-place of the 'parliament' which he had brought together in opposition to that 'Long' one at Westminster.

But at the very time when Oxford, as a city, was losing its political and strategical importance there was growing up within it a distinct, and destined often to be a hostile, corporation which was to make it for centuries the intellectual capital of England. This corporation was the university which we find by the end of the 12th century and

the beginning of the 13th establishing itself in Oxford. But, at the same time, it must have been only the official recognition of a guild of teachers with their pupils which was already in existence in the city; and a guild of this kind must, in its turn, have been the development of accidental, and perhaps temporary, assemblages of teachers and students. The beginning of the university of Oxford is therefore to be carried as far back as the earlier third of the 12th century; Thibaut d'Estampes (Theobaldus Stampensis) about 1120, and Robert Pullein in 1133, being recorded to have taught in Oxford. The university, thus begun under Henry I. (who in 1130 built as a royal residence Beaumont Palace in the north suburb of Oxford, in which palace Richard Cœur de Lion was born in 1157), rapidly grew in numbers and in prestige; and by the beginning of the 13th century we find popes and kings interested in its fortunes, its scholars numbered perhaps by thousands and not by hundreds, and the feuds between it and the town occasionally events of almost national importance. Teachers and scholars in this early university were of the secular clergy; they lived and taught in houses ('halls') and lecture-rooms ('schools') hired from the townsmen; and discipline was practically non-existent.

The fame of the university attracted to Oxford the four great orders of mendicant friars immediately after their arrival in England, the Dominican (Black) Friars coming in 1221, the Franciscan (Grey) Friars in 1224, the Carmelite (White) Friars in 1253, and the Austin Friars in 1268. The friars, unlike the older orders of monks, who had stood aloof from secular learning, threw themselves with enthusiasm into the studies of the university; and the 'schools' in their convents and their lecturers soon eclipsed the fame of the secular schools and teachers. That Oxford can boast the greatest names in mediæval learning and legend, Bishop Grosseteste, Roger Bacon, Friar Bungay, and Duns Scotus, is due to these conventual schools. So threatening did the supremacy of the friars become that the university in the early 14th century had a hard fight to retain control of its own education.

In emulation of the friars, the older monastic orders began to found conventual schools at Oxford for students of their own body. The Benedictines had four colleges in Oxford: Gloucester College (*v. supra*); Durham College (*v. supra*); Canterbury College, founded in 1363, now taken into the site of Christ Church; and St Mary's College, founded in 1435, now a dwelling-house belonging to Brasenose. For the Cistercians St Bernard's College was founded in 1437 (*v. supra*).

The introduction into the university of the conventual system, with the severity of its discipline, the interpenetrating stimulus of its common life, and the efficiency of its personal tuition, suggested a change in the university of secular students which was to effect in time an entire revolution in its form. In 1264 Walter de Merton conceived the plan of bringing together into a common home a number of secular students, engaged in academic studies but subject to something like conventual discipline. In 1274 he moved his college (which he had established at Malden in Surrey) to Oxford. Two other institutions, which had been founded in Oxford at a slightly earlier date, soon, under the influence of the new idea, took the shape of Balliol and University Colleges. By 1525 ten other colleges had been instituted, among them such great designs as New College, Magdalen College, and Wolsey's Cardinal College (afterwards reconstituted by Henry VIII. as Christ Church, with a fraction of its former endowment).

The Reformation of religion, and the dissolution of the monasteries which it carried with it,

destroyed half the glory of Oxford. Two abbeys, five friaries, and five monastic colleges ceased to exist; and the western and south-western quarters, which had contained the finest buildings of the city, became heaps of stones out of which the citizens of Oxford quarried building material. During the Romanist reaction under Queen Mary something was done to repair the loss thus inflicted: Trinity College in 1554 and St John's in 1555 were built on the respective sites of Durham College and St Bernard's College. Jesus College, founded in Elizabeth's reign, was the first of Protestant colleges. The more settled times of the early Stuarts patronised the gown more liberally; Wadham College coming in 1613, Pembroke in 1624. Then came the Civil War, and not till 1714 did a new foundation arise in Oxford, in Sir Thomas Cookes' Worcester College; and, except for the abortive attempt (1740-1818) to erect Hart Hall into a college, that example found no imitator till the foundation of Keble College in 1870 and of Hertford College in 1874, followed by the transference to Oxford of Mansfield College and of Manchester New College, bearing witness to the new life which had begun to throb alike in the Anglican Church and in Nonconformity.

In Elizabeth's reign, and still more under the Stuarts, we have to mark a very strong desire on the part of the supreme power to compel all students in the university to reside within the walls of the colleges and the halls (then five in number). The strong opposition of minorities, in matters both of polity and faith, rendered English sovereigns and their ministers suspicious and intolerant of students and teachers who were not directly under their control; and to secure this control they required that all students should reside in the colleges, where they were under the charge of governors appointed by court influence and responsible to the court. From this time, therefore, we have to date the disappearance of the old university and the development of that peculiarly English form, a university of colleges.

In some outstanding features the university of Oxford stands in marked contrast to universities out of England. (1) The College System. Before a person becomes a member of the university he must first of all become a member of one of the twenty-one colleges, of St Edmund Hall, or of the Society of Non-Collegiate Students; and the moment he ceases to be a member of one of these societies his actual membership of the university is also terminated. This means that the Oxford undergraduate is not left as a unit in a great body of two or three thousand, but is made a member of a much smaller body of a few hundred members. (2) The Fellowship System. Formerly every first-class man (and many in the second class) could count with certainty on his fellowship—that is, on a secure endowment (for a shorter or longer period) which would enable him to pursue his studies or to prepare himself for professional life. Some few of these fellowships are still open to competition; but the regulations of the Commission of 1877, which suppressed many fellowships to found professorships, coinciding with the loss of more than a third of the annual revenues of the colleges from the fall in agricultural rents, have seriously reduced their number and, so far, deprived Oxford of her best feature. The scholarship system—i.e. endowments held during the time of an undergraduate's course—is not so distinctive of Oxford; though such endowments are more numerous and valuable in Oxford than in any other university. (3) The System of Tuition. The work which in other universities is discharged by the professors is in Oxford done mainly by the college lecturers. Formerly a college

lecturer lectured only to the men of his own college, a system unfair to the students of an inefficient college; now the better college lectures are practically open to the whole university. At the same time, the old Oxford tradition of a college tutor devoting himself to the interests of the men of his own college still continues. Apart from attendance at lectures, a large portion of Oxford tuition consists in taking compositions, translations, papers, and essays either individually or in very small classes to one's tutor or lecturer. This individual instruction involves, it is true, an expenditure of time and talent which seems out of all proportion to the results it achieves, yet the happiest memories of Oxford men are probably those half-hours or hours in their tutor's room when their individual faults were exposed by the large scholarship and their individual eccentricities corrected by the unsparing but good-natured chaff of a kindly mentor. When the university has resident in it a man of special reputation in a given branch of study, the common university fund has frequently appointed him to lecture for three or more years in his own subject, with the title of 'Reader.' (4) The Discipline. The discipline of Oxford is much stricter than that of any university outside England. Within college the government of the college deans, without college the vigilance of the proctors and their deputies, repress disorder and immorality. The passage of years has softened many restraints, but even yet there is a strict code of discipline both with respect to the university as a whole and to each particular college. The wearing of cap and gown, though not now so general as formerly, is still insisted on for certain functions—e.g. university ceremonies.

Under present arrangements the B.A. degree is reached by three examinations: (1) Responsions, a preliminary examination in the elements of a certain number of specified subjects. In 1920 Greek, hitherto compulsory, was made optional for this examination. (2) The 'First Public Examination,' usually known as Moderations ('Mods'). Here it is necessary to decide whether a candidate shall (a) take an Honours examination in the middle of his course, (b) take a Pass examination at that point, or (c) take an examination which implies taking an Honours examination at the end of the course. (3) The final examinations, officially termed the 'Second Public Examination,' but colloquially 'Greats,' where the distinction between pass and honours is very marked. The degree of M.A. is obtained by keeping the name on the books for three (or four) years from the date of B.A., by paying quarterly dues, and by paying graduation fees. The university of Oxford grants also the degrees of doctor in philosophy, and of bachelor and doctor in divinity, law, medicine, literature, science, music. The doctors' degrees are awarded, as in other universities, on the production of approved theses. Although attendance at lectures and examinations has been open to women students since 1884, only since 1920 have women been admitted to matriculation and degrees (except degrees in divinity).

Since 1868 there has been in Oxford a body of students not members of any college or hall, styled formerly 'unattached students,' but latterly The Society of Non-Collegiate Students. These students reside in licensed lodgings; have a building provided by the university in which they attend lectures and meet their tutors; are under the disciplinary control of a censor, as the students of a college are under the control of their dean; and are supervised by a board of delegates, in the same way as the students of a college are by the head and fellows of their college. A somewhat similar

institution for women is The Society of Oxford Home-Students (1879). Under a statute of 1882 it is possible for a member of convocation to open a 'private hall,' of which he is the 'licensed master,' for the reception of academical students. These private halls are partly for Roman Catholics under a head of their own faith.

Oxford is fortunate in having been described from the points of view of its different interests in several attractive handbooks: Rev. C. W. Boase's *Oxford City*, in the 'Historic Towns' Series (Longmans, 1887); Dr Brodric's *History of the University of Oxford*, in the 'Epochs of Church History' series (Longmans, 1886); Rev. E. Marshall's *Oxford Diocese*, in the 'Diocesan Histories' series (S.P.C.K. 1882); and a complete series of *Oxford College Histories* (F. E. Robinson, 1898 *seqq.*). Alden's *Oxford Guide* is a useful guide to the architectural features of the city; and in Andrew Lang's *Oxford: Brief Historical and Descriptive Notes* (1885; new ed. 1890) a charming presentment of Oxford is given both by writer and artists. A manual of the studies of the university is furnished by J. Wells in his *Oxford and Oxford Life*, while for general information *Oxford of To-day*, by Crosby and Aydelotte (1923), is interesting reading. A full account of Oxford, civic, ecclesiastical, academic, collegiate, personal, up to the end of 17th century, will be found in the various works of the great Oxford antiquary, Anthony Wood, in the following editions—his *History of the University and of the Colleges and Halls*, by J. Gutch (1786-96); his *Athenae and Fasti*, by Dr Bliss (1813-20); his *City of Oxford*, by A. Clark (1889 *seqq.*). From the time of Wood the formal annals of the university become of little interest and very little importance. The interest of books about Oxford rather lies in the diaries which give the day-to-day impressions of Oxford residents. Anthony Wood for the 17th century and Thomas Hearne for the 18th (best edition of both by the Oxford Historical Society), or in reminiscences of Oxford life in memoirs and autobiographies—e.g. in the autobiographies of Edmund Gibbon, R. L. Edgeworth, &c., and in Stanley's *Life of Arnold*. Part of the ground traversed by Wood has been gone over from the point of view of modern criticism by James Parker for the city (to the year 1100) in his *Early History of Oxford* (Oxf. Hist. Soc. 1888), and by H. C. Maxwell Lyte for the university (to the year 1530) in his *History of the University of Oxford* (1886). See also *Reminiscences of Oxford by Oxford Men*, edited by Miss Quiller-Couch (1891); S. F. Hulton, *Ricce Ozonienses* (1892); Joseph Foster, *Alumni Ozonienses 1500-1886* (1888-91), and his *Oxford Men and their Colleges* (1893); Wells, *Oxford and Oxford Life* (1893), and numerous other publications, *Oxford and its Colleges*, *The Charm of Oxford*, &c.; *The Colleges of Oxford, their History and Traditions*, edited by Andrew Clark (1891); Madan's *Oxford outside the Guide-books* (1923); Mallet's *History of the University of Oxford* (1924). See also books by Fulleylove, Stirling-Taylor, Headlam, Evans.

Oxford, EARL OF. See ASQUITH, HARLEY.

Oxford Clay, the principal member of the Middle Oolite series. See JURASSIC SYSTEM.

Oxford Movement. See ENGLAND (CHURCH OF), and KEBLE, NEWMAN, PUSEY.

Oxfordshire, an inland county of England, in shape very irregular, and with an extreme length and breadth of 48 miles by 26; is bounded on the N. by Warwickshire and Northants, E. by Bucks, S. by the river Thames, and W. by Gloucestershire. Area, 749 sq. m., or 479,220 acres. Pop. (1801) 109,620; (1891) 185,669; (1921) 189,558. Flat and bleak in the north and west, except near Edgehill (q.v.), on the Warwickshire border, and undulating in the central district, the county in the south presents a succession of richly wooded hills, alternating with picturesque dales, and terminating on the south-east border with a branch of the Chiltern Hills, which, near Nuffield, attain a height of nearly 700 feet above sea-level. Foremost, however, among the natural beauties of Oxfordshire are the numerous rivers by which it is watered, notably the Thames, with its affluents the

Windrush, Evenlode, Cherwell, and Thame. By river and canal Oxfordshire has water communication with nearly every part of England. The soil in general is fertile, and the state of agriculture advanced; wheat, barley, and oats are the principal crops, while sheep, cattle, and pigs are reared. Ironstone is extensively worked in North Oxfordshire. The most important manufactures are those of plush, shag, and girth weaving, agricultural implement-making, and engineering at Banbury (also famous for its cakes), of blankets at Witney, of paper at Shiplake and Henley, and, to a certain extent, of gloves at Woodstock. The county contains the city and county borough of Oxford, the municipal boroughs of Banbury, Chipping Norton, Henley-on-Thames, and Woodstock, the urban districts of Bicester, Thame, Wheatley, and Witney, all in the diocese of Oxford. Two members are returned to the House of Commons for the county, as also one for the city of Oxford and two for the university. Most of the historical events connected with the county took place at Oxford (q.v.), but apart from them may be mentioned the battles of Chalgrove (1643) and Cropredy Bridge (1644). The best known of its worthies are Edward the Confessor, Leland (the antiquary), Dr Heylin, Viscount Falkland, 'Doctor' Fell, Thomas Ellwood, Lord Chief-justice Holt, Rev. James Granger, Warren Hastings, Lord Keeper Guilford, Sir William Beechey, Miss Edgeworth, Charles Reade, Green (the historian), Lord Penzance, Sir W. Vernon Harcourt, and Lord Randolph Churchill. See works by Skelton (1823), Davenport (1869), Meade Falkner (1899), and the 'Victoria History' (1907 *et seq.*).

Oxidation is the term given to the changes which occur when elementary or compound substances enter into new combinations with oxygen. The majority of those chemical actions to which the term Combustion (q.v.) is applied are examples of oxidation. The products of the processes of oxidation are frequently (but not invariably) oxides.

Oxides are compounds of oxygen with other elements, and are amongst the most important of the classes of chemical compounds. Basic oxides and acid oxides are described in the article CHEMISTRY (q.v.). In addition to these two large classes of oxides there are numerous oxides which do not possess either basic or acid properties, or if at all only to a very insignificant degree.

Oxlip. See COWSLIP.

Ox-pecker. See BEEF-EATER.

Oxus, the ancient name of the Amu Daria in Asiatic Russia, known as Jihûn by Arab writers. Rising in the Pamir at 13,000 or 14,000 feet above sea-level, it flows westwards between Afghanistan and Bokhara; from 66° E. it runs NW. across the deserts of Bokhara and Khiva, and empties itself through a delta 90 miles long into the southern extremity of the Sea of Aral. From the junction of the Waksh (or Surkhab) and Panj, between 68° and 69° E., the river is navigable, and is called Amu Daria by the natives. Its length from Lake Victoria in the Pamir to the Aral Sea is 1560 miles; its width varies from 400 yards to over 3 miles; its basin, half in Afghanistan, half in Russian Central Asia, is 116,000 sq. m. in area, apart from rivers like the Zarafshan and Kashka Daria, which are lost in Bokharan deserts before reaching the Amu Daria. Its tributaries (e.g. Surkhan and Kafirnahan on right, Aksarai on left) all enter E. of 67° E. Of all great rivers the Amu Daria derives the greatest percentage of its waters from mountain snow and ice; in the hot, dry plains absorption and evaporation take place; in winter the river freezes. From early times it has been utilised, as in the Khiva oasis, for irrigation purposes,

and it invites extensive development. At Charjui the Transcasian Railway crosses it by a bridge (1888; rebuilt 1901) over a mile long. Some authorities have maintained that the Oxus used to flow into the Caspian by the Uzboi depression in the Post-Pliocene period, and even at intervals during the Christian era. The Russians long considered the possibility of diverting it into the Caspian. See TURKESTAN, ARAL, CASPIAN SEA, PAMIR.

Oxyacetylene. See BLOWPIPE.

Oxychlorides, chemical compounds containing both chlorine and oxygen in combination with some other element, and intermediate in composition between the oxides on the one hand and the chlorides on the other. Thus, antimonious oxychloride, SbOCl , is intermediate between antimonious oxide, Sb_2O_3 , and antimonious chloride, SbCl_3 .

Oxygen (sym. O; atom. number, 8; atom. wt. 16) is a colourless, inodorous, tasteless gas, long regarded as a 'permanent' gas, but liquefied by Pictet of Geneva for the first time in 1877. Its chemical affinities for other elementary substances are very powerful; with most of them it is found in combination, or may be made to combine, in more than one proportion; with several in as many as four different proportions. Apart from the gases of the argon group, bromine and fluorine are the only elements with which it does not enter into combination. Owing to the intensity with which many of these combinations take place, this gas has the power of supporting Combustion (q.v.) in an eminent degree. It is only slightly soluble in water; 100 cubic inches of that liquid dissolving 4.11 cubic inches of gas at 32°, and only 2.99 inches at 59°. It is slightly heavier than air, its specific gravity being 1.1056.

Oxygen gas is not only respirable, but is essential to the support of animal life; and hence it was termed *vital air* by some of the older chemists. A small animal placed in a bell-glass containing pure oxygen will not be suffocated as soon as if it were placed in the same glass filled with atmospheric air. For further details on this property of oxygen, the reader is referred to the article RESPIRATION.

Oxygen is the most abundant and the most widely distributed of all the elements. In its free state (*mixed* but not *combined* with nitrogen) it constitutes about a fifth of the bulk, and considerably more than a fifth of the weight, of the atmosphere. In combination with hydrogen, it forms eight-ninths of all the water on the globe; and in combination with silicon, calcium, aluminium, &c., it enters largely into all the solid constituents of the earth's crust; silica—in its various forms of sand, common quartz, flint, &c.—chalk, limestone, marble, and all the varieties of clay, containing about half their weight of oxygen. It is, moreover, found in the tissues and fluids of all forms of animal and vegetable life, none of which can support existence independently of this element.

There are various laboratory methods of obtaining oxygen on the small scale, the simplest of which consists in the exposure of certain metallic oxides to a high temperature. It was originally obtained by its discoverer, Dr Priestley, from the red oxide of mercury, which, when heated to about 750°, resolves itself into metallic mercury and oxygen gas. It may be obtained similarly from red oxide and peroxide of lead, the resulting products being protoxide of lead and oxygen.

The ordinary laboratory method commonly employed to obtain an abundant supply of oxygen consists in heating chlorate of potash, KClO_3 , which yields up all its oxygen (amounting to 39.16 per cent.), and leaves a residue of chloride of potassium. One ounce of this salt yields nearly

two gallons of oxygen gas. It is found by experiment that if the chlorate of potash is mixed with about a fourth of its weight of black oxide of copper, or of binocide of manganese, the evolution of the gas is greatly facilitated, although the oxides do not seem to undergo any change during the process.

Various processes have been proposed for obtaining oxygen on the large scale, but only in recent years has the commercial production of the gas been carried out sufficiently cheaply to enable oxygen to be employed extensively for industrial purposes. The method employed by Brin's Oxygen Company consists in passing air under pressure over barium oxide, BaO , heated to a temperature of dull redness. In this way a quantity of barium peroxide, BaO_2 , is formed, and this can be made to again yield up its extra oxygen in the pure state (being reduced again to BaO) by heating to a full red heat, or, as is actually done in practice, by greatly diminishing the gaseous pressure without altering the temperature. It is now obtained in a high degree of purity by the fractional distillation of liquid air. Oxygen can now be obtained in practically any required quantity in wrought-steel cylinders, in which it is compressed up to a pressure of 120 atmospheres.

Oxygen was discovered almost simultaneously, in 1774, by Priestley and by Scheele. Priestley called it 'dephlogisticated air,' Scheele 'empyrean air,' Condorcet 'vital air;' and in 1789 Lavoisier, who proved that the combustion of bodies in the air consisted essentially in their chemical combination with oxygen, and thus overthrew the 'Phlogiston' (q.v.) theory, gave it its present name (from Gk. *oxys*, 'acid,' and *gennao*, 'produce'), believing (wrongly) that it was a necessary constituent of every acid.

Oxyhydrogen. See BLOWPIPE, LIME-LIGHT.

Oxyrhynchus (now *Behnesa*), on the edge of the Libyan Desert, near the Nile and some 400 miles SSW. of Cairo, is the site of an ancient city, where since 1896 valuable papyri have been excavated, including Logia ('sayings'—some otherwise unknown) of Jesus, lost poems of Callimachus, Sappho, and Pindar, much of Isocrates, Menander, and Alcæus, fragments of Ibycus, a heretofore unknown continuation of Thucydides, and a 3d-century Christian hymn, the most ancient piece of church music extant. Most of them have been edited by Grenfell and Hunt.

Oyer and Terminer (Fr. *ouïr*, 'to hear;' *terminer*, 'to determine'). See ASSIZE.

Oyster (*Ostrea*), a genus of bivalves, the members of which are well known to be very passive and very palatable. *Structure*.—The fundamental characteristics, as displayed by the favourite European species, *Ostrea edulis*, are those of other bivalve Molluscs (q.v.), but the 'foot,' with which many less sedentary forms move, is almost completely degenerate, the two valves of the shell are unequal, the hinge which unites them is without teeth, and the powerful closing muscle is almost median in position. The left valve of the shell, that by which the animal fixes itself, is hollowed out, while the other is almost flat, and the whole animal is slightly unsymmetrical. On an opened oyster it is easy to detect the fringed mantle which lines and makes the shell, the ciliated gills or 'beard,' two somewhat similar flaps (labial palps) on each side of the mouth, which, overhung by a hood, lies near one end of the hinge, the brownish digestive gland, the heart and the kidneys close beside the shell-shutting muscle. 'I suppose,' says Professor Huxley, 'that when the sapid and slippery morsel—which is and is gone like a flash of gustatory summer lightning—glides along the palate, few people imagine that they are swallowing a piece of machinery (and going machinery too) greatly more

complicated than a watch'—in fact a living organism of a high order.

General Life.—The oyster feeds on microscopic organisms which are washed into the gaping shell and on to the mouth by the ciliary activity of the

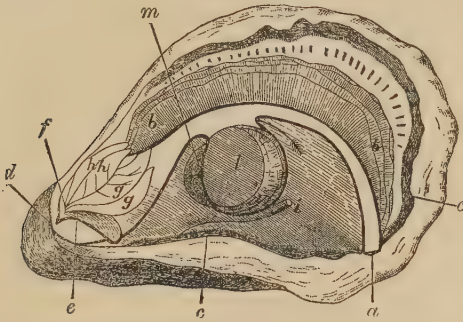


Diagram of Internal Structure.

The dorsal surface is downwards, the anterior or head end to the left. *a*, region where water enters and leaves the animal; the dark lines indicate where one mantle-flap has been cut away to expose the other structures; *b*, gills; *c*, margin of one of the mantle-folds; *d*, anterior part of hinge; *e*, hood over mouth; *f*, position of mouth; *g*, *h*, labial palps; *i*, end of intestine; *l*, the closing muscle of the shell; *m*, position of the heart.

gills and palps; and it may be noted that the greenish tinge, regarded by epicures as one of the highest credentials of an oyster, is probably due to a copious diet of minute green algae. As every one knows, oysters live gregariously in 'beds' or 'banks' at depths of 3 to 20 fathoms, and are strangely fastidious as to locality. They have many enemies besides the dredger, such as the little sponges (*Clione*), which bore in the shells; marine worms, and sea-snails (e.g. *Purpura* and *Murex*), which also effect an entrance; besides starfishes, which swallow little ones intact, or, embracing larger specimens, insert their arms when the shells gape. Although these passive animals have no eyes or ears they can detect the shadow of an approaching boat; the mantle-fringe and some other parts are undoubtedly sensitive; and some enthusiasts have even inferred 'intelligence' from the fact that in the 'oyster-schools' and elsewhere the molluscs learn to keep their shells shut when the tide retires or when they are transported by rail!

Life-history.—There are many interesting facts connected with the life-history of the oyster. Thus, *O. edulis* is hermaphrodite, being first an egg-laying female, afterwards a sperm-producing male, while *O. angulata* and the American *O. virginica* have the sexes separate. Maturity is sometimes rapidly attained, but usually not until the third or fourth year of life, and the maximum fertility is between the fourth and seventh year. The reproductive season generally begins in May, and continues till the beginning of autumn, but its limits are extended or lessened by the conditions of temperature. When the oyster becomes 'sick,' 'milky,' or 'out of season,' the mantle-cavity and the interspaces between the gills are packed with developing eggs, which fishermen call 'white,' and at a later stage 'black spat.' Buckland likened this black spat to fine slate-pencil dust, and the emergence of the young from the mother to a puff of smoke from a railway-engine. He computed the number of developing eggs in an oyster at from 276,000 to 829,000; and Professor Möbius, a great German authority on oysters, calculated that 1000 full-grown parents produce 440 million embryos annually.

These embryos are only about $\frac{1}{16}$ th of an inch in length, and about two millions of them might be

packed into a cubic inch, but the numbers which rise from an oyster-bank are so immense that the water seems to be clouded. They are very unlike the adults in habit, for they swim actively for some days by means of a protrusible ciliated cushion or *velum*. The valves of the shell are transparent and symmetrical; the gills, palps, and some other adult structures have yet to be developed. In the American oyster, the eggs are set adrift at an early stage, fertilisation and the whole of development taking place outside the shelter of the parent. In either case the mortality is enormous; multitudes are washed away to unsuitable localities, and multitudes are devoured by hungry animals; in fact Möbius computes that out of 440 million embryos only 421 individuals reach maturity.

Those that survive become weighted by their growing shells, draw in their ciliated velum for the last time, and sink to the bottom as a 'fall of spat.' They settle on stones, shells, or other 'culch,' and often nowadays on chalked tiles or on floating collectors which are placed for the purpose of receiving them. Moored by their left shells, they grow rapidly, from $\frac{1}{8}$ th of an inch when first attached, till at the end of six to eight months they are like threepenny pieces, and are known as 'brood.' The diameter of an oyster at two years is about two inches, another inch is added in the third year, after which the growth is much less rapid.

Different Kinds.—Oysters are represented by several widely distributed species—e.g. the European *O. edulis* and *O. angulata*, the American *O. virginica* with several varieties, two others from the western coasts (*O. conchophila* and *O. lurida*)—all of them edible, while the Cape of Good Hope, Australia, Japan, &c. are not without their share. They vary considerably in size; those from 3 to 6 inches are common, but Sir J. E. Tennent found one in Ceylon measuring a little over 11 inches in length. American oysters are often very large. The banks of oysters sometimes form important marine and shore deposits—witness the banks of long, narrow 'raccoon' oysters off the coast of Georgia and other parts of North America, which are said to form natural breakwaters. The race is an ancient one, for oysters appear in the Carboniferous strata, and two related forms—*Gryphæa* and *Exogyra*—with thick heavy shells, are common fossils. The name is sometimes extended to other bivalves, such as the false oyster *Anomia* (one valve of which is perforated by a tag of attaching byssus), the pearl-oyster *Meleagrina* (see PEARL), and the thorny oyster *Spondylus*.

Edibility.—The accumulations of oyster-shells in the 'kitchen-middens' of Neolithic ages show that the appreciation of oysters is no modern taste. To Roman palates the oyster was precious, and the praises of its appetising flavour (*grata ingluvies*) were often sounded. Those of Rutupie (Richborough, in Kent) were early known to the epicures and highly esteemed. When eaten alive or half-alive in the usual fashion, they are not only pleasant, but nutritious and readily digested, nor can any evil effects (such as parasites) be traced to moderate indulgence in these dainties. 'The points of an oyster are,' Frank Buckland says, 'first the shape, which to be perfect should resemble very much the petal of a rose-leaf. Next, the thickness of the shell; a first-class thoroughbred native should have a shell of the tenuity of thin china or a Japanese tea-cup. It should also have an almost metallic ring, and a peculiar opalescent lustre on the inner side; the hollow for the animal of the oyster should be as much like an egg-cup as possible. Lastly, the flesh itself should be white and firm, and nut-like in taste. It is by taking the average proportion of meat to shell that oysters should be

critically judged. The oysters at the head of the list are of course "natives" (oysters artificially reared); the proportion of a well-fed native is one-fourth meat.

Oysters and Disease.—Many cases of enteric illness and death have been referred to the eating of oysters, and bacteriological investigations of the power of the oyster to absorb, retain, and transmit the typhoid bacillus and the cholera vibrio have been made. It appears that oysters contaminated by sewage, &c., can and do transmit disease; and that in many localities the conditions of culture and storage do expose oysters to the serious risk of such contamination.

Supply.—The British supply is derived from three sources—from the national oyster-banks, which are gradually getting the attention which they deserve; from the continental banks and farms, especially those of France and Holland; and from the United States. Of national oyster-banks the chief are at Whitstable, Colchester, and Brightlingsea, but oyster-fishing is also conducted at Inverary and Ballantrae in Scotland, and at Wicklow, Queens-town, Ballyheige, Galway, and Moville in Ireland. In Britain oysters are considered as in season from September to April. By an act of 1877, applying to England and Scotland, a general close time for the capture and sale of 'deep-sea oysters' is fixed from 15th June to 4th August, and for all other kinds of oysters—except oysters taken in the waters of a foreign state—from 14th May to 4th August. In Ireland the general close time fixed by law is from 1st May to 1st September, but in several instances this period has been legally varied. In France the principal oyster fisheries are at Arcachon (q.v.) and Cancale (q.v.). From France and elsewhere large quantities of young oysters are imported to be fattened on British culture-grounds. In the United States the great oyster-beds are at Long Island Sound and Chesapeake Bay. The bivalve is found, however, from the Gulf of St Lawrence to and along the north shore of the Gulf of Mexico, and, though smaller, at points on the west coast, as Puget Sound and Juan de Fuca Strait. The chief market lies in the east, but oysters are sent also in car-loads from Baltimore, New York, and other centres to places in the west—to Milwaukee, Chicago, St Louis, and even San Francisco. In some parts the Clam (q.v.) rivals the oyster in popularity. For the oyster fisherman the practical problem is to keep up a supply sufficient to meet the large demand. For various reasons this seems to be difficult. As oysters live in 3 to 20 fathoms of water, they can hardly be gathered with much selection; they are sometimes lifted by 'rakes' and tongs, but usually by the dredge; this is a destructive process, probably killing more than it secures. There seems some evidence to show that sheer over-dredging has almost ruined some of the banks, but this probably has been exaggerated. Changes in the sea-bottom and in the food-supply have doubtless had more to do with the disappearance of oysters from localities where they once abounded. Those who permit all kinds of debris and foulness to be emptied into the sea can hardly expect a flourishing oyster-bank in the neighbourhood. To preserve the beds, to observe 'close time,' to re-stock when the supply wanes, and similar practical precautions are certainly effective; but regulations which are satisfactory on paper are often very unsatisfactorily realised.

Oyster-culture.—Artificial oyster-culture is now successfully practised on various plans throughout the world, British and American methods substantially agreeing, while French, Dutch, and Japanese systems are somewhat more elaborate. Oyster-culture is no novelty, having been prac-

tised by the Romans. Thus, Pliny says that 'the first person who formed artificial oyster-beds was Sergius Orata (in the time of Augustus), who established them at Baiæ . . . not for the gratification of gluttony, but for the sake of gain, as he contrived to make a large income by the exercise of his ingenuity.' In the days of the later emperors there were well-established *ostrearia*, and Lake Fusaro, the Acheron of Virgil, a muddy salt-water pond, nowhere more than six feet in depth, has been for many centuries utilised for this purpose. Of oyster-culture there are many different kinds; it may be confined to 'fattening' oysters in some conveniently constructed pond; or 'fallen spat,' collected on tiles or artificial 'culch,' may be brought to the sheltered culture-grounds, where the young can grow in safety; or again, oysters may be bred in confinement. It has even been found possible in America to fertilise the eggs artificially with sperm from male oysters, and though this is not so feasible in the case of the European species, whose eggs are retained within the parent until they have to some extent developed, they can nevertheless be bred in confinement. Another possibility is to collect the free larvæ, which are sometimes very abundant, and transfer them to culture-grounds where the risks of mortality would be lessened. The success which has already attended various forms of oyster-culture certainly warrants further extension and experiment, especially as many authorities believe that there is more hope in this than in any legislative measures to preserve the natural banks.

Oyster-catcher (*Hematopus*), a genus of birds of the family Charadriidæ, closely allied to the Plovers, and distinguished chiefly by the long, strong, straight, wedge-shaped bill, legs of moderate length, feet with only three toes, all directed forwards and united at their base by a small membrane. The genus, which is cosmopolitan in its distribution, embraces nine species. The only European species, *H. ostralegus*, known also as



Oyster-catcher (*Hematopus ostralegus*).

the Sea-pie and Mussel-picker, is found on many parts of the English coast, and is common in Scotland along the whole east coast, on the Scottish islands even as far as St Kilda, and also on the Irish coasts. Although a coast bird, it often wanders inland, and may be found breeding near inland lochs and on the banks of large rivers. It occurs in Greenland, is common in Iceland, and in many parts of Europe, Asia, and Africa. Its southern migrations extend to Burma, Ceylon, Persia, Mozambique, and Senegambia. The adult bird is about 16 inches long, has black and white plumage, orange-yellow bill, crimson irides, and flesh-coloured legs and toes. It is very regular in its feeding habits, passing with great punctuality to and from its feeding-grounds, where it regales

itself with mussels, whelks, limpets, annelids, crustaceans, and small fish. Its eggs, usually three or four in number, are laid on shingle, more rarely among sandhills or even in fields inland, and sometimes on the top of a fairly lofty stack. The oyster-catcher swims well, and takes to the water of its own accord. Its flesh, though dark in colour, is palatable. *H. capensis* is a black species ranging from the Cape to the Canaries. Three or four species are confined to America.

Oyster Plant. See SALSIFY.

Ozæna (Gr. *ozē*, 'a stench') is generally used of all diseased conditions of the nose accompanied by great fetor of the breath. This may arise from the ulcerations occurring in tubercular or syphilitic disease, or in lupus; from malignant disease; from necrosed bone; or from the presence of a foreign body. But it also occurs where none of these causes is present; and to this form of disease the term is limited by medical writers. In these cases there is a peculiar form of inflammation of the mucous membrane of the nose, called *dry catarrh*, in which the morbid secretion accumulates in the form of crusts in the nasal cavity. This may occasion comparatively little inconvenience, till it leads, as it often does, to the occurrence of an offensive and characteristic odour, the precise cause of which has not been ascertained. It is a very chronic and troublesome disease; but much relief is obtained by the frequent use of alkaline and antiseptic washes or sprays. An arrangement devised by Gottstein renders the secretion moist, and so keeps the fetor in abeyance—the introduction of a plug of cotton-wool, which is worn in each nostril for a few hours daily.

Ozaka. See OSAKA.

Ozanam, ANTOINE FRÉDÉRIC, was born at Milan, 23d April 1813, studied at Lyons and Paris, and was appointed in 1841 to fill the chair of Foreign Literature at the Sorbonne. He died at Marseilles, 8th September 1853. Ozanam possessed learning and industry, but fate did not favour him in his dream of rivalling the work of Gibbon, save in such fragments as *Dante et la Philosophie Catholique au XIII^e Siècle* (1839), *Histoire de la Civilisation au V^e Siècle* (1845; Eng. trans. 1868), and *Études Germaniques* (1847–49). A collected edition of his writings fills 11 vols. (1862–65). See books by Karker (Paderborn, 1867), O'Meara (Edin. 1876), Hardy (Mainz, 1878), Chauveau (1887), Huit (1888), and Baurard (1912).

Ozokerite. See BITUMEN.

Ozone (Gr. *ozō*, 'I smell'). It was remarked long ago that a peculiar odour was produced by the working of an electrical machine. Van Marum found that, when electric sparks were passed through a tube containing oxygen, the gas became powerfully impregnated with this odour—which he therefore called the 'smell of electricity.' Subsequent writers attributed the phenomenon to the formation of nitric acid, due to a trace of nitrogen mixed with the oxygen; especially as the gas was found to act energetically upon mercury. Thus supposed to be explained, these curious results were soon forgotten. But in 1840 Schönbein (q.v.) with remarkable acuteness made a closer investigation of the question, and arrived at many most curious results, all of which have not even yet been satisfactorily accounted for. The problem remains, in fact, one of the most perplexing, as well as interesting, questions imperfectly resolved in chemistry. The earlier results of Schönbein were these: (1) When water is decomposed by the voltaic current, the electrodes being of gold or platinum, the oxygen (which appears at the positive

pole) possesses in a high degree the smell and the oxidising power developed by Van Marum by means of friction-electricity. (2) When the positive electrode is formed of an oxidisable metal these results are not observed, but the electrode is rapidly oxidised. (3) The oxygen collected at a platinum electrode retains these properties for an indefinite period if kept in a closed vessel; but loses them by heating, by the contact of an oxidisable substance, and even by contact with such bodies as charcoal and oxide of manganese. To the substance, whatever it may be, which possesses such powerful chemical affinities, Schönbein gave the name ozone, from its smell. In 1845 he showed that the same substance can be produced by the action of phosphorus on moist air, and hinted that it might be a higher oxide of hydrogen.

De la Rive and Marignac shortly afterwards, repeating the experiments of Van Marum, showed that electric sparks produce ozone even in *pure* and *dry* oxygen, and came to the conclusion that ozone is oxygen in an *allotropic* state, as diamond is a form of coke or charcoal. Baumert, in 1853, endeavoured to show that there are two kinds of ozone—one formed from pure oxygen by electric sparks, which he allowed to be allotropic oxygen; the other formed in the voltaic decomposition of water, which he endeavoured to prove to be a *terozide* of hydrogen. Andrews, in 1856, refuted this view, by showing that no such oxide of hydrogen (at least in a gaseous form) is produced in the electrolysis of water; and that ozone, from whatever source obtained, is the same body, and is not a compound, but an allotropic form of oxygen.

In 1860 Andrews and Tait published the results of a series of *volumetric* experiments on this subject, which led to some remarkable conclusions—among which are the following: When the electric discharge is passed through pure oxygen it *contracts*, hence ozone must be denser than oxygen. A much greater amount of contraction, and a correspondingly greater quantity of ozone, are produced by a silent discharge of electricity between fine points than by a brilliant series of sparks. The contraction due to the formation of the ozone is entirely removed by the destruction of the ozone by heat; and this process can be repeated indefinitely on the same portion of oxygen.

Soret subsequently determined the density of ozone as compared with that of oxygen, first by absorbing the ozone from the oxygen with which it was mixed by means of oil of turpentine or oil of cinnamon, and observing the contraction produced; and later by determining the relative rates of diffusion of chlorine and ozone. He ascertained that its density is one and a half times that of oxygen. Andrews showed later that ozone is rapidly destroyed when shaken up with dry fragments of glass, &c. He also proved that the effect which is (almost invariably, and sometimes in fine weather powerfully) produced by the air on what are called ozone-test papers—papers steeped in iodide of potassium which are rendered brown by the liberation of iodine—is really due to ozone. Ozone has been liquefied by the application of pressure, at a temperature of about -23° C. It is then a blue liquid, liable to decomposition into oxygen, with explosive violence, on sudden diminution of pressure.

Its value as an oxidising agent, in regenerating impure air and sterilising water, is explained by its being concentrated oxygen, O_3 , with three atoms of oxygen instead of the usual two. Mechanisms have been devised for breaking up by electric current three 2-atom oxygen molecules into two 3-atom ozone molecules; and have been in use in ozonising the air in banks, theatres, restaurants, and underground railways.

P



the sixteenth letter of our alphabet, descends from the seventeenth letter of the ancient Semitic alphabet, the original sound of which, the voiceless labial stopped consonant, was retained unchanged in the Greek and Roman alphabets.

In late Hebrew and Aramaic the letter was sounded as a bilabial *f* when following a vowel; in Arabic and some Syriac dialects it has the value of *f* in all positions. The Semitic name (in Hebrew and Syriac *pē*, and adopted by the Greeks as *pei*, which became *pi* in late Greek) is supposed to be identical with the Hebrew *peh* (inflected *pī*), meaning 'mouth.' No resemblance to the shape of the mouth can be seen in the earliest known form , which was variously modified in the later Semitic alphabets, becoming in late Hebrew , at the end of a word . One of the early Semitic forms was , which was adopted by the Greeks, and when the direction of the writing was reversed was turned into . This form was afterwards altered into , and ultimately into , represented by Π, π in printed Greek.

The Romans modified the early Greek form by bringing the hook round to meet the stem. The resulting form **P** is identical with the late Greek form of the letter R. In minuscule handwriting the body of the letter was, like that of other stemmed letters, written on the line, so that the stem descended below the line. This mode of formation is retained in our printed *p*. In the script

form *p* the loop is left uncompleted, in order

to facilitate junction with a following letter. The Romans used the combination *Ph* in Greek proper names and in Greek words adopted into Latin, to render the letter Φ, which expressed the sound of an aspirated *p* (= *p+h*). In late Greek this sound developed into *f*, and in late Latin the pronunciation of *ph* was altered in conformity therewith. Hence in French, English, German, and some other languages, the digraph *ph*, which is used almost solely in words of Greek derivation, is pronounced as *f*. In modern Italian and Spanish *f* is used instead of *ph*.

In the modern European languages there are a considerable number of words of Greek etymology beginning with *pn*, *ps*, *pt*. As these combinations of consonants are foreign to English habits of articulation, it has in English until recently been the universal custom to omit the *p* in pronunciation. As, however, many modern scientific terms become unrecognisable when pronounced in this way, a tendency has lately arisen to restore the *p* sound except in words of popular currency. In other European languages initial *pn*, *ps*, *pt* are pronounced as spelt. A silent *p*, inserted for etymological

reasons, occurs in the English *receipt* and in the French *baptême* and other words.

The Roman name of the letter *pē* (formed after *bē*, *cē*, *dē*, *gē*) is preserved in the modern languages except Italian (*pi*).

Paardeberg, a mountain on the Modder River, Orange Free State, 30 miles SE. of Kimberley, where Cronje (q.v.) surrendered, 27th February 1900.

Paarl, capital of a district in the Cape Province, 40 miles by road NE. of Cape Town; pop. 12,000.

Pabjanice, a town of Poland, 10 miles SSW. of Łódź; textiles and agricultural implement making are the principal industries; pop. 32,000.

Pabna, a town of Bengal, on an arm of the Ganges, 115 miles N. of Calcutta; pop. 19,000.

Paca (*Calogenys*, i.e. 'hollow-cheek'), a remarkable genus of rodents, allied to the Agoutis (*Dasyprocta*), represented by two Brazilian species, an alpine form (*C. paca*) and the common forest form. The latter, also called the 'Spotted Cavy,' has its cheek-bones uniquely developed, the zygomatic arch being enlarged to form a great cavity on each side. Each communicates by a narrow aperture with the mouth, is lined by mucous membrane, and does not contain food as an ordinary cheek-pouch naturally does. The *paca* is two feet in length, stout and somewhat pig-like in build, with



Paca (Calogenys paca).

a large blunt head, cloven lip, small ears, stump-like tail, thick legs, five-toed feet, and rounded back. The colour is brownish-yellow above, whitish below, with whitish-yellow spots or longitudinal bands along the sides. Though somewhat clumsy in form and gait, the *paca* runs actively, and can swim well. It lives alone or in pairs in the moist forests, especially by sides of rivers, and tends to be nocturnal in its habits. It makes burrows, said to have three openings. The female bears only one or two young at a birth. As a vegetable eater, the *paca* sometimes does damage to sugar-cane plantations and gardens. Its fat, pork-like flesh is much esteemed.

Pace. See YARD.

Pachamac, a village of Peru, 18 miles SE. of Lima, with the ruins of a temple from which Pizarro took immense treasure.

Pachmann, Vladimir de, Russian pianist, born at Odessa, 1848. He studied music under his father and at Vienna, and has gained a unique reputation as an interpreter of Chopin.

Pachmarhi, a sanatorium and convalescent dépôt for European troops in India, is situated, 2500 feet above the plains, in the Central Provinces, 110 miles SW. of Jabalpur; pop. 4500.

Pachomius, an Egyptian monk, the founder of Christian cenobitic life. He was born about 292, and about 340 founded the first monastic institution at Tabenna, an island in the Nile. He also established the first convent for nuns, under the presidency of his sister. At his death, according to Palladius, not fewer than 7000 monks and nuns were under his inspection. The writings ascribed to Pachomius are not only worthless in themselves, but of dubious authenticity. See MONACHISM.

Pachuca, capital of the state of Hidalgo, in Mexico, 55 miles NNE. of Mexico city; the vicinity is rich in silver, and Pachuca is one of the oldest mining towns of the country; pop. 39,000.

Pachydermata (Gr., 'thick-skins'), a term, no longer much used, applied by Cuvier to hoofed mammals (Ungulates) which are not ruminants—e.g. elephants, hyrax, hog, hippopotamus, tapir, rhinoceros, horse, &c.—and which have thick skins. See MAMMALS.

Pacific Ocean.—*Position and Extent.*—The Pacific Ocean is the largest of the great divisions of the ocean, occupying as it does about one-half of the water-surface of the globe and more than one-third of the whole area of the world. It is almost landlocked towards the north, communicating with the Arctic Ocean by the narrow and shallow Behring Strait, only about 40 miles in width, whereas towards the south it opens widely into the great deep Southern and Antarctic Oceans. Looking upon its southern boundary as the Antarctic Circle, its length from north to south is about 9000 miles, while its greatest breadth at the equator is over 10,000 miles. Its area is approximately 68,000,000 sq. m.

History.—The Pacific was first seen by Europeans in 1513, when a Spaniard, Balboa, with a few followers, viewed its waters from the summit of a mountain in Panamá; Columbus was aware of its existence, but did not live to see it. The first European to sail upon it was Magellan, who in 1520 entered it after threading his way through the strait bearing his name, and he gave it the designation 'Pacific,' by which it is known to the present day. From about this time trade was established between Europe and the Pacific coasts through the Strait of Magellan and round Cape Horn. Sir Francis Drake was the first Englishman to sail upon it, entering it in 1577, and afterwards sailing across it as far as the Moluccas. The explorers of the 17th century discovered Australia, New Zealand, and other islands, and during the 18th century the work of exploration was carried on by numerous voyagers, whose names are famous in the annals of geographical discovery. Many of them attempted to find passages between the Atlantic and Pacific through the Arctic Ocean; but the problem remained unsolved until M'Lure in 1850 discovered the North-west Passage, and Nordenskiöld in 1874 the North-east Passage. In the 19th and 20th centuries many surveying expeditions investigated the Pacific (see CHALLENGER EXPEDITION). The Pacific telegraph cable, connecting Canada with Australasia, was completed in 1902; and there is an American cable system to the Philippines, with branches to Shanghai and Bonin Islands (Japan).

River-systems.—Compared with the enormous expanse of the Pacific the area of land draining into

it is comparatively insignificant—7,600,000 sq. m., being less than a third of that draining into the Atlantic. By far the greater proportion of the land of North and South America drains into the Atlantic, the Andes and Rocky Mountains, which form the watershed, running north and south in more or less close proximity to the Pacific coast. The largest American river draining into the Pacific is the Yukon in the extreme north, which is over 2000 miles in length, and flows into Behring Sea. Proceeding south, we find the Fraser (600 miles long), the Columbia or Oregon (750), the Sacramento (420), and the Colorado (1100). The South American rivers draining into the Pacific are little more than mountain-streams. The Asiatic rivers flowing into the Pacific include some of the largest and most important rivers of the world. There is the Amur, 3060 miles in length, flowing into the Sea of Okhotsk, the Hoang-ho, over 3000 miles long, and the Yang-tse-kiang, 3200 miles in length, falling into the Yellow Sea; into the China Sea flow the Chu-kiang, the Mekhong, and the Menam. Australian rivers draining into the Pacific include the Burdekin in Queensland (440 miles) and the Fitzroy-Dawson (490 miles). The total annual rainfall on the catchment basin of the Pacific is estimated at 5000 cubic miles; the annual river discharge at over a fifth of that amount.

Coasts and Seas.—Generally speaking, the American and Australian coasts bordering the Pacific are mountainous and free from indentations, while the Asiatic coasts are low and fertile, with many gulfs and bays, and fringed with island groups enclosing numerous seas. The Alaskan shores of North America are low and swampy, while the coast farther south is rocky and rugged, with numerous inlets and off-lying islands. The most considerable indentation of the whole American Pacific coast is the Gulf of California, the Gulfs of Panamá and Guayaquil being the only others of importance. The southern extremity of South America presents a complete contrast to the rest of the coast-line, being broken up into numerous bays with scattered islands, the winding Strait of Magellan separating Tierra del Fuego from the mainland. The contour of the Asiatic coast-line is much more diversified than that of America, being especially characterised by the off-lying seas more or less completely enclosed and cut off from communication with the open ocean. Behring Sea is separated from the Pacific basin by the peninsula of Alaska and the Aleutian Islands, communicating with the Arctic Ocean through Behring Strait. The Sea of Okhotsk is divided from Behring Sea by the peninsula of Kamchatka, and from the basin of the Pacific by the Kurile Islands. The Sea of Japan is cut off from the ocean by the Japanese islands, from the Sea of Okhotsk by the island of Sakhalin, and from the Yellow Sea by the peninsula of Korea. The Yellow Sea (q.v.) is cut off from the Pacific by the East China Sea lying between Kyushu and Formosa. The South China Sea is separated from the Pacific by Formosa, the Philippine Islands, the island of Palawan, and Borneo, and from the Indian Ocean by the Malay Peninsula; it includes the two extensive Gulfs of Tongking and Siam. The islands of the Malay Archipelago cut up this part of the Pacific into several more or less distinct seas, known as the Sulu, Celebes, Java, Banda, and Arafura Seas, the last named lying between the north coast of Australia and New Guinea, and including the Gulf of Carpentaria. The Coral Sea is enclosed by the north-east coast of Australia, New Guinea, New Britain, the Solomon Islands, the New Hebrides, and New Caledonia, and communicates with the Arafura Sea by Torres Strait. The Pacific coast of Australia is mountainous and free from any considerable

inlets, the most important harbours being Port Jackson and Moreton Bay, though others of equal value are yet undeveloped; its northern portion is fringed by the Barrier Reef. Bass Strait separates the island of Tasmania from Australia. The main islands of New Zealand are separated by Cook Strait, and the principal bays are the Gulf of Hauraki, Bay of Plenty, Hawke Bay, Pegasus Bay, and Tasman Bay.

Islands.—The Pacific Ocean is remarkable for the innumerable small islands and island groups which stud its surface, but the area occupied by the truly oceanic islands is very small; they are principally congregated towards the central and western portions of its basin, the eastern portion, for some considerable distance off the American coasts, being comparatively free from islands. The principal continental islands may be briefly enumerated: commencing at the southern point of South America, and proceeding northwards along the American coast, then southwards along the Asiatic coast, we have various islands off the coast of Chile; Vancouver, Queen Charlotte, Prince of Wales, and other islands off the coast of British North America; Kodiak Island, off the Alaskan coast; the Aleutian chain of islands, stretching from the Alaskan peninsula towards the Asiatic coast and enclosing Behring Sea; the Kurile Islands, stretching from the peninsula of Kamchatka to the Japanese Islands; Sakhalin; the islands of Japan; Formosa and Hainan, off the Chinese coast; the Philippine Islands; Borneo, Celebes, Sumatra, Java, and other islands of the Malay Archipelago; New Guinea; New Caledonia; Australia and Tasmania; and New Zealand. The oceanic islands of the Pacific are all either of volcanic or coral origin, the volcanic islands lying within the zone of coral-reef builders being fringed with coral-reefs, while there are large numbers of islands entirely of coral formation—coral atolls. The principal groups are the Hawaiian Islands, in the centre of the North Pacific basin, 18° to 22° N. lat., consisting of eight larger and four smaller islands, containing many active and extinct volcanoes, including the well-known Kilauea in Hawaii, said to be the largest active crater in the world; the Bonin Islands, south-east of Japan; the Ladrone or Mariana Islands, between 13° and 20° N. lat., containing several active volcanoes; the Caroline Islands, south of the Ladrone, mostly of coral formation; the Marshall Islands, east of the Carolines, entirely of coral formation; the Gilbert Islands, on the equator, of coral formation and densely populated; in the South Pacific there are the Solomon Islands, the New Hebrides, the Fiji Islands, the Friendly or Tonga Islands, the Samoa or Navigator Islands, the Society Islands, all fringed by coral-reefs, and the Tuamotu or Low Archipelago, an extensive group of coral islands lying between 10° and 25° S. lat., besides the volcanic Galápagos group on the equator about 600 miles off the coast of Ecuador, and others of less extent and importance.

Depth.—The Pacific was formerly looked upon as rather a shallow ocean, but it is now known that some of the greatest depths in the world occur in it, and that on the whole it is deeper than the Atlantic, its mean depth being about 2500 fathoms. The eastern basin is comparatively uniform in depth, between 2000 and 3000 fathoms, while the western basin is much more diversified, numerous groups of islands, shallow water, and immense depths occurring irregularly. Eight soundings over 5000 fathoms have been recorded, all in the Pacific Ocean: three in the South Pacific, in the Aldrich Deep, to the north-east of New Zealand; four in the Challenger Deep, to the south of Guam, in the Ladrone group of islands; and the deepest

known sounding, which was taken in the Swire Deep, off Mindanao, in the Philippine group, in 5348 fathoms (32,089 feet, or over six English miles), by the German survey ship *Planet*. The *Challenger's* deepest sounding, 4575 fathoms (nearly $\frac{1}{2}$ miles), was in the sea between the Caroline and Ladrone Islands. The seas bordering on the western basin of the Pacific vary considerably in depth, the greatest depths in each being as follows: In the Behring Sea over 2200 fathoms, in the Sea of Okhotsk over 1800 fathoms, in the Sea of Japan 1900 fathoms, in the Yellow Sea 1300 fathoms, in the China Sea 2500 fathoms, in the Sulu Sea 2300 fathoms, in the Celebes Sea 2700 fathoms, in the Java Sea 500 fathoms, in the Banda Sea 3500 fathoms (the Weber Deep), and in the Arafura Sea 1700 fathoms. The bulk of water filling the Pacific is estimated at nearly 170,000,000 cubic miles.

Winds and Currents.—The surface-currents of the Pacific Ocean depend to a great extent upon the direction of the prevailing winds, the principal of which are the two trade-winds, blowing more or less constantly, the one from the north-east, the other from the south-east. Between these two regions is what is called the equatorial belt of calms, which is found all the year round north of the equator in the eastern Pacific, but in the western Pacific it is south of the equator during the summer of the southern hemisphere, and during the southern winter it is replaced by a regular southerly breeze; north and south of the trade-winds, also, there are two other belts of calms. In addition to the trade-winds, there are the monsoons, which blow with great regularity, but the direction of which changes according to the season. Monsoons are especially prevalent in the west Pacific, their general direction being south-east, north-east, or north-west, and they cause surface-currents, the direction of which likewise changes with the season. The differences between the temperature and atmospheric pressure over the land and over the water cause monsoonal winds. In mid-ocean the winds are found to have a greater velocity than in the vicinity of the land.

The Pacific is practically cut off, as far as the circulation of the deep water is concerned, from communication with the Arctic Ocean in the north, but towards the south it has uninterrupted communication with the Antarctic. A cold surface-current flows constantly northwards from the Antarctic, dividing into two at Cape Horn, one entering the Atlantic, the other flowing along the coasts of Chile and Peru, thence turning to the westwards; but the cold water frequently met with along the eastern coasts of America is evidently brought from oceanic depths by the action of off-shore winds. The great equatorial current flows to the westward, divided by a counter-current running in an opposite direction into two branches, the northern one on approaching the Asiatic coast being deflected northwards and finally north-eastwards as the Japan current, which is comparable to the Gulf Stream in the Atlantic; the southern branch is diverted to the southward, flowing along the shores of Australia and New Zealand, thence curving eastwards, and ultimately merging into the Antarctic surface-current. There are many minor currents, and branches of the more important ones, diverted by the numerous groups of islands. The broad currents, circling in the one direction in the North Pacific and in the opposite direction in the South Pacific, enclose in their centres two miniature Sargasso Seas somewhat similar to that of the North Atlantic, though not so well marked.

Temperature of the Water.—The temperature of the surface-waters of the Pacific varies with the

season, but in the tropical regions the variation is very small. Between the latitudes of 45° N. and 45° S. the temperature of the surface is always above 50° F., while north and south of these latitudes it is nearly always below 50° F. The highest temperature occurs among the islands of the Malay Archipelago and off the Mexican coast, where the mean temperature rises to 85° F., and in the sea between Japan and New Guinea the temperature in August reaches 84° F. In the South Pacific the temperature of the surface-water is apparently higher than that of the air, while in the North Pacific the reverse is the case in some places. The temperature of the water below the surface as a general rule decreases as the depth increases, the lowest temperature occurring at the bottom in great depths, where the bottom temperature appears to be nearly constant all the year round, usually about 35° F. This refers only to the open ocean, for in the enclosed seas of the western basin of the Pacific the minimum temperature is usually found some distance above the bottom, depending upon the depth of water over the barrier cutting off the sea from the general oceanic circulation. (See SEA.) The temperature of the intermediate water in the open ocean decreases rapidly at first from the surface downwards, and then slowly down to the bottom, irrespective of the surface temperature, which may vary, from below 60° to over 80° F.

Salinity.—The salinity of the surface-waters of the ocean changes with the season; increase of evaporation raises, while precipitation in the form of rain lowers, the salinity. In the South Pacific there is a region of high salinity in the neighbourhood of the Society Islands, the maximum salinity exceeding 36 per thousand; in the North Pacific the salinity is never so high, being usually less than 36 per thousand.

For the deposits see the article SEA; see also CORAL, POLYNESIA.

Pacifico, DON. See PALMERSTON.

Packard, ALPHEUS SPRING (1839–1905), son of the historian of Bowdoin College, was born at Brunswick, Maine, graduated at Bowdoin in 1861, was assistant to Agassiz at Cambridge, and in 1878 became professor of Zoology and Geology at Brown University. A Neo-Lamarckian (see LAMARCK), he is best known as a distinguished entomologist and for his classification of insects (1863). His writings include *Text-book of Entomology* (1898), *Lamarck* (1901), and various monographs on arthropod zoology.

Packfong, or PETONG, a Chinese alloy or white metal, consisting of arsenic and copper.

Pactolus, anciently the name of a small brook of Lydia, in Asia Minor, which rises on the northern slope of Mount Tmolus (modern *Buz Dagh*), flows north past Sardis (*Sart*), and empties itself into the Hermus (*Kodus*). It is never more than 10 feet broad and 1 foot deep. The sands or mud of Pactolus were long famous in antiquity for the particles of gold-dust which they contained. The collection of these particles, according to legend, was the source of Cressus' vast wealth. The brook is now called *Sarabat*.

Pacuvius, the earliest of Roman tragic poets, the sister's son of Ennius, was born at Brundisium about 220 B.C., lived mostly in Rome, and died at Tarentum, ninety years of age (130 B.C.). His dramas, of which only fragments are extant, were formed after Greek models.

Padang, capital of a residency on the west coast of Sumatra, at the mouth of the Padang River; pop. 38,000.

Paddington, a metropolitan and parliament-

ary borough (two members) of London, mainly residential in character; pop. 144,000.

Paderborn, a town of Westphalia, situated 50 miles SW. of Hanover. The fine Romanesque cathedral (Roman Catholic), completed in 1163, is built over the sources of the Pader (a tributary of the Lippe), and contains the silver coffin of St Liborius. Other noticeable edifices are St Bartholomew's Chapel (1017) and the town-house (1615; restored 1870–76). There are miscellaneous manufactures in the town and mineral springs close by. The old Hanse town was sacked by the Duke of Brunswick in 1622, and it suffered much else during the Thirty Years' War. From 1614 to 1819 it was the seat of a Roman Catholic university. Much of the town was burnt down in 1875. Pop. 32,000.

Paderewski, IGNACE JAN, Polish pianist, was born in Kurylowka, Podolia, 18th November 1860, and began to play as a child of three. He studied at Warsaw, becoming professor in the Conservatoire there in 1878. In 1884 he taught in the Strasburg Conservatoire, but thereafter became a virtuoso, appearing at Vienna in 1887, and with extraordinary success at Paris, in London, and in America in 1889–91. He became director of Warsaw Conservatoire in 1909. A Polish Nationalist, Mr Paderewski came forward as a leader in 1918. In 1919 he relinquished a disputed presidency for the premiership of the republic, but this later in the same year he resigned. He has composed for the piano, for the voice, and for piano and orchestra.

Padiham, a cotton town of Lancashire, 3 miles W. of Burnley; there are also coal-mines and quarries; pop. 12,500.

Padilla, JUAN DE, one of the most popular heroes in Spanish history, was a scion of a Toledan family, and was appointed by the Emperor Charles V. military commandant of Saragossa. While he was so employed a formidable rebellion, caused by the excessive taxes which the emperor imposed on the Spaniards, to defray the cost of his various wars in Italy, Germany, and the Low Countries, broke out among the towns of Castile, and the rebels, who were known as *comuneros*, called upon Padilla to put himself at their head. He was successful in a number of anti-royalist enterprises, but on 23d April 1521 was completely beaten at Villalar. This conflict decided the fate of the rebellion and of Padilla himself, who was taken prisoner, and next day beheaded. His wife, Doña Maria de Pacheco, rallied the remnants of the rebel army, and for a long time held Toledo against the royalist besieging army; after its fall she retired to Portugal, where she died in 1531. Numerous poems and dramas celebrate their deeds.

Padishah, in Turkish PADISHAH (Persian *padi*, 'protector' or 'throne'; *shah*, 'prince'), one of the titles of the Sultan of the Ottoman empire, and of the Shah of Persia.

Padua (Ital. *Padova*), a city of North Italy, 23 miles by rail W. by S. of Venice and 18 SE. of Vicenza, is still surrounded with walls. The principal streets are lined with arcades; most of the others, especially in the older parts, are narrow, dark, and ill-paved; but there are several handsome squares and fine gates. Of buildings the municipal palace (1172–1219) is a huge structure resting on arches, with balconies running round the upper story. The roof (1420) of its great hall (267½ feet long, by 89 wide, and 78 high) is one of the largest in Europe unsupported by pillars. The churches include the cathedral (1552–1754); St Antony (1230–1307), said to have been designed by Niccola Pisano, a building in the

Pointed style, with Byzantine blendings, and a richly decorated interior by Donatello, Sansovino, and others—the bones of St Antony rest in a side-chapel; outside is Donatello's fine equestrian statue of Gattamelata, the Venetian captain; St Justina (16th century), a fine Renaissance church, with an altarpiece by Veronese, and other pictures; church of the Eremitani (13th century), with frescoes by Mantegna; the chapel of the Annunciation (1303), adorned with frescoes by Giotto; and the chapel of St George (1377), with frescoes by Avanzi and Altichieri. The 'saint's school' has frescoes by Titian and his pupils. Padua's famous university was founded by the Emperor Frederick II. in 1221, though the fine Renaissance buildings date from 1493–1552. To it are attached one of the oldest botanical gardens in Europe, and a library (1629). The city museum (1881) contains antiquarian, art, and numismatic collections, a library, and archives. There is not much industry or much commerce, though leather, cloth, and gut-strings are prepared. Pop. of commune, 105,100. Padua's most famous natives were Livy and Mantegna. One of the oldest cities in Italy, *Patavia* came under the Roman supremacy in 215 B.C. In the 5th century it was severely handled by the Huns, and was banded to and fro between the Goths and the Eastern empire. From the Lombards it passed to the Franks (774); during the Guelph and Ghibelline quarrel it alternately submitted to the emperors and sided with the Lombard cities. From 1318 till conquered by Venice in 1405, it was ruled by the house of Carrara. Venice kept it till 1797, when it was given to Austria, who held it (except from 1805–14) until it was incorporated in Italy in 1866. The province has an area of 800 sq. m.; pop. 550,600.

Paducah, capital of McCracken county, Kentucky, on the Ohio River, 48 miles above its mouth, and just below the entrance of the Tennessee, 226 miles by rail WSW. of Louisville. It has a large trade by river and rail, notably in tobacco, and contains foundries, railway-shops, woollen, flour, and saw-mills, &c. Pop. 25,000.

Pæan (of doubtful etymology), the name given by the ancient Greeks to a kind of lyric poetry originally connected with the worship of Apollo.

Pædo-baptism. See BAPTISM.

Pæony. See PEONY.

Pæstum, anciently a Greek city of Lucania, in Southern Italy, on the present Gulf of Salerno. Founded as Posidonia by the Sybarites between 650 and 600 B.C., it was subdued by the Lucanians, and from them passed to the Romans, who established a colony there about 273 B.C. The Latin poets sing the praises of its roses, which bloomed twice a year—long extinct except in the guide-books. Pæstum was burned by the Saracens in the 9th century, and ravaged by Robert Guiscard in the 11th, and never recovered from these disasters. Portions of the ancient walls and three well-preserved Doric temples remain. See Labrousse, *Les Temples de Pæstum* (1877).

Pagan. See BURMA.

Paganini, NICOLO, Italian violinist and composer, was born a porter's son at Genoa on 18th February 1784. His genius showed itself early, and, practising sometimes a single passage for ten hours running, he acquired, if somewhat addicted to mere feats of musical legerdemain, a mastery over his instrument that has never been equalled; the vulgar, indeed, ascribed it to diabolic agency. He gave his first concert as early as 1793; began his professional tours in Italy in 1805; in 1827 received from the pope the order of the Golden

Spur; in 1828–29 made a great sensation in Austria and Germany; and in 1831 created an equal *furor* in Paris and London. He had gambled much in youth, but returned very rich to Italy. He died at Nice on 27th May 1840, drawing a last long note on his favourite G string.

See Grove's *Dictionary of Music*; there are Lives in English by Stratton (1907) in French by Fétis (1851) and Prod'homme (1907), in Italian by Bruni (1873) and Bonaventura (1911), in German by Niggli (1882) and Kapp (1913).

Page (derivation variously assigned to Gr. *pais*, 'a boy,' and Lat. *pagus*, 'a village'), a youth of noble or good birth employed in the service of a royal or noble personage. The practice of employing youths of noble birth in personal attendance on the sovereign existed in early times among the Persians and Romans, and was a special feature of feudal chivalry. The degree of page was preparatory to the further degrees of esquire and knight. The practice of educating the higher nobility as pages at court began to decline after the 15th century.

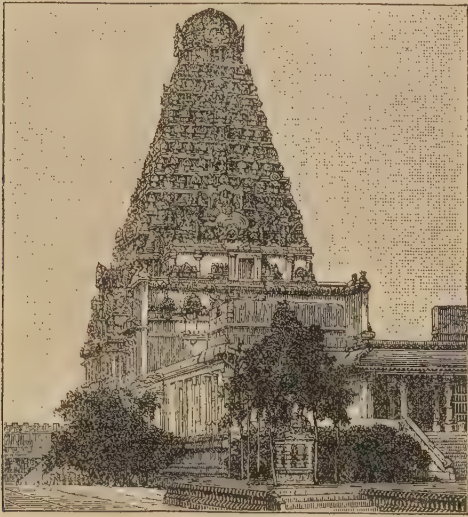
Page, WALTER HINES, United States editor and diplomat, was born at Cary, North Carolina, 15th August 1855. Graduating from Randolph-Macon College, Virginia, in 1876 he became, after association with various newspapers, editor of the *Forum* (1890–95), the *Atlantic Monthly* (1896–99), and the *World's Work* (1899–1913). He was appointed United States ambassador in London in 1913, but retired owing to failing health in August 1918, and died on 21st December of the same year at Pinehurst, South Carolina. A champion of Anglo-American solidarity, Page's labours during the Great War were important, especially in the delicate years preceding United States intervention. He wrote *The Rebuilding of Old Commonwealths* (1902), and a novel *The Southerner* (1909). See B. J. Hendrick, *Life and Letters of Walter H. Page* (3 vols. 1922–25).

Paget, SIR GEORGE EDWARD (1809–92), was born at Yarmouth, and educated at the Charter-house and at Cambridge. He took his B.A. in 1831, became Fellow of Caius in 1832, M.D. in 1838. In 1872 he became regius professor of Physic in Cambridge. He played a leading part in the advancement of medical education.

Paget, SIR JAMES (1814–1899) brother of Sir George, was born at Yarmouth. He became president of the Royal College of Surgeons in 1875. He discovered *Trichina spiralis* (q.v.), and wrote two standard works, *Lectures on Surgical Pathology* (1853), and *Clinical Lectures* (1875). See the *Memoir and Letters* (1901) by his son.

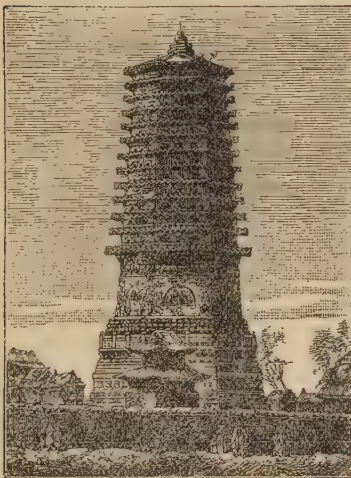
Pagoda (a Portuguese corruption of the Persian *but-kadah*, 'idol-temple') is originally an Indian temple of the approximately pyramidal shape especially characteristic of the Dravidian style (see INDIA). Thus, the great pagoda at Tanjore has a perpendicular part two stories in height, 82 feet square, and above that thirteen stories, forming an elongated pyramid about 100 feet high. The basement section is simple in outlines, but adorned by niches and pilasters; the pyramidal portion is somewhat elaborately sculptured; and the whole is crowned by a dome (said to consist of a single stone), which brings the total height to 190 feet. The temple stands in one of two great courtyards, and in the same court stand several small shrines, one of which is so beautifully carved as to rival in interest the great temple. The date of the latter is not certainly known, but is with much probability referred to the beginning of the 14th century. The so-called 'Thousand Pagodas' of Brambanan (q.v.) in Java are obviously

modelled on Hindu originals, either Jain or Buddhist. The Burmese pagodas are described



Pagoda at Tanjore.

and illustrated at BURMA. The term is also loosely applied to the Chinese *taa*, or tapering



Chinese Pagoda of Thirteen Stories.

pagodas have seven, nine, or thirteen stories; minor ones three or five.

Pago-Pago (also PANGO-PANGO), a United States port and coaling-station on the SE. coast of Tutuila in Samoa (q.v.).

Pahang, or PAKANG, a Malay and Moslem state on the east coast of the Malay Peninsula, since 1889 under British protection, and one of the Federated Malay States. Area, 14,300 square miles; pop. 146,000. See MALAY STATES.

Pahlanpur. See PALANPUR.

Pahlewi, or ENZELI, the port of Reshd (q.v.) on the Caspian.

Paignton, a seaside resort of Devonshire, on Tor Bay, 2½ miles SW. of Torquay; here is a 14th-century Bible Tower, last occupied by Miles Coverdale; pop. 14,400.

Paine, THOMAS, deistical and radical writer, was born at Thetford in Norfolk on 29th January 1737, the son of an ex-Quaker staymaker. He himself had by turns been staymaker and marine, schoolmaster, exciseman, and tobacconist, had married twice, losing his first wife, and soon separating from the second, when in 1774, with introductions from Franklin, he sailed for Philadelphia. On 1st January 1776 appeared his pamphlet *Common Sense*, which argued simply but strongly for complete independence, and which in Washington's words 'worked a powerful change in the minds of many men.' His *Crisis*, a twelvemonth later, gave the battle-cry, 'These are the times that try men's souls,' for the Americans' first victory at Trenton, where Paine himself was serving as a private; and congress rewarded him with the post of Secretary to the Committee of Foreign Affairs. He lost that post in 1779 for divulging state secrets, but was appointed clerk of the Pennsylvania legislature, and in 1785 received from congress \$3000 and the confiscated farm of New Rochelle. In 1787 he returned, by Paris, to England, where in 1791-92 he published *The Rights of Man*, the most famous of all the replies to Burke's *Reflections upon the French Revolution*. The work, of which 1,500,000 copies were sold in England alone, involved many in heavy penalties. Paine escaped to Paris, having been elected by the department of Pas-de-Calais its deputy to the National Convention. Here he voted with the Girondists, and at Louis XVI.'s trial he 'alone,' says Madame de Staël, 'proposed what would have done France honour—the offer to the king of an asylum in America.' He thereby offended the Robespierre faction, and in 1794 was thrown into prison, just before his arrest having written part i. of *The Age of Reason*, against Atheism and against Christianity, and in favour of Deism. Part ii. appeared in 1795, and a portion of part iii. in 1807. The book alienated Washington and most of his old friends; and it was not till after an imprisonment of eleven months that he was released and restored to his seat in the Convention. He became disgusted with French politics, and occupied himself chiefly with the study of finance, till in 1802 he returned to America. He died at New York, 8th June 1809. The stories about his intemperance were greatly exaggerated. In 1819 his bones were removed by Cobbett (q.v.) from New Rochelle to England; their whereabouts since 1847 is unknown. There is a memorial (1905) at New Rochelle, and a museum established in Paine's house there by the Thomas Paine National Historical Association, New York (founded 1906). 'Paine's ignorance,' says Sir Leslie Stephen, 'was vast and his language brutal; but he had the gift of a true demagogue—the power of wielding a fine vigorous English.'

The standard edition is Conway's (4 vols. 1894-96); there are biographies by 'Francis Oldys' (i.e. George Chalmers, 1791), Cheetham (1809), Rickman (1814), Sherwin (1819), Vale (1841), Blanchard (1860), Conway (2 vols. 1892), and Gould (1925). See also Sir Leslie Stephen's *English Thought in the Eighteenth Century* (1880); Alger's *Englishmen in the French Revolution* (1889); and pamphlets of the Thomas Paine National Historical Association.

Pains and Penalties. See ATTAINDER.

Painted Lady. See BUTTERFLY.

Painter, WILLIAM, author of the *Palace of Pleasure*, was born of Kentish stock in London about 1540, and studied at Cambridge. In 1560 he was master of Sevenoaks school, but early next year became Clerk of the Ordnance in the Tower, with a stipend of eightpence a day. He kept this post all his days, married, seems to have had a somewhat easy standard of honesty, grew rich, and bought lands. He made his will in 1594, and died

probably soon after. In 1566 he published the first volume of *The Palace of Pleasure* 'beautified, adorned, and well furnished, with Pleasant Histories and Excellent Nouells selected out of divers good and commendable authors;' the second volume, 'containing manifold store of goodly Histories, Tragical matters, and other Moral argument, very requisite for delight and profit,' followed in 1567. Of the first volume the principal source was the *Heptameron*; of the second, Bandello, through the medium of the French translations of Boastuau and Belleforest; but, in the definitive edition of the whole work (1575), to both parts stories were added from Boccaccio, Ser Giovanni, and Straparola. These last two at least he must have taken directly from the Italian. Painter's work became exceedingly popular, and indeed was the main source whence many dramatists drew their plots. Even in almost all Shakespeare's comedies we see the prevalence of the convention in early English comedy in favour of Italian plots, names, and places. Ascham in the *Scholemaster* denounces the 'bawdie stories . . . enchantments of Circes, brought out of Italie, to marre mens maners in England,' and there can be little doubt that here he points directly at Painter, though he does not name his book. Painter's English is easy and unaffected, but lacks the dignity the reader expects of an Elizabethan. His book is the largest work in prose between the *Morte d'Arthur* and North's *Plutarch*, but its real importance is that it introduced into our literature many of the best novels of Boccaccio, Bandello, and Margaret of Navarre.

Joseph Haslewood edited an admirable edition in 1813 (2 vols.); a later is that by Joseph Jacobs (3 vols. 1890).

Painter's Colic, or LEAD-POISONING. See LEAD.

Painting. This sketch of the history of painting may conveniently be divided into two main sections, the first dealing with the technical, and the second with the intellectual, history of the art.

(1) *The Technical History of Painting.*—The importance of technical conditions in the fine arts is due to their influence upon the action of the mind. For example, fresco-painting, if genuine, requires both speed and decision, oil-painting permits deliberation and correction almost without limit. Water-colour occupies, as to hurry, a position between the two. A technical facility allures the mind in certain directions, a technical difficulty impedes it, and a technical impossibility, like an insurmountable obstacle, diverts its energy into another channel. Each art has its own educational influence on the artist who practises it. Albert Dürer was an engraver with the burin, and he carried the strictness and precision of the burin into his painting; Rembrandt was an etcher, and he painted with an etcher's freedom; Turner was a water-colour painter, and his practice in oil bears evidence of his other skill. Fresco was painted either from drawings or from pure imagination. The deliberation possible in oil has led to painting from the life, with its consequences of increased reality, better knowledge, and more perfect truth. The improvement in water-colour has done for landscape what oil has done for the figure. As water-colour dries quickly it is convenient for sketching from nature, so that modern landscape-painters have been induced to study more in colour than their predecessors, a practice which has brought about a revolution in landscape-painting by taking it from the studio and the gallery into the open air.

Painting was not, in its origin, an independent art. It was employed in subservience to sculpture, to architecture, and to primitive engraving quite unconnected with printing. Rude idols were coloured in imitation of life, or rude outlines in-

cised in stone or wood were filled up with spaces of colour sharply separated and clearly distinguished. The outlines might also be themselves painted and then filled up with colour. Painting was separated from sculpture and engraving long before it was separated from hard and definite linear drawing.

Palæolithic painters, as at Altamira in north-west Spain, have left remarkably spirited paintings of animals in red, brown, and black. They painted on the walls of caves with iron ores, carbonaceous matter, pyrolusite, and kaolin. These were mixed with fat. The ancient Egyptians, painting in a kind of distemper or water-colour with dissolved gum, used white, a light yellow, a duller yellow, light red, dark red, light blue, green, brown, and black. Pure chalk supplied a white; the Egyptians were acquainted with a vegetable yellow; they were familiar with the ochres; cinnabar was to be had in Ethiopia; their blue was powdered blue glass, itself stained with copper, and when mixed with yellow it supplied a green; black was easily obtained from animal charcoal and other materials. It is a misunderstanding of Egyptian art to criticise it as a representation of nature; that was rendered impossible by ignorance of perspective and other technical deficiencies. It was intended to be at the same time a record and a decoration, and it effectually answered both purposes.

The remains of Assyrian painting are much less abundant than those of Egyptian, though it appears from the evidence of travellers that the Assyrians must have painted extensively upon internal wall-surfaces covered with plaster, and also upon tiles built together so as to make more or less extensive compositions. The little that we know of Assyrian and Babylonian painting leads to the conclusion that it was technically not more advanced than that of Egypt, and resembled it in being a record and a decoration rather than an imitation of nature. Outlines were still strongly marked and adhered to, and spaces were coloured flatly, almost as we colour them in heraldic painting. The painting of those early times is, in principle, much the same as that now employed upon playing-cards.

The supreme position of Greece in the art of sculpture has strongly predisposed many critics in favour of her painters, and it has long been believed that if we could see their works we should admire them as we now admire Greek statues of the age of Pericles. There are, however, very good reasons for believing that Greek pictures, even by the most famous men, would appear to us still primitive from the pictorial point of view, though it is certain that the drawing of the figures would be elegant and observant. We have no evidence whatever in the classical paintings which have come down to us that the ancients ever mastered the craft of painting in the modern sense—i.e. as an art which interprets truths of effect and which studies not only the *forms* but the *appearances* of nature. The great Greek painters must have been fine linear draughtsmen, and they would colour their drawings carefully; but all Greek art that is known to us has a clear and positive quality incompatible with the richness, the mystery, and the subtle visual truth of painting in its most advanced stages. With regard to the colouring of the Greeks, Sir Joshua Reynolds praised them for having used only four colours, and said that four are sufficient to make every combination required. Sir Joshua probably was thinking of flesh-colour only, which has since been painted by Etty with very few colours. Maclise said of Etty that 'with three colours and white—anything approaching to a yellow, a red, and a blue—he could produce a sweetly-coloured picture.' The Greeks in like manner might

colour 'sweetly' with few pigments, but it is not possible to imitate the full colouring of the natural world without a complete palette. Apelles himself could not paint a primrose with yellow ochre, nor a geranium with red ochre, nor is there any means of mixing black and white so as to imitate the azure of a southern sky. It is therefore of the greatest interest to ascertain whether the Greeks had a complete palette or not. Here the difficulty is to know at what date each pigment came into use. The vague expression generally employed is that certain colours were 'known to the ancients.' Of yellows Pliny says that Polygnotus and Micon used yellow ochre only. Vermilion is said to have been 'first prepared by Kallias the Athenian five hundred years before the Christian era,' and minium (red lead) was first used by Nicias, a painter of Athens in the time of Alexander. It is highly probable that the Greeks would be acquainted with Egyptian colours, and the Egyptians knew the madder-root. The Tyrian purple and Egyptian blue were too famous for the Greeks to remain ignorant of them. Yellow and red orpiment were also known to the ancient world. Blue-black made from burnt wine lees was used by Polygnotus and Micon, and ivory black is said to have been employed by Apelles. As for vehicles, there is a well-known passage in Pliny which Sir Joshua Reynolds interpreted as a description of glazing, that is, repainting with transparent colours; but it seems more probable that such accounts as have come down to us mean really no more than varnishing. The use of the word 'atramentum' by Pliny seems to imply that the varnish darkened the picture, which it would do if it were not colourless. It is generally believed now that the works of the Greek painters were executed in distemper and varnished afterwards, except their encaustic pictures, tediously executed with melted colours. Distemper or tempera (the Italian word for the same thing) is a kind of painting in which opaque colours, ground in water, are mixed with any kind of thin glue or white or yolk of egg with vinegar. We believe that the Greeks possessed oils and varnishes, but there is no evidence that they ever practised what we call oil-painting. However, a tempera picture protected by a coat of oil-varnish is distinguishable from an oil-painting only by experts. As to their palette, the probability is that the extremely restricted list of pigments which has been attributed to them was a matter of choice rather than of necessity for conventionally under-coloured work, or they may have begun their paintings with very few colours, as Titian did afterwards, and finished them with a fuller palette.

For a study of Roman painting our materials are much more abundant. We have no important works by famous artists, but there is an ample supply of such ordinary painting as was applied to the decoration of houses and tombs; and from this we may infer at least the technical condition of higher art. The variety of pigments was evidently sufficient to give a full scale of colouring by mixture or superposition, and, as oils and varnishes were known, it might have been possible for oil-painting to arise under the Cæsars. Everything was ready for it as everything was ready for printing, yet the final step was not taken. The art of tempera or size-painting remained technically much what it had been before, except that there may have been greater freedom in execution and in choice of subject. Classical taste in painting continued with a tradition of old methods for a considerable time after the introduction of Christianity, and even when the nude figure was no longer a subject of study tempera painting was still practised, though more stiffly than in classic times. The

distance from the painters of Pompeii to mediæval work is marked by more than a technical decline.

In reading histories of painting we may be on our guard against the careless and inaccurate employment of the word 'fresco.' It really means painting on fresh plaster—i.e. on plaster that is still wet; but the word is inaccurately used for paintings on dry plaster also. The practice of painting on walls covered with plaster is as old as ancient Assyria, and it has been believed that the ancient Greeks understood true fresco, principally on the strength of an expression of Plutarch, *eph' hūgreois zōgraphēin*, 'to paint on a wet ground.' Vitruvius, too, speaks of a wet ground, and, although he does not directly say that it was painted upon *when wet*, he says that, so prepared, it was fit for pictures, and that colours on it are permanent. This permanence of the colours is the characteristic of true fresco. Unfortunately, Plutarch compares painting on the wet with encaustic as evanescence to permanence.

Whatever may be the real antiquity of true fresco, it is certainly much older than oil-painting. The technical process (see *FRESCO*) was well understood and practised in Italy in the middle ages, when mural painting in churches was already in great request, and when art itself was still in a primitive condition.

Cimabue, Taddeo Gaddi, and Giotto, with many less known men, painted in fresco as well as in tempera, so that all the technical part of the craft was a matter of ancient tradition when Raphael and Michelangelo took it up on their own account, and brought to it far greater powers of mind. To appreciate the progress made before these great men it is necessary only to refer to the stiff and mindless Byzantine art from which that of Cimabue was already a partial emancipation.

After the invention of oil-painting the inconveniences of fresco were more strongly felt, and many artists turned away from it to the new process. True fresco cannot be retouched; it has to be painted darker than the artist's intention, as it lightens in drying, and it must be painted from sketches or cartoons. On the other hand, it is luminous and has no gloss, and so is suitable for mural decoration. Raphael seems to have liked fresco and oil equally well. Michelangelo greatly preferred fresco, as better suited to his powers. Leonardo da Vinci painted his great mural work, 'The Last Supper,' in oil, though fresco must have naturally suggested itself.

Many modern attempts to revive fresco have been made in Europe. They have rarely been successful, and have especially failed in the Houses of Parliament, where many works have decayed prematurely. Modern failures have led to the adoption of a process on dry plaster, fixed afterwards with water-glass in spray, as in Maclise's large works in the Royal Gallery; but this is not absolutely durable. The best substitute for true fresco appears to be Gambier Parry's 'spirit fresco,' employed by Lord Leighton for his large compositions at South Kensington. These are painted with a spirit medium on dry mortar. In France a substitute for fresco has been found in painting on canvas with a dead surface, the canvas being afterwards fastened to the wall with white lead. True fresco may now be considered almost a dead art.

The next step of importance in the history of art is the discovery, or earliest known practice, of what we call 'oil-painting,' which includes the use of varnishes during the progress of the work. This has been generally assigned to Jan van Eyck, who was born about 1390; but it is now believed that his elder brother Hubrecht may have an equal if not a better claim. Both certainly worked in the new method, and Jan continued it after his

brother's death. Since then the practice of oil-painting and of varnish-painting has been carried without interruption down to our own time, and, though it has undergone much technical development, it remains essentially distinguished from tempera by the mixture of oil or varnish with the colours themselves and by the consequences in execution to which this mixture has led. The brothers Van Eyck themselves were far from anticipating the future freedom and power of oil-painting. Their work was beautifully executed in a smooth and simple way, and, with the exception of small cracks, it has lasted wonderfully; but their careful rendering of detail belongs to the infancy of art. An Italian student of painting, Antonello da Messina, stayed in Flanders for some time and worked under Jan van Eyck. He afterwards returned to Italy by way of Venice, and from him the knowledge of the new method spread to Florence, and thence to the other cities of Italy. His death, in Venice, apparently occurred in the last years of the 15th century.

It may be convenient to remember that the year 1500 saw the practice of oil-painting firmly established in the north and south of Europe. It did not immediately win the absolute pre-eminence that it has subsequently attained. Michelangelo expressed a contempt for it, which was probably due to the fact that its full powers were not yet developed by his neighbours. The fame of Raphael as an artist is due to other qualities than the technical merit of his oil-painting, which remained comparatively primitive. The earliest practice of oil-painting was dependent upon the luminous quality of the ground showing through the colours; and, although the early oil-painters manifested a workman-like skill in dealing with their materials, they displayed no power of handling. The manual precision of Albrecht Dürer has never been surpassed, yet his work as a painter is primitive. Roman painters of the time of Michelangelo might use oil as a convenience, but they could have expressed themselves as completely in fresco or tempera. When we come to the Venetian school the case is very different. There was a harmony between the technical methods of oil and the genius of the Venetians which led to the highest technical excellence. Van Eyck and his followers, both in Flanders and Italy, painted upon a transparent monochrome. Titian used a substantial dead-colouring in which he could make whatever alterations he chose, and afterwards worked upon that by successive glazings till he obtained the utmost richness of quality. The notion that Titian had some secret that died with him may be dismissed as purely fanciful. His method of painting is well known, and his superiority to his imitators may be accounted for by his natural genius and by favourable circumstances. His master, Bellini, drew carefully and coloured well, but his work is still primitive, because it is still coloured drawing. In Titian's painting the different kinds of technical knowledge are so completely fused together that he is not the draughtsman who colours, but the painter. The same is true of Giorgione, almost equally gifted, but less favoured than Titian in the circumstances of his life.

Rubens was a great master of the *technique* of painting in another way. He painted much in transparent or semi-transparent colours over a first painting in transparent brown monochrome; but, instead of leaving the lights thin that the white ground might show through as in the practice of the early Flemish painters, Rubens loaded his lights with thick opaque colour. His way of painting was technically very systematic, which permitted an extreme rapidity. There is evidence that he followed the early practice of mixing

varnish with his colours, at least when transparent and for linear sketching with the brush. The technical execution of Velázquez is a model of excellence in the use of both transparent and opaque colours and in variety of handling. It is not so methodical as that of Rubens, being always subordinated to the artistic intention of the painter.

The most perfect works on a small scale have hitherto been those of the Dutch painters, Teniers, Terburg, Metsu (or Metzu), Maas, Peter de Hooch, and many others of the same school. Their method of painting was almost universally to begin with a transparent brown monochrome on which they painted the shadows thinly, giving more substance and opacity to the lights. Being limited in their aims, and painting chiefly what they could see around them and study at their own convenience, they attained a high degree of technical excellence. Their drawing is almost invariably careful and true, and their colouring harmonious, whilst the quality of their textures is often inimitable.

The practice of modern artists is always founded upon that of one or other of the masters we have mentioned. There are not very many ways of painting, or if they seem to be many they are reducible to a few very simple principles. The early method of giving luminous quality to the lights by letting the white ground show through them is seldom followed in these days, but it has been resorted to occasionally. The practice of Rubens, by which the shadows are painted thinly and the lights more thickly, is much commoner in the modern schools. Reynolds, who painted first a strong dead-colour with few colours and glazed upon it afterwards, worked on the principle of Titian. Landseer's practice was essentially that of the Flemish school, and Meissonier's (in his best works) that of the Dutch. Turner approached much more nearly to the Venetian practice than to that of Rubens, as he dead-coloured broadly and afterwards painted in detail on the dead-colour, using glazes and scumbles (opaque colour used thinly); but Turner's practice was complex, as he often had recourse to water-colour in his oil-pictures, and finally loaded his lights. Ingres, the leader of the classical French school, was a close follower of Raphael. It is difficult to point to any real technical originality in modern art, unless it be the use of thick pigments in the French school (called in French, *pleine pâte*) introduced by Decamps, and often exaggerated by his imitators. The novelty here was, however, rather in the brush-work than in the use of thick pigments themselves. Many French artists have also blurred their outlines in revolt against the clear definition of the classical school, but the originality was rather in the manner of doing it than in the mere softening of the outlines, as Titian, Correggio, Reynolds, and others had already carefully avoided the early hardness of definition.

Although the technical methods of oil-painting are few and have now been known for centuries, the varieties of *quality* which result from individual genius are almost as numerous as artists themselves. They cannot be explained without examples; but it may be said generally that, as different violinists elicit different qualities of tone from the same instrument, so the idiosyncrasy of painters produces new results with old colours and old processes. It is in this way, and not by the invention of novel methods, that the art continually renovates itself.

Oil-painting now holds the first place on account of its convenience, as it permits of infinite deliberation and alteration, and also on account of its great power and truth in imitating the textures and tones of nature. But the true successor of fresco in modern times is water-colour. It resembles fresco

very closely by its rapidity and by the absence of gloss, though it cannot replace fresco in mural decoration. Water-colour, as a process, is much more ancient than oil, having been extensively employed in various ways during ancient and mediæval times; but the method of using it that gives the process its present intellectual value is essentially modern and English, dating from the early years of the 19th century. The practice of the 18th century led up to it by the use of broad washes in sepia or in neutral tint, afterwards more or less coloured, an adaptation of the Dutch and Flemish practice in oil-painting, except that the finished result stopped very far short of full colour. The water-colour of the present day has discarded the monochrome wash, beginning with pale washes in colour, and working from light to dark. In its perfection modern water-colour is distinguished by extreme freshness and brilliancy. It is important not only as an independent art, but by its great influence on modern oil-painting. The majority of oil-painters have themselves employed water-colour as an auxiliary for studies, especially in landscape, and much of the light and air in modern oil-painting may be attributed to its influence. Water-colour, in the 19th century, proved a compensation for failure in the attempted revival of fresco. Though apparently of inferior importance, because practised on a small scale, it has taught what fresco taught and more, as it has educated us in landscape. Improvements in the materials of water-colour have led some of its practitioners to attempt rivalry with the force of oil, which is unnecessary, as oil must ever remain the more powerful medium of the two, and water-colour has its own superiorities in freshness and delicacy. There does not seem to be any probability that either of the two arts will ever be replaced by a new discovery as tempera was superseded by oil, nor is it likely that the technical methods will be improved. There is room for improvement in a stricter abstinence from the use of evanescent or destructive colours; but unfortunately very few artists trouble themselves to secure the permanence of their works.

Water-colour was despised in France until the fall of the second empire; but the example of English artists has led the French to the study of it, and now many of them pursue it with success. Their methods of work are usually very simple and direct, and their influence is almost exclusively in favour of freshness and decision.

(2) *The Intellectual History of Painting.*—Under the Egyptian dynasties painters were recorders of events and decorators; in Assyria they illuminated a sort of pictorial history of royal deeds. In both these cases there could be very little room for the exercise of individual intellect in the artist, who was seldom more than a manual workman, laying on colour according to methods prescribed for him by authority. Even in Greece we have evidence that the manual skill of artists was despised as handicraft by the class of gentlemen and scholars; however, Greek painters of eminence attained individual distinction, and such a complete degree of personal emancipation that they were free to exercise whatever intellectual power they possessed. There is not much expression in Greek sculpture, but there is some, and what there is proves quite sufficiently that the subtle and acute intellect of Greece could express itself in art as effectually as in literature. What remains to us of Greek and Roman caricature is good evidence of faculties that might have exercised themselves, by an alliance with a higher form of art, in what we now call genre-painting. Still, we have no direct proof that the fine arts in Greece ever really were intellectually so great as her poetry, her philosophy, and her drama. In the decline of classical art we find little

more than the current production of an inferior class of men for the adornment of habitations or tombs. The beginnings of Christian art, stiff in design and laboriously ornamental, give hardly any evidence of intellect; the artists who produced that art were in a condition of mental servitude, like that of those modern descendants of the early Byzantine school—the makers of holy icons in Russia. As the fine arts became gradually emancipated from the thralldom of sacerdotal authority intellectual power began to show itself, and, at length, when the human mind was stimulated in so many directions by the great outburst of the Renaissance, the art of painting had its full share in the general activity, and assumed a place by the side of literature which it has ever since maintained. Nevertheless, the necessity for high manual accomplishment and technical mastery must always, in painting, give an advantage to the workman over the thinker; and so we find, as in many Dutch pictures, that clever representations of the most commonplace subjects preserve their value though almost destitute of mind. There can be no more striking contrast than that between a Dutchman toiling for six weeks on the representation of a besom and Michelangelo painting a prophet in half a day; yet the Dutchman is immortal too. The intellectual progress of art has been marked by the extension of its sympathies. Under Christianity the art of painting began again from the beginning, without either technical or intellectual preparation. Its first awakening of sympathy is with the human side of Christianity, the love of mother and child, the sufferings of the crucified Christ, the sorrow and bereavement of the disciples. As religious art advances, its mental progress is shown by the increasing importance given to the human side of its subjects and the diminution of ornament in dress, till at length the dresses become simple draperies, almost without jewels or embroidery, and the charm of the work lies in the beauty or nobility of the faces and the dignity of the attitudes. With the Italian Renaissance the art of painting made a great intellectual advance by its sympathy with what was then the new activity of scholarship. Raphael was, if not himself a scholar, the intimate friend of scholars, working constantly under their influence; besides which he was an architect and an archæologist. The selection of 'The School of Athens' as the subject of one of the most important mural pictures in the Vatican is most significant. In Leonardo da Vinci the artistic is united to the scientific intellect; in Rubens it is united to the broadest culture of the scholar and the man of the world. Rembrandt may not have been a learned man, but few authors or artists have shown more sympathy with different classes, or have discerned so well the dignity that may belong to the learned or the unlearned, to the rich or the poor. The pictures and etchings of biblical subjects by Rembrandt bring them nearer to us by their homely truth than the ideal conceptions of Raphael. Surely we cannot refuse the title 'intellectual' to an art which contains a philosophy at once so comprehensive and so ripe. The faculties of Teniers and Ostade are narrower and lower, yet even in their works there is a sympathy with the humbler classes which has lasted down to the art of our own day, which was lively in the art of Wilkie, and is graver and more profound in the work of Israels.

All portrait-painting of any importance has endeavoured not only to copy the features, but to express as much as possible of the mind; and the knowledge we derive from historians and biographers is felt to be incomplete until we have referred to the canvases of some observant contemporary

artist, some Holbein, Van Dyck, Velázquez, Reynolds, or Raeburn. Even in these days of photographic invention the portrait-painter keeps his place, great portraits are painted still, and future students of history will not be satisfied with the photograph alone, but will go for the intellectual element to the canvases of a Millais or a Bonnat. Closely connected with portraiture is the art which observes and records the passing phases of social life, an art which reached perfection in the 18th century in the strongly characterised and too truthful pictures of Hogarth. The representation of contemporary life, in drawing-rooms and elsewhere, has been actively pursued down to our own day in all the leading schools of Europe, and is now practised more than ever, especially in France, where the artists are tempted by the elegance of modern interiors and the grace of feminine costumes.

In the 19th century there was also much retrospective painting, particularly of the 18th century, and this led to a very close and minute study of that century by Leslie in England, Meissonier and Gérôme in France, and many other artists of ability. The retrospective tendency of our own time has been strongly manifested in other ways. The modern interest in the past has been shown by much 'historical' painting on insufficient data representing personages whose portraits we do not possess, in buildings that have left no trace, and engaged in actions known to us only by the meagre narrative of some chronicler. Art of this kind possesses no real historical interest, though it may display considerable artistic ability. Of late years it has been in a great measure superseded by archaeological painting, skilfully practised by Sir L. Alma Tadema and his followers, whose object has been to revive the past in its details as it really was by representing everyday life without much pretence to the portraiture of individuals or the recording of particular events. This kind of painting has brought the art nearer than ever to the spirit of scholarship. No doubt the special interest of it is outside of artistic interest, but there is no reason why archaeological pictures should not be as beautifully drawn, as well composed, and as richly coloured as any others.

A sketch of the history of painting would not be complete without some notice of the way in which landscape became a speciality. Rude and childish landscape backgrounds are found even in Assyrian art, they are not uncommon in Greek and Roman antiquity, and they attained a considerable degree of freedom and observation in the backgrounds of the paintings at Pompeii. After the death of classic art, painting began again from its first rudiments in the ornamental art of the middle ages, and the study of landscape soon revived in the backgrounds of religious pictures. Mediæval landscape lasted down to Raphael, who was himself essentially a mediæval landscape-painter, especially in his early works. The general characteristics of that kind of landscape are clear atmosphere, pure skies, either cloudless or with a few white clouds, pale blue distances with hills, green foregrounds, and almost invariably one or more well-kept buildings. Trees in the foreground are usually slender, with thin twigs and few leaves visible almost separately against the sky; in the distance they may be more massive. Water is usually calm in ponds or winding rivers, or serene in distant sea. Rocks occur in mediæval landscape, but are seldom accurately represented, the mediæval ignorance of rocks having even persisted in Leonardo da Vinci notwithstanding his scientific genius. In the backgrounds of Albert Dürer all kinds of objects are observed and set down as in a catalogue; he perceived the grandeur of mountains,

the abundance of forest trees, the picturesque beauty of mediæval towns, and he took an interest in all the details of the foreground; but he never fused his details into one connected whole; he never saw nature with the eye of a landscape-painter; he had no sense of atmosphere or effect. The beginning of the modern landscape spirit is to be sought for in Venice. Titian made many studies of landscape, and, although in his pen-drawings there is no recognition of local colour and very little effect, there is a remarkable sense of grandeur and a fine grasp of noble scenery, not in detail merely, but as a whole. In his painted landscape backgrounds Titian goes still further and attempts transient effects, showing himself a true precursor of the modern landscape-painters. Tintoretto occasionally exercised his magnificent powers in the same direction. The most influential of professed landscape-painters was Claude. He had not the power of the Venetians, but he had a tenderness and charm, and a sense of grace and beauty, that won the hearts of contemporaries and have since maintained the celebrity of his name, though it is easy for criticism to point out deficiencies of knowledge. Unlike Dürer, Claude saw nature, not in details, but synthetically in complete pictures full of atmosphere and light. Salvator Rosa and Gaspard Dughet (or Poussin) maintained a grandeur of conception and style in landscape which, in spite of a certain remoteness from pure nature, tell effectually in picture-galleries even at the present day.

The same may be said of Gainsborough, whilst Wilson perpetuated in England a feeling for landscape akin to the amenity of Claude. Cozens and Girtin had the old breadth and serenity of conception, with a more modern view of nature, and Turner did not manifest much personal independence until he had first studied and imitated the old masters, particularly Claude. Indeed, he is much more closely connected with the past than with the future of landscape-painting. He had the deepest respect for the older masters, whom he both studied and imitated, yet he founded no school and has had little influence on the art of England and none on that of continental Europe. Constable, on the other hand, who during his lifetime was a less celebrated artist, has had a very far-reaching influence. The freshness and originality of his view of nature, less poetical and imaginative than Turner's, but nearer to rustic reality, determined the future direction of that French rustic school which in its turn has influenced all the schools of Europe. Whilst England has had her poet landscape-painter in Turner, France has had hers in Corot, a painter of at least equal celebrity, though of much narrower range. Like Turner, Corot founded his art on the study of Claude, but won public favour late in life by a delicacy of sentiment which was his own. His subjects were simple and his effects chosen so as to avoid strong colouring, but he composed beautifully and was a master of quiet grays, pale yellows, and browns.

Since the middle of the 19th century landscape-painting, both in oil and water-colour, has been actively pursued all over Europe, every class of scenery finding its own interpreters. Marine painters in all countries appear to concentrate their attention more than their predecessors upon the sea itself, and English, French, and American artists alike have produced remarkable studies of waves.

It may be of interest to give a brief outline of the sects which have divided artists. The chief of these have been the Classics, the Romantics, the Realists, the Pre-Raphaelites, the Impressionists, and the Post-Impressionists. The classical aim was the pursuit of the ideal, which was believed to be *one* and to have been attained by Raphael; this school was represented by the

French painter Ingres. The Romantics desired freedom from the classical restraint, and liberty to illustrate all literature and all history that interested them in their own way; their great man was Eugène Delacroix. The doctrine of the Realists is the right to represent persons and things as they are without beautifying them by idealisation. This doctrine was at one time represented by the French painter Courbet; but, in fact, there was a great deal of downright realism long before his time, as we find it in Velázquez, Rembrandt, Teniers, Ostade, Hogarth, and many others, who have redeemed the ugliness of a subject by the intelligence of their treatment and the force of their execution. Even in the case of Courbet himself we now easily see that, although he affected to take nature exactly as it is, he displayed the wilfulness and the style of an artist. English Pre-Raphaelitism was not alone in its return to the painstaking imitation of detail which marked the practice of Raphael's predecessors. Like the continental movements in the same direction, it was a return to patient analysis, and had a disciplinary value; but the accumulation of artistic experience was too much for it. After Titian, Velázquez, and Reynolds, it is not possible to bind down the art of painting permanently to the minute practice of the early masters. Intellectually the movement was of more importance, as it favoured the choice of noble subjects. Impressionism asserts the importance of visual truth as opposed to mere truth of fact, and affirms that painting ought not to represent what *is*, but what *appears*. Impressionism is also opposed to the abstract rendering of this or that quality; it requires a synthesis of all visible qualities as they strike the eye together. The Impressionists claim several great artists, especially Turner and Constable, as their predecessors. They are equally opposed to the detail of the minute painters and to the hard, clear, linear definition of the classical schools. If sound theoretically, in practice their art has often proved unsatisfactory.

At the end of the 19th century Impressionism was everywhere triumphant; but reaction came with the 20th. To this reaction in its various manifestations the general name 'Post-Impressionism' (also 'Neo-Impressionism,' and 'Expressionism') has been given. As opposed to the Romantics and Realists, the movement, which is an outcome of as well as a reaction from Impressionism, claims to be a return to the tradition in painting represented by Raphael, Poussin, David, and Ingres. At the heart of Post-Impressionism lies a breaking away from a subordination to external and visible things; these, it is held, are to serve only as a means towards expressing the artist's emotions. Post-Impressionism as a movement is essentially French in origin. Apart from the Dutch painter Vincent van Gogh (1853-90), its chief precursors have been Paul Cézanne (1849-1906), Georges Seurat (1859-1891), Henri Rousseau (1844-1910), Gustave Moreau (1826-1898), and Paul Gauguin (1848-1903). Combining in different degree the several ideas of these painters, various groups of Post-Impressionists have arisen. Thus Symbolists stress the doctrine that a work of art must aim at the expression of an idea, and claim that, in so far as form must be used in that expression, a work of art must necessarily be symbolic in character. Closely akin in method to the Symbolists are the Fauves. Cubists represent a reaction not merely against Impressionism and the chaotic art which had grown out of it, but also against Fauvism; Cubist art is essentially abstract in character, and stands for the introduction of order and discipline into painting; in its attempt to represent conceptions it rejects entirely the reproduction of natural appearance, and that is,

indeed, its central point; questions relating to the representation of the third dimension—an element of resemblance to Nature here being introduced—have divided Cubists into various groups. Futurists, deriving their name from a complete disparagement of past achievement, reject Cubism, and claim to surpass Impressionism, though accepting it as their point of departure; their aim is to represent, not the appearance of objects at some particular point in time, but the sensation of movement and growth itself; Futurism, which has had no more than a transient influence, is, unlike Symbolism, Fauvism, and Cubism, not of French but of Italian origin. Vorticism, an English development, in part rejects Futurism, in part accepts it, but joins the modern movement as a whole in claiming that the artist's task is not to copy Nature but to create new realities; these realities are to be expressed in forms which proceed from the artist's 'vortex,' this vortex being a general conception of relations in the universe, through which for each individual ideas pass and take concrete shape.

Painting as an art is now completely free from all former restraints of religious or classical authority; within recent times, too, almost every school has developed in a manner quite independent of national artistic ancestry; a certain freshness in consequence pervades most modern work. Schools of art are now no longer national, and painting has become cosmopolitan to a degree impossible for literature. Paris has become the capital of the art, and the northern European countries send their students there as once they sent them to Rome. The clever and promising American school, though still in the main an offshoot from the French, shows signs of developing distinctly American characteristics. Manual skill has, perhaps, never been so general as now, but the intensity of the commercial struggle amongst the great multitude of artists is certainly not favourable either to learning or to refinement, and it is doubtful whether painting makes any advance in taste and culture corresponding to the increase of its productiveness or the extension of its fields of study.

Chronology.—The extent of the subject renders laconic treatment necessary. Archaic Greek drawing, marked by want of proportion, especially in thickness of limbs, lasts in vase-painting throughout the 6th century B.C. and later. In 5th century better drawing on many vases; in 4th century it is often learned and beautiful, as on Camirus vase (British Museum), contemporary with Protogenes. Attitudes then easy and graceful, faces shown in all positions; 5th and 4th centuries B.C. golden age of antique painting, including Apollodorus, Zeuxis, Parrhasius, Apelles, Polygnotus, and Micon. Romans imported Greek pictures and took up painting by imitation. Roman painter Ludius (Augustan age) anticipated Claude in choice of subjects. Paintings preserved at Herculaneum and Pompeii, and in baths of Titus, belong nearly to Christian era, some earlier, others a few years later. Pompeian painting shows interest in ordinary life and in landscape. Classical art is, in feeling and principle, prolonged for six centuries in the service of Christianity.

The middle ages are divided by Woltmann into (1) Early, from 700 to 950 A.D.; (2) Romanesque, from 950 to 1250 A.D.; (3) Gothic, from 1250 to 1400 A.D. Thus the three periods are 250, 300, and 150 years. Throughout these ages, speaking generally, the human motive of art is religious, and its artistic motive is ornament. In the middle ages figure design began again from a barbarous infancy, it being necessary for the representation of religious personages. From 8th to 13th century childish drawing and gaudy colouring prevailed throughout Europe. In 13th some partial improvement takes

place, and in 14th the advance is remarkable when Claes Sluter carved his life-like statues. The Brothers Van Eyck (q.v.) were born in this century.

The 15th century is the time of transition from the art of the middle ages to an improved craft of drawing and painting preparatory to the Renaissance. Improvement is simultaneous in Flanders and Italy. Van Eyck's work was known in southern Europe, his influence only technical, and soon died out in Flanders itself. Roger van der Weyden (died 1464) worked differently, having stayed in Italy and exercised much influence in Flanders and Germany. His pupil, Hans Memlinc, died in 1495.

The 16th century is remarkable for its extension of the subject-matter of painting. Before 1500 the art is chiefly confined to religious subjects and portraits, afterwards it includes more of what we now call genre—a change associated with the name of Quentin Matsys (1466–1530). The nude was introduced into Flemish art from Italy by Jan Gossart (died 1532). After this date Flemish painters went much to Italy, which produced a hybrid school called the 'Italianised Flemings'—e.g. Michael Coxis (1499–1592), spent many years in Italy. The first Flemish school, now at an end, was influential in Germany; Roger van der Weyden had German pupils. Cologne and Nuremberg were active centres. Martin Schongauer lived in Rhineland in the 15th century. Hans Holbein the elder, of Augsburg, lived in 15th and 16th centuries. His famous son, Hans (1498–1543), represents the perfection of German realism in portrait. Albert Dürer (1471–1528) stands for Germany, coming out of, but not yet delivered from, the middle ages. His contemporary, Lucas Cranach (1472–1553), was like Dürer, laborious and productive. Dürer visited Venice 1506, and was admired for his skill (particularly by Giovanni Bellini), but had little influence. German hardness and minuteness of finish culminated in the comparatively mindless art of Denner (1685–1747).

Italian painting is minutely divided into local schools, and these again chronologically into three or four stages of development. Masters of 14th century divided into Tuscans, Siene, Bolognese, Paduan, and Neapolitan; those of the 15th into Tuscan, Umbrian, Paduan, Veronese, Milanese, Venetian; those of the 16th are headed by the well-known great individualities. The schools affect each other—e.g. it is difficult to disengage Roman and Florentine art, whilst the Umbrian school gave strength to Rome. The following list gives the most famous names.

14th Century—Tuscans.—Giotto (1276–1336), Taddeo Gaddi (1300–66), Orcagna (died before 1376). *Siene.*—Duccio (still living in 1339), Angelico (1387–1455).

15th Century—Tuscans.—Paolo Uccello (c. 1400–79), Masaccio (1452–28), Filippo Lippi (1412–69), Ghirlandajo (1449–98). *Umbrians.*—Pietro della Francesca (living 1494), Giovanni Santi (died 1594), Pietro Perugino (1446–1524). *Bolognese.*—Francia (1450–1517). *Paduans.*—Andrea Mantegna (1431–1506). *Venetians.*—Antonello da Messina (1414–93), Gentile Bellini (1421–1507), Giovanni Bellini (1426–1516).

16th Century—The Great Masters.—Leonardo da Vinci (1452–1519), Michelangelo (1475–1563), Raphael (1483–1520), Correggio (1494–1534), Giorgione (1478–1511), Titian (1477–1576), Tintoret (1512–94), Paul Veronese (1530–88). Other Italians of eminent, but not of supreme, rank in the 16th century are Luini (living 1500–30), Volterra (1509–66), Andrea del Sarto (1488–1530), Sebastiano del Piombo (c. 1485–1547), Palma Vecchio (c. 1480–1528), Moroni (c. 1525–78).

In the north of Europe there was a new development occupying the 17th century. In the year 1600 Rubens was an accomplished artist (died

1640). Snyder (1579–1637) his most powerful contemporary, and Van Dyck (1599–1641) his most eminent scholar. David Teniers, the father (1582–1649), was eclipsed by David Teniers, the son (1610–94); the latter gave genre-painting a firm position. Gonzales Coques (1614–84) was a portrait-painter. Passing to Holland we find Frans Hals, a contemporary of the elder Teniers (1584–1666), and a painter of remarkable certainty and spirit. The greatest of the Dutchmen, Rembrandt, belonged entirely to the 17th century (1607–69). The fame of Rembrandt greatly increased during the 19th century, and so did that of Frans Hals. Rembrandt had distinguished pupils, like Dow and Flinck, and he influenced many artists. Terburg, genre-painter, was Rembrandt's contemporary (1608–81), also Metsu (1615–58). These carried genre-painting to perfection. Landscape also prospered in Rembrandt's time, chief representatives being Ruysdael (c. 1628–82) and Hobbema.

In Spain a primitive school was founded as early as 1450. In the 16th century local schools developed themselves. Eminent foreign artists visited Spain and worked there, as in England. Of the Spaniards themselves, few have become celebrated out of their own country. Ford's list includes only thirty-seven names; the National Gallery only seven, and of these one was a Greek. Only five Spanish artists are represented in the Louvre. The fame of the school is due almost entirely to Velázquez (1599–1660) and Murillo (1616–82). Next to these come Zurbaran (1598–1662) and Ribera (1588–1656); Morales (c. 1509–86) is also known. Goya (1746–1828) is the only great Spanish artist between the old masters and our contemporaries.

The French school before developing a character decidedly of its own was subject to foreign, chiefly Italian influences, especially after the Renaissance. François Clouet (c. 1500–72), one of the earliest French masters, was naturalised, and probably of Flemish origin, like his accurate method of work; Jean Cousin (1500–89) worked under Italian influence; Vouet (1590–1649) studied, lived, and married in Italy; the great Poussin (1594–1665) lived nearly forty years in Rome, and died there; Claude le Lorrain (1600–82) lived fifty-five years in Rome, where he, too, died; Lesueur (1617–55) refused to go to Rome, but was influenced by Raphael; Le Brun (1619–90) studied four years in Rome, like other eminent Frenchmen since his time. The following artists are essentially French: Rigaud (1659–1743), Watteau (1684–1721), Lancret (1690–1743), Chardin (1699–1779), Boucher (1704–70), Greuze (1725–1805), Fragonard (1732–1806), Prud'hon (1758–1823).

In the British school the seven names which follow are at the same time distinctly national, and generally recognised by continental criticism. They occupy in this respect a position similar to that of the few Spanish masters who are generally known: Hogarth (1697–1764), Reynolds (1723–92), Gainsborough (1727–88), Turner (1775–1851), Constable (1776–1837), Wilkie (1785–1841), Landseer (1802–73).

Technical Chronology.—400 B.C., white-lead of this date has been found at Athens; 1398 A.D., Indian ink prepared in China as now; 1350–1400, true fresco used in Italy; 1500, oil-painting generally adopted; 1710, Prussian blue discovered by Diesbach of Berlin; 1787, zinc white suggested by Courtois of Dijon; 1802, Thénard discovers cobalt blue; 1814, discovery of emerald green; 1814, first discovery of existence of artificial ultramarine and prize offered for its manufacture soon afterwards won by Guimet of Lyons; 1814, cappagh brown found on Lord Audley's estate; 1817, cadmium discovered by Stromeyer; 1834, zinc white prepared by Winsor and Newton as Chinese white; 1838, discovery of chromium green by Pannetier and Binet; 1850, water-glass painting introduced. Of the

ten colours chosen for permanence in Professor Church's restricted palette six were discovered during the 19th century.

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Paisiello, GIOVANNI (1741-1816), a Neapolitan composer. Besides more than ninety operas (including a *Barbiere di Siviglia*) Paisiello composed over a hundred masses, requiems, and cantatas.

Paisley, a manufacturing town of Renfrewshire, stands on the White Cart, 3 miles above its influx to the Clyde, 7 WSW. of Glasgow and 16 ESE. of Greenock. Although commonly identified with the *Vanduaora* or *Vindogara* of Ptolemy, which Skene places rather at Loudoun Hill in Ayrshire, it first is heard of certainly about 1157 as *Passeleth*, a possession of Walter Fitzalan, the first Scottish ancestor of the royal Stewarts (q.v.). He founded here six years later a Clugniac priory, which was dedicated to SS. James, Mirin, and Milburga, and which in 1219 was raised to the rank of an abbey. It was burned by the English in 1307; suffered much at the Reformation in 1561, and still more by subsequent vandalism; and now is represented chiefly by the aisled Decorated nave (15th century: the Abbey parish church, restored since 1862), and by the chapel of St Mirin, called the 'Sounding Aisle' (1499), with the altar-tomb of Marjory Bruce. In the ruined choir of the abbey is a memorial of the Stewarts placed there by Queen Victoria (1888). Near the abbey are statues of Wilson the ornithologist and Tannahill, who, like Professor Wilson ('Christopher North'), were natives of Paisley. There are also fine statues of George A. Clark, founder of the town-hall, and (since 1891) of Sir Peter and Thomas Coats. Motherwell and Alexander Smith were residents; and the latter describes the town well in *Alfred Hagart's Household*. Elderslie, 2 miles W., is the traditional birthplace of Wallace.

The public edifices include the municipal (formerly county) buildings (1818); new sheriff court-house (1885); the fine Clark town-hall,

Italian in style (1879-82); the new county buildings (1891), containing one of the finest council halls in Scotland; the Coats free library and museum (1871) with a picture-gallery and an observatory; the grammar-school (1576; rebuilt 1864); the Neilson educational institution (1852); and the Technical College and School of Art. The Coats Memorial Baptist Church (1894) is, it is claimed, the finest ecclesiastical edifice built in Scotland since the Reformation.

The linen, lawn, and silk-gauze industries, important during the 18th century, are now extinct; as, too, are the 'Paisley shawls,' so celebrated between 1805 and the middle of the 19th century, their sale sometimes exceeding £1,000,000 per annum. The manufacture of linen sewing-thread, introduced in 1722 by the witch-denouncer Christian Shaw of Bargarran, has been nearly superseded since 1812 by that of cotton thread, which has assumed gigantic proportions. There are also works for dyeing, bleaching, the manufacture of tartans, woollen shawls, carpets, chemicals, starch, corn-flour, soap, paper, and preserves, for engineering, the building of motor-cars and ships, &c. The Cart, which has been navigable since 1786, was finally deepened to 18 feet in 1888-90. Paisley was made a free burgh of barony in 1488. Since 1833 it has returned one member to parliament. Pop. (1801) 24,324; (1841) 48,125; (1881) 55,627; (1921) 84,837.

Palacio Valdés, ARMANDO, a distinguished Spanish man of letters, born at Entralgo, Asturias, in 1853, won notice first as a critic, then turned to novel-writing in 1881. Notable works are *Marta y María* (1883), *El Idilio de un enfermo* (1884), *José* (1885), *Riverita* (1886), *Los Majos de Cádiz* (1896), *La Algeria del Capitán Ribot* (1899), *Tristán* (1906).

Palacky, FRANTIŠEK, a Bohemian historian, was born 14th June 1798 at Hodoslavitz, in Moravia, and studied at Presburg and Vienna. In 1829 he was appointed historiographer of Bohemia, and was charged to write a *History of the Bohemian People to 1526* (5 vols. 1836-67), which appeared in both German and Czech; it is one of the greatest literary works in Czech, and nationalist through and through. Palacky took part in the political agitation of 1848, and was the leader of the Slav or national party as opposed to the German at the Diet of the Kremsier. Besides his great *History* he published works dealing with the Hussite period, and with Schafarik edited *The Oldest Memorials of the Bohemian Language* (1840). He died 26th June 1876 at Prague.

Palaeobotany. See PALÆONTOLOGY.

Palæography is, according to its derivation from Greek, the science which deals with ancient handwriting. The term 'ancient' is of course relative, but in actual practice it covers the thousands of years that have passed since writing first appears in history down to the invention of printing (about 1450 A.D.). Nor, strictly speaking, is the study confined to any language or group of languages. But in these days of highly specialised study one scholar can command only a region or two of the vast area, and this article therefore deals only with Greek and Latin, and especially with the latter, as it shares its various scripts with most of the modern languages of Europe. Palæography teaches us not only to decipher ancient manuscripts, but to judge of their date, genuineness, and place of origin. While Epigraphy (see the article INSCRIPTIONS) is concerned with letters engraved on some hard substance, such as stone or metal, the materials for palæographic study comprise ancient books, either rolls, *volumina*, written on leather or papyrus, or *codices*, written in book form on sheets of papyrus, vellum, or paper.

Wax-tablets, charters, bulls, decrees, acts, business papers, and similar documents have also to be considered by the student of palæography.

The oldest extant manuscripts come from Egyptian tombs, and are written on sheets of Papyrus (q.v.), prepared from the pith of a rush. Perhaps the oldest extant papyrus is one containing the accounts of King Assa, about 3500 B.C., and the earliest copy of a literary work is the *Papyrus Prisse*, written not later than 2500 B.C. Coming down to the 18th and 19th dynasties, papyrus rolls, usually containing portions of the Book of the Dead (q.v.), are numerous. The earliest Greek literary work written on papyrus is the *Persæ* of Timotheos, of the 4th century B.C., and the earliest Latin work on the same material is a small poetical fragment (not later than 79 A.D.) found in Herculaneum. But documents written on papyrus, a very fragile material, have mostly perished, and the chief ancient MSS. which have come down to us are written either on parchment, which is still used for legal documents, or on vellum; the skins being prepared so as to be written on both sides, thus superseding the older leather rolls, still used in Jewish synagogues for copies of the Law, and the papyrus rolls, which were commonly inscribed on one side only, and the papyrus *codices*, the leaves of which tended to become easily detached. The necessary limits of this article make it impossible to discuss the hieratic and demotic papyri from Egypt, or any of the Eastern scripts, Chinese, Pali, Indian, Coptic, Syriac, Hebrew, or even the magnificent specimens of Persian and Arabic calligraphy preserved in oriental libraries. The student may, however, be referred to the oriental series of the Palæographical Society, to Silvestre's *Paléographie Universelle*, and Burnell's *Elements of South Indian Palæography*. It must, here suffice to describe briefly the Greek and Latin styles, and the more

important of the mediæval scripts.

Both in Greek and Latin manuscripts we find two contemporaneous but widely-different styles of writing; a book-hand, formal and regular, easily legible, used by professional scribes, and a cursive hand, rapid, careless, loose, and straggling, often very difficult to read, which was employed for private correspondence, contracts, accounts, such documents, in fact, as were not intended for permanent preservation, and, somewhat formalised, for charters, rescripts, and other official documents.

The Greek book-hands may be classed as Capital, Uncial, or Minuscule; the Latin as Capital, Uncial, Half-(Semi-)Uncial, and Minuscule. The capitals, which differ little from the lapidary forms used in inscriptions, are square and angular, such as are still retained for initials, titles, and superscriptions. Manuscripts written wholly in capitals are very rare, the use of more facile materials, such as parchment or papyrus, having led at a very early time to modifications of the lapidary forms, transforming them into uncials, a formal book-hand, large, clear, and legible, used by professional scribes, and derived from the capitals with little change, save that the forms are more rounded, and sometimes inclined rather than upright. Thus, **Ε** both in Greek and Latin is a characteristic uncial form, obtained by rounding the capital form **E**, and saving labour by requiring only two strokes of the pen instead of four. The term Uncial is as old as the time of St Jerome, but the origin of the name has not been explained. In the early Middle Ages Latin uncial writing was known, at least in certain circles, as *scriptura Romana*. The general resemblance in the character of Greek and Latin uncials will be seen by a few words from St John, xxi. 19, as they appear in the *Codex Bezae* at Cambridge, a manuscript assigned to the 5th or 6th century, containing the Gospels and Acts in Greek, with a Latin translation.

CHMENONTI OIWOΘANATWΔOΞACEITONON

Greek.

SIGNIFICANSQUAMORTEHONORIFICABITDM

Latin.

Or, in ordinary minuscules, σημειων [σημαιων] ποιω θανατω δοξασει τον Θεον, 'significans qua morte honorificabit Deum.'

In the 8th and 9th centuries a new book-hand was evolved mainly out of the cursive, but incorporating sundry forms from the degenerate contemporary uncial. This, by reason of the smaller size of the letters, is called minuscule. The old majuscule cursive, developed out of the capitals and uncials, which had by this time become formless and illegible, was gradually superseded by a new cursive, developed out of the minuscule. The minuscule reached its perfection as a book-hand in the 12th century, after which it continually degenerated till the invention of printing. Both for Greek and Latin books the early printers adopted at first the corrupted forms of the contemporary book-hands, but afterwards returned to the older and purer types of the 11th and 12th centuries. Thus there is a general analogy between the successive stages of Greek and Latin writing. Side by side with the old cursive scripts there is a gradual evolution of improved uncial book-hands till about the 6th century, followed by a period of decay, till the 9th century, when the revival of learning produced a regeneration, again followed by progressive deterioration till the invention of printing caused a reversion to the best of all preceding styles, that of

the 11th century. Traces of these revolutions may still be recognised. It will be observed that we now employ four different alphabets: minuscules for our printed books, and capitals for their title-pages, headings, and initials, and cursives for our correspondence, while the initials in our ordinary writing are analogous to uncials. Familiarity prevents us from noting the wide differences in the forms of such letters as A, a, α; B, b, β; G, g, γ; or R, r, ρ. These are survivals, the first from the lapidary capitals of the Augustan age, the second from the French book-hand of the 11th century, and the third from the Tudor cursive, modified and improved by the Italian cursive of the Elizabethan age.

Greek Palæography.—The earliest Greek manuscript shows a style of lettering hardly removed from the capitals found on stone. The remarkable finds in Egypt enable us to trace the steady development of Greek majuscule writing from the 4th century B.C. down to the end of the majuscule period in papyrus writing. From this period we have numerous MSS. of Homer, as well as the Orations of Hyperides, Bacchylides' *Odes*, Aristotle's *Constitution of Athens*, the *Mimes* of Herodas, and many other writings, many previously in print, and some quite new to the modern world. The preservation of these old books is due to the dry-

ness of the climate, and to the practice of burying documents in tombs. We have from Herculaneum an ancient library consisting of 1803 papyrus rolls, which must be older than 79 A.D., when the town was destroyed. These contain Greek works of the Epicurean school of philosophy, especially writings of Philodemus of Gadara, a member of the household of the library's owner, Piso, a contemporary of Cicero. These early Greek uncials being written on papyrus, a fragile material, are slender and delicate, without bold curves, thick downstrokes, or fine hair-lines, which only became possible when the use of vellum introduced a firmer and bolder style. In these uncial papyri the occasional presence of ligatures is no doubt due to the influence of cursive forms, which are exhibited in the *ostraca*, of which great numbers have been found in Egypt. These are usually receipts for taxes, scratched with a point or written with ink on potsherds. Our knowledge of the early Greek cursive begins about the beginning of the 3d century B.C., to which a fairly large number of specimens found in Egypt belongs. Cursive forms were, however, used by the Greeks at a much earlier period; Greek inscriptions in the Cypriote syllabary exhibit forms of a distinctively cursive character as early as the 7th century B.C. Compared with the papyri the uncial vellum codices, of which about 300 are known, exhibit a firmer and more set uncial style, which was rendered possible by the material. The oldest to which a definite date can be assigned is the Dioscorides now at Vienna, which from internal evidence must have been written about 506 A.D. Earlier, but undated, are the three great Biblical codices, the *Codex Vaticanus* at Rome, which is assigned to the 4th century; the *Codex Sinaiticus* at St Petersburg, assigned to the end of the 4th or the beginning of the 5th century; and the *Codex Alexandrinus*, now in the British Museum, which probably belongs to the middle of the 5th. The Washington codex of the Four Gospels is also assigned to the 5th century. The style of the writing in these uncial codices is seen in the subjoined specimen, which is taken from the Septuagint version of Esther, i. 22, as it appears in the *Codex Sinaiticus*.

ΚΑΙ ΑΠΕΣΤΙΛΕΝ ΕΙΣ Ὁ ΒΑΣΙΛΕΥΣ
 ΠΑΣΑΝ ΤΗΝ ΒΑΣΙ
 ΛΕΙΑΝ ΚΑΤΑ ΧΩΡΑΝ
 ΚΑΤΑ ΤΗΝ ΛΕΞΙΝΑΥ
 ΤΩΝ ὩΣΤΕ ΕΙΝΑΙ
 ΦΟΒΟΝ ΑΥΤΟΙΣ ΕΝ
 ΤΑΙΣ ΟΙΚΙΑΙΣ ΑΥΤῶΝ.

This in ordinary Greek type would read :

καὶ ἀπέστειλεν εἰς
 πᾶσαν τὴν βασι
 λεῖαν κατὰ χώραν
 κατὰ τὴν λέξιν αὐ
 τῶν ὥστε εἶναι
 φόβον αὐτοῖς ἐν
 ταῖς οἰκίαις αὐτῶν.]

To the 5th century are assigned the palimpsest *Codex Ephraemi* at Paris, to the 5th or 6th the *Codex Bezae* at Cambridge, and to the 6th the

Codex Claromontanus at Paris. After the 7th century the Greek uncial loses its early style; the letters become oval, narrow, elongated, and cramped, sloping to the right; accents make their appearance, and the pure early uncial degenerates into forms difficult to read.

About the middle of the 4th century we find the first beginnings of the new minuscule, the book-hand of the future, which was destined to replace both the deformed uncial and the earlier cursive, from each of which it borrowed certain elements. The earliest traces of these minuscule forms as yet discovered are seen in a letter on papyrus, belonging to about the year 350 A.D., written by Flavius Macarius, chief officer of finance in Egypt, to Flavius Abinnæus, a *praefectus castrorum*. The transition from the old to the new style is exemplified in a most interesting sheet of papyrus from Ravenna, now at Vienna, which contains the signatures of certain bishops to the Acts of the Council of Constantinople, held in 680. The older bishops sign in slanting uncials and the younger men in early forms of the new minuscule. In the 9th century, with the revival of learning, this new minuscule developed into a calligraphic book-hand, which was used in vellum codices. The oldest dated books in which it appears are the Uspensky Gospels, written in 835, and the Bodleian Euclid of 888 A.D. The chief transformations are due to the use of ligatures, as is plainly seen in the forms of the letters δ, ϑ, and σ. Hence in the fully-formed minuscule of the 11th century we find the letters α, ε, κ, λ, φ, ω, which follow the old uncial forms, while δ, η, μ, ν are taken from the cursive. In the case of several letters the double source of this script is shown by the retention of duplicate forms, β, θ, π, and ς, for instance, being uncials, while Ϸ, Ϲ, Ϻ, and σ are of cursive origin.

From the end of the 12th century to the invention of printing the minuscule continually degenerates, losing its purity and beauty, and breaking up into a rough cursive script. The writing becomes intricate and involved, ligatures and accents being combined into a single character rapidly executed without taking the pen from the paper, thus making the writing very difficult to read. In the earliest

printed books the contracted and ligatured forms of contemporary minuscule MSS. were faithfully imitated. These, however, were gradually discarded, though a few, such as Ϸ for στ, Ϲ for ου, and Ϻ for ος, survived till quite recent times.

Latin Paleography followed much the same course as Greek. There were four set book-hands—capitals, uncials, semiuncials, and minuscules, of which the two last were influenced by the old Roman cursive. The capitals are of two kinds, Square and Rustic. Square capitals differ little

from the lapidary characters used in inscriptions, and may be defined as being bounded by a square or as having their vertical and horizontal strokes at right angles. Of the few examples we possess of this script the best is perhaps the St Gall Virgil, assigned to the 4th or 5th century. Rustic capitals, which were more usual, are characterised by circumflexed finials and by the crossbars being curved and slightly oblique. This style, which can be traced as far back as a Herculaneum papyrus of the 1st century A.D., and the sign over a boot-maker's shop in Pompeii of the same date, was

greatly in fashion from the 3d century to the 7th. Good examples are four famous Virgils: the *Codex Vaticanus* assigned to the 4th century, the *Codex Palatinus* and the *Codex Romanus* to the 5th, all of which are in the Vatican, and the 5th-century (about 494 A.D.) Medicean Virgil at Florence. The Rustic died out about the 10th century, and left no successor.

The uncials arose out of the square capitals, and exhibit rounded forms of certain letters. The earliest uncial codices extant are not earlier than the 4th century A.D., but it is plain that uncial writing was practised at an earlier period, since we find isolated uncial forms in inscriptions from about the end of the 2d century A.D. onwards. The uncial book-hand is distinguished from the contemporary square capitals by the rounded forms *Є M U H* instead of E, M, V, H, and by the tails of P, F, Q, and R falling below the line, while the head of L rises above it. Over 400 MSS. or portions of MSS. in this style survive.

Uncial manuscripts naturally fall into two groups. One group is manifestly the older: in orthography, punctuation, and abbreviation it bears close resemblance to inscriptions of the classical or Roman period. The other group is as manifestly composed of the more recent manuscripts: this may be inferred from the corrupt or barbarous spelling, from the use of abbreviations unfamiliar in the classical period but very common in the Middle Ages, or from the presence of punctuation, which the oldest manuscripts invariably lack. The manuscripts of the first group show letters that are simple and unadorned and words unseparated from each other. Those of the second group show a type of ornate writing, the letters having hair-lines and flourishes, and the words being well separated' (E. A. Lowe, *A Sixth-Century Fragment of the Letters of Pliny the Younger*, Washington, 1922; p. 14). After the 8th century uncial was not used for whole texts, but only for titles and such like.

One of the oldest uncial Latin MSS. is the Vercelli Gospels, said to have been transcribed by the hand of Eusebius himself (died 371), but in any case nearly as early as his time. A good example of the later uncials is the copy of the Gospels now in the library of Corpus Christi College, Cambridge, which is believed to have been brought from Rome by St Augustine (of Canterbury) in 596. Also of the 6th (or 5th) century is the *Codex Bezae* at Cambridge, the style of which is shown in the fac-simile already given. The earlier and later uncial styles are well seen in the famous palimpsest Cicero from the monastery of Bobbio, now in the Vatican. A palimpsest is a manuscript from which the writing was washed off with a sponge, or sometimes scraped or rubbed, in order that the vellum might be used for some other work. The *Codex Ephraemi* above mentioned is a palimpsest, a 5th-century Greek text being overwritten in a 12th-century hand. The Vatican Cicero is a codex consisting of 150 leaves, containing in the first hand the treatise *De Re Publica*, written in double columns in large uncials, probably of the 4th century. Over this is written across the commentary of St Augustine on the Psalms, in a small uncial hand of the 7th century.

In the fainter writing of the original manuscript we may decipher the words EST IGITUR INQUIT AFRICANUS RESP.(ublica). The writing in the second hand reads (line 1) HOMO EST QUIA, (2) ET OMNES XPIANI (*Christiani*) MEMBRA SUNT XPI (*Christi*), (3) MEMBRA XPI (*Christi*) QUID CANTANT. AMANT, (4) DESIDERANDO CANTANT. ALIQUANDO.

We now come to the script which goes by the name of semiuncial or half-uncial. This name, which arose out of a misconception of early palaeographers, does not signify a script half the size of the uncial, some semiuncials being larger than some uncials, but is used to denote an uncial script with new forms of b, d, g, m, r, and s, which were derived from the cursive. The earliest traces of the semiuncial style are found in a 4th-century papyrus containing an epitome of Livy. The script seems to have been used mostly in Italy and France, and almost exclusively for the copying of Christian writings: about 160 MSS. or portions of MSS. in this style are known. Various specimens are assigned to the 5th century. The earliest dated example in this script is, however, a Hilary, written in 509 or 510, now preserved in the Chapter Library of St Peter's at Rome. The script endured till about the end of the 8th century by the side of the uncial style.

The old Roman cursive, which contributed to the creation of the half-uncial style, is of great palaeographical importance, since it became the source of many forms in modern scripts. Its character from about the beginning of the Christian era is now fairly well known from examples that have been discovered, particularly on wax and lead tablets, but also on walls (see GRAFFITI). For example, in a house at Pompeii a number of wax-tablets were found in 1875, which proved to be the business memoranda of L. Caecilius Jucundus, a Pompeian banker and agent, mostly belonging to the years 53-62 A.D., and relating to purchases at auctions, and payments of taxes on behalf of his clients. Similar tablets, which are dated from 131 to 167 A.D., have been discovered in abandoned gold-workings in Dacia. This old Roman cursive, which is very illegible, exhibits the forms out of which arose *f* (the long *s*) and also the modern forms g, b, f, m, n, d, r, h, which replaced the capital forms G, B, F, M, N, D, R, H. This illegible Roman cursive reappears in a more set official hand in rescripts addressed to Egyptian functionaries in the 5th century, in official documents written at Ravenna in the 6th century, as well as in numerous marginal notes in uncial or semiuncial manuscripts. It is also employed in a copy of Avitus, written in the 6th century, and a Josephus of the 7th. These two books are written on papyrus, and the absence of other examples may be explained by the fact that the fragile papyrus books, probably copied made by scholars for their own use, have mostly perished, only vellum codices as a rule having been preserved.

With the establishment of the Teutonic kingdoms on the ruins of the Roman empire a number of national scripts developed, such as the Merovingian in France, the Visigothic in Spain, and the Lombardic in North Italy. These were all based on the Roman cursive, and were used for civil purposes as well as for charters and other diplomatic documents. The Merovingian became the official hand of the Frankish empire. It is cramped and vermiform,

homo est quia
et omnes xpiani membra sunt xpi
membra xpi quid cantant, amant
desiderando cantant. aliquando
africanus resp.

with exaggerated loops for the heads and tails of certain letters. It was used as the diplomatic hand in the chanceries of France and Italy till the 9th century, and in the imperial chancery till 1231, when its use was abolished by Frederick II. It has survived, however, in a modified form in the modern German cursive, in which many of the peculiar forms of the old Roman cursive can be detected. Out of the official Roman cursive arose the script which was employed in papal bulls till the 12th century, when it was replaced by the French minuscule, which was used till the 16th century, when a deformed, contracted, and illegible script called the *littera Sancti Petri* was adopted.

The old cursive derives its chief importance from having been one of the sources from which were developed the semiuncial and the minuscule book-hands. The period from about 600 to 800 witnessed a great variety of minuscule scripts in various parts of Europe, some of which have not yet been thoroughly studied. In them can be found cursive, capital, uncial and half-uncial elements mingled in various proportions. Only some of these types can be here referred to. The Beneventan was employed in southern Italy and Dalmatia from the end of the 8th to the end of the 13th century. Its chief centre was Monte Cassino, and its best period the latter part of the 11th century. Among its distinguishing features are the forms of *a* and *t*, the former being made like two *cs* touching each other, the latter with the cross-stroke curved downwards to the left of the stem, sometimes even as far as the line; the prevalence of ligatures with 'enclitic' *i*; and the use of the long form of *i* to indicate the semi-vocalic *i*, a peculiarity shared to a less extent by Visigothic. The script as a whole is marked by the adaptation of certain cursive elements for calligraphic purposes. The minuscule scripts associated with these islands are combined under the term 'insular.' Few recognisable specimens of the Welsh-Cornish and Breton scripts survive, but Irish and Anglo-Saxon examples abound, many of them written on the Continent. Irish and Italian influences converged in the monasteries of Northumbria. The insular scripts are not easy to distinguish from one another. They share an elaborate system of abbreviations and certain forms of letters. Among the latter the forms of *n*, *r*, and *s* are hard to distinguish. There are two types of insular script, the round and the pointed. The insular scripts travelled with the Irish and Anglo-Saxon missionaries, and we thus find Irish influence at St Riquier (Picardy), Péronne, Liège, Luxeuil, Fulda, Metz, Murbach, Reichenau, Würzburg, St Gall, Bobbio, &c. : Anglo-Saxon influence is found at Echternach, Corbie, Lorsch, Ratisbon, &c. The Visigothic script was employed in Spain and southern France from about the end of the 8th century till the beginning of the 12th century. Its dependence on the late Roman cursive is more marked than that of any other script. In many specimens the writing inclines to the left. Of the peculiar forms of letters, the *q*-formed *g* and the *a* form of *t* may be mentioned. The script is further distinguished by special orthography, such as *quum* (for *cum*), *srahel* for *Israhel*, the excessive use of the aspirate before vowels (e.g. *hannis* for *annis*), and its absence where most other scripts rightly employ it (*traere* for *trahere*, cf. Span. *traer*), and by special abbreviations (*aum* for *autem*, *n̄r* for *noster*, &c.). The older Merovingian script of France has many cursive elements, and is, of all pre-Caroline scripts, the most difficult to decipher. It is impossible to follow here the various scripts associated with Corbie, of which the most interesting is the Corbie *ab* script (used from 780 to 815); the writing of Lorsch; the script of Murbach-Reichenau-St Gall-

Chur; the writing of the Veronese school; the Bobbio scripts which combine Irish and Italian elements. The Irish semiuncial is an important script, as it became the basis of the 'Roman type,' which is used in our modern printed books. The history of this Irish semiuncial is obscure. Its elements must have been obtained, probably in the 5th century, from the semiuncial book-hand of southern Gaul. The forms of some of the letters are plainly those of the Roman uncial; others are calligraphic forms which must have been derived from an ecclesiastical Gallican type of the Roman cursive. Just as the Greek minuscule has duplicate forms of certain letters, some derived from the uncial, others from the cursive, so the double parentage of the Irish semiuncial is demonstrated by the permissive use of *N*, *R*, *S*, which are uncials, and of *n*, *r*, *f*, which are uncialised cursives. Several other forms, such as *g*, *b*, *a*, *m*, *f*, *h*, *l*, are also uncialised cursives, and not, like the Roman uncials, merely rounded capitals (see IRELAND, *Language and Literature*). This Irish semiuncial suddenly blazes forth in the 6th century. The noblest specimen is the magnificent Book of Kells now at Dublin, which was probably written at the close of the 7th century, though often referred to the 9th (see ILLUMINATION). Of somewhat later date are St Chad's Gospels, originally of Llandaff, now at Lichfield, and the Lindisfarne or Durham Book, commonly called St Cuthbert's Gospels, now in the British Museum. The latter was written in Northumbria, where the script had been introduced by Irish missionaries.

This Northumbrian semiuncial formed with Merovingian minuscule the basis of the nearly perfect Caroline minuscule, so called because during the reign of Charlemagne it was introduced by Alcuin of York, the friend and preceptor of the emperor, into the calligraphic school at Tours, over which Alcuin presided from 796 to 804. The bewildering variety of minuscule scripts throughout the area which became Charles's empire, each with its own system of abbreviation, each varying more or less in orthography from the others, and each more or less incomprehensible by those who lived outside the particular area where it was employed, made reform necessary. It was most desirable that the new empire should have a common script, distinguished by clearness and beauty, and by a consistent orthography, corrected according to the standards set forth in the works of Cassiodorus and Bede. Alcuin seems to have incorporated certain elements from the Roman uncial and the Merovingian minuscule; and the new script, recommended by its legibility, distinctness, and minuteness, was rapidly diffused by Alcuin's pupils over Europe, and rapidly superseded all the other monastic book-hands. Starting at the end of the 8th century, it reached its highest perfection at the end of the 11th. In the 13th deformation set in; it stiffens and becomes more cramped, ligatures and contractions are introduced, and out of it grew the Black Letter or Gothic of the 15th century, a form of which still survives in many German printed books. The black letter was used in the earliest printed books, but, with the revival of learning, Italian scholars returned to the beautiful Caroline minuscule of the 11th century, which was imitated in the Roman type now universal in Italy, France, Spain, Britain, and America, and which is rapidly replacing the Gothic letter in northern Europe. See PRINTING.

Beside the pure Caroline minuscules used for books various cursive hands are found, more angular, irregular, and difficult. Such are the deformed hands used in English charters and the records of courts of law. Our modern English script is based on this 'court-hand,' improved, however, in the reign of Elizabeth by the influence

of the contemporary Italian hand. It is, however, much superior in legibility and distinctness to the modern German script, which, as we have seen, is to a great extent a survival from the old Roman cursive.

Contractions.—The difficulty of deciphering mediæval MSS. arises largely from the contractions, abbreviations, and ligatures which were employed to economise labour and parchment. To give a complete list within reasonable limits is impossible, more especially as they varied at different periods and in the various scripts. In the very oldest MSS., apart from those containing technical works and those written in cursive, only two abbreviations are found, *b* with a dot after it for the syllable *bus*, and *q* with a dot after it for the syllable *que*. Almost as early we find *m* or *n* after a vowel at the end of a line indicated by a horizontal stroke above and beyond the vowel. The abbreviations of sacred names constitute a special class by themselves. The Hebrews were the first to indicate the name of God in a special way, either by omission or by different coloured lettering, either with or without a horizontal line over the top of the word. The Greek Bible imitated this custom, and the Latin imitated the Greek. In these Bibles and in other sacred works the names for God, Lord, &c., were abbreviated as a sign of sanctity, and the horizontal line was placed above the abbreviation. In the Church the custom was gradually extended to the words meaning Christ, Jesus, Son, Spirit, Holy, and so on. The whole process can be traced almost from the beginning. The still familiar symbol IHS is really the first three letters, or the first, second, and last letters of the name Jesus in Greek, the Greek letters being still used in the Western Church, even after it had ceased to be Greek-speaking. From the beginning of the minuscule period the volume of abbreviation increases, Ireland making in the earliest days the largest contribution. Six ancient shorthand symbols were preserved by the Irish scribes, indicating respectively *con*, *contra*, *et*, *eius*, *est*, and *autem*. It may also be mentioned that abbreviation by suspension is in origin pagan; abbreviation by contraction is in origin Christian.

More than 5000 contractions of Latin words were used in France between the 7th century and the 16th, while in England more than 1000 are found in official Latin documents of the Tudor period alone. There are, for instance, six recognised contractions for *quoniam*, seven for *esse*, and ten for *et*. In one class of MSS. *qm̄* stands for *quoniam*, in another for *quum*, while *quō* denotes *quomodo* in one script and *quoniam* in another. Instead, therefore, of attempting to catalogue the more usual contractions, which are tabulated in several works referred to below, it will be more useful to explain the general principles by which mediæval scribes were guided. In most cases, if not in all, these contractions arose out of ligatures, and were used at first for some particular syllable, and then as time went on they were generalised, so as to denote a whole class. Some of these ligatures we still use. Thus, *w*, as the name implies, is a ligature for *uu*; *æ* and *œ* need no explanation. The two suprascript dots, as in *ä* or *ö*, which express the German *umlaut*, are merely the ligatures *æ* and *œ*.

In *viz* for *videlicet*, and *oz* for *ounce*, we have survivals of a very frequent abbreviation, which proves to be a ligature. The *z* is merely used by printers for their own convenience instead of the correct sign *3*, which is found, by tracing it back, to be only a rapid and slurred way of writing the semicolon (;) without taking the pen from the paper. This sign at one time denoted only the omission of certain frequently occurring final letters. After-

wards it was generalised to signify the omission of any final syllable, as in *oz* for *ounce*, or in the apothecaries' signs *3* for *uncia*, and *3* for *drachma*. The sign *3* for scruple is merely the ligature *sr*, the long *s* being crossed by a cursive *r*.

The suprascript comma now used to denote the omission of medial syllables or letters, as in *can't* for *cannot*, or *I've* for *I have*, was at first merely a suprascript vowel, indicating the omission of *r* followed by that vowel. This custom first occurs in early Irish minuscule. In English records it forms a ligature with the preceding letter, as in *fūnt* for *fuertunt*, *vbō* for *verbo*, or *ts* for *tres*.

The circumflex (*~*) grew out of a cursive form of the uncial *m*, and originally denoted exclusively the omission of *m*, then of *n*, and afterwards of other letters. Thus we have *omēs*, *omīs*, and *ōes* for *omnes*, *ōia* and *ōmīa* for *omnia*, *hōiū* and *hōiū* for *hominum*, *nō* and *nī* for *non*. The horizontal line (*—*) is one of the earliest signs of omission, as we have seen. Its use was, however, less restricted than that of the circumflex, and we still use it in the contraction *lb* for *librae* (pounds), the double bar in *£* denoting a double omission. Shillings and pence, now expressed by *s.* and *d.*, were formerly denoted by *š* and *đ*, abbreviations for *solidi* and *denarii*. The sign *\$* for dollars is said to be the ligature *dll*, the *S* being merely *š*, a cursive Dutch form of *d* (but see DOLLAR). The circumflex (*~*) which was a cursive *m* was not always written horizontally. We see this in the common sign *2* used for *rum*, as *suoz* for *suorum*, or *švo2* for *servorum*. Here *2* is the ligature of *r* and *u*, which is crossed by *m* in the cursive form (*~*) or (*—*) written vertically. For *et* there are numerous signs, all of which resolve themselves into ligatures. Some of them, such as *3*, *ε*, and *q*, require no explanation. They are found in *ε&i* for *etiam*, and in the various forms *ε&c&era*, or *ε&c&ta*, or *ε&cet.* or *ε&ō*, or finally *ε&c.* which we now use for *et cetera*. In like manner *esse* is written in late times *≈*, the two dots each representing *e*, and the two circumflexes being each a long *s*. This became *≈* and then *=*, whence we obtain *=s* for *esses*, *=t* for *esset*, and *=m9* for *essemus*.

Many similar contractions were also used, most of which go back to the early days of minuscule at least. A few of the more common are *p* for *pro*, *p* for *per* and *por*, and *p̄* for *præ*, *q* for *qui*, *fr* for *frater*, *i* for *vel*, *£* for *ser*. Thus we have *supius* and *supio* for *superius*, *ppe* for *prope*, *p̄* for *proximus*, *gehof* for *generosi*, *ass=* for *assisa*, *fiz* for *fitz*.

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Palæolithic. See ARCHEOLOGY, ART, FLINT IMPLEMENTS, STONE AGE; also MAN.

Palæologus, the name of an illustrious Byzantine family, which first appears in history about the 11th century, and attained to imperial dignity in the person of Michael VIII. in 1260 (see BYZANTINE EMPIRE). The last of the dynasty, Constantine XI., fell bravely fighting at the siege of Constantinople. His brothers were princes of the Morea and of Achaia respectively; a daughter of one of them married Ivan III. of Russia. A branch of the family ruled Montferrat from 1306 to 1533.

Palæontology (Gr., 'study of ancient life'), the science or study of fossil organic remains—whether of animal or plant life. The study of fossil animals is sometimes termed palæozoology, and that of fossil plants palæobotany or palæophytology. The aim of palæontology is to attain a knowledge of all the various plants and animals which have successively appeared and disappeared in the course of geological ages. But as the geological record is highly imperfect, and myriads of species must have lived and died without leaving any trace behind them, it is obvious that our knowledge, no matter how enlarged it may become, can never possibly be complete. The history is full of gaps, some of which may eventually be bridged over, but, however that may be, it is nevertheless certain that our knowledge must always bear but a small proportion to our ignorance. Nevertheless, the study of palæontology has been fruitful in results. It has greatly influenced zoology and botany—and that not merely by adding to the number of subjects with which those sciences deal, but especially by the light which it has thrown on the evolution and mutual relations of existing forms of life. Fossil organic remains consist chiefly of the harder parts—such as bones, scales, teeth, shells, crusts, spines, &c.—of animals, and the ligneous tissues of plants (see FOSSILS). In attempting to interpret the evidence supplied by such remains, palæontologists were early led to study, for purposes of com-

parison, the structures of existing plants and animals. By applying the results of these comparisons to the restoration of extinct forms of life, Cuvier was enabled to establish the law of the 'correlation of organs;' and thus the palæontologist, who has to deal principally with fragmentary remains, is not in such a helpless case as might have been supposed. 'Stated in its most general form, the law of the correlation of organs is the law that all the parts of an organism stand in some relation to one another, the form and characters of each part being more or less closely dependent on, and connected with, the form and characters of all the rest. In other words, an organism is not a fortuitous collocation of unrelated parts, but is composed of mutually adapted and related organs; the possession of any given organ, therefore, implying the possession of other "correlated" parts' (Nicholson and Lydekker). Hence the palæontologist can often infer from an isolated organ or structure the essential characters of the remainder of the organism. But, while the biological sciences have greatly benefited, it is geology which has been most advanced by palæontological research. Without the help of fossils the geologist would be unable to reconstruct the past. By their aid he is able to identify and correlate the various formations which constitute his systems. It is from them that he infers former climatic and geographical changes—that he is able to distinguish between freshwater and marine, shallow-water and deep-sea conditions, &c. But for the general relations of palæontology to geological research the reader is referred to the article GEOLOGY. Some account of the palæontology of the stratified or fossiliferous rocks will be found in the articles that deal with the various geological systems. Here all that need be done is to summarise the characteristic features of the Palæozoic, Mesozoic, Cainozoic, and Quaternary or Post-Tertiary faunas and floras.

Palæozoic Life.—The most prominent types of Palæozoic times were Graptolites, Rugose corals, Brachiopods, Crinoids, Pteropods, Nautilid Cephalopods, Trilobites, Eurypterids, and Heterocerat Ganoids. Graptolites ranged from the Cambrian into the Upper Silurian, and seem to have become extinct before Old Red Sandstone times. Rugose corals, unknown in the Cambrian, swarmed in Silurian, Devonian, and Carboniferous seas, but were much less numerous in those of the Permian. Crinoids first appear in the Cambrian, and attained their maximum development in the Upper Silurian. They are also well represented in the limestones and shales of the Devonian and Carboniferous. Brachiopods, commencing in the Cambrian, abounded all through Palæozoic times, but culminated in the Upper Silurian period. They were still numerous in Devonian and Carboniferous seas, but less abundant in those of the Permian period. Pteropods were more common in Upper Cambrian and Silurian than during Devonian and Carboniferous times. Nautilid Cephalopods first appear in the Upper Cambrian, and seem to culminate in the Silurian, but they continued to abound in the Devonian and Carboniferous seas, becoming reduced in those of the Permian period. Trilobites appear first in the Cambrian, reach a maximum in the Silurian, wane in the Devonian and Carboniferous, and die out in the Permian. They are therefore essentially and characteristically Palæozoic forms. So likewise are the Eurypterids, which, culminating apparently in the Upper Silurian and Old Red Sandstone, became extinct in late Permian times. True fishes, allied to modern sharks, as well as a curious group of extinct forms, Ostracodermis, date back to Upper Silurian times; in the succeeding Old Red Sandstone period these were accompanied by Dipnoan and Ganoid types.

Such are the more prominent types in Palæozoic strata. Many other forms, however, are met with, amongst which may be noted starfishes (Asteroidea), brittle-stars (Ophiuroidea), sea-urchins (Echinoidea), and the wholly extinct and characteristic Palæozoic types, Cystoidea and Blastoidea. Amongst the crustacea were cirripedes, ostracods, phyllopods, king-crabs, amphipods, isopods, long-tailed decapods, and stomapods. Arachnids were represented by scorpions and other forms; myriapods and insects by a number of ancestral types. All the great classes of molluscan life were present—Cephalopods appearing first in the Upper Cambrian; Gasteropods and Lamellibranchs in the Lower Cambrian; and the earliest forms of Scaphopods in the Lower Silurian. The fishes have been already mentioned. Amphibians, represented by Labyrinthodonts and Salamandroids, appear first in Carboniferous strata.

Amongst plants the prominent Palæozoic types are cryptogams—Lepidodendroids, Sigillarioids, and Calamites being exclusively Palæozoic, but conifers were also present; and for Pteridosperms see FOSSILS.

It may be noted that many of the characteristic life-forms of Palæozoic times were what are *synthetic* or *comprehensive* types, that is to say, types which while belonging fundamentally to some particular division or group of the animal kingdom, yet present in their structure characteristics of one or more contemporaneous, or as yet non-existing types. Among such intermediate or comprehensive forms may be mentioned the Labyrinthodonts, which were urodele amphibians with many piscine and reptilian characteristics. Examples are also furnished by the Ganoids, the Trilobites, the Brachiopods, the insects, &c. Amongst plants the Pteridosperms exhibit similar peculiarities, for they combine characteristics of seed plants and ferns. Again, many Palæozoic forms attained a larger size than the corresponding forms that belong to later times. Thus, some of the pteropods, cephalopods, ostracods, phyllopods, and insects were larger than any corresponding forms of our own day. The amphibians likewise exceeded in size any living representatives of their class.

Innumerable Palæozoic genera died out before Mesozoic times, while not a few lived on, and some have even persisted to the present day. These persistent forms are met with chiefly among the lower types of animal life, as foraminifers, brachiopods, and molluscs. See CAMBRIAN, SILURIAN, OLD RED SANDSTONE, CARBONIFEROUS, and PERMIAN SYSTEMS.

Mesozoic Life.—The life of Mesozoic times is in many respects strongly contrasted with that of the Palæozoic era. In place of Sigillarioids and Lepidodendroids, the prevalent forms of plant-life up to the close of the Cretaceous period were arborescent and herbaceous ferns, conifers, and cycads, while in early Cretaceous times the earliest angiosperms appeared. Corals, which were plentiful in Mesozoic seas, consisted almost exclusively of modern types—the rugose corals having waned almost to extinction. Echinoids and starfishes abounded, but Crinoids, so prevalent in Palæozoic seas, were now much reduced in numbers. Some of the higher grades of the crustacea, which are hardly known in Palæozoic rocks, were plentiful in Mesozoic times, and the same was the case with insects. Brachiopods ceased now to be dominant forms; while amongst molluscs the Cephalopods take the lead, and reach their culmination in swarms of Ammonitidæ and Belemnitidæ. Gasteropods and Lamellibranchs are well represented, and include a number of modern genera, which increased towards the close of the era. Ganoids were still numerous, mostly with symmetrical

tails. Chimæroids, true sharks, and rays were all represented, while Teleosteans or bony fishes made their first appearance. Labyrinthodonts, which in Triassic times attained a great size, soon died out, making way for the advent of a prodigious reptilian fauna, in which all orders, save the Ophidians, were represented. There were swimming reptiles (Ichthyosaurus, q.v., Plesiosaurus, q.v.), flying reptiles (Pterodactylus, q.v.), snake-like reptiles (Dinosaurs, see DINOSAURIA), crocodiles, and chelonians. This reptilian life was specially abundant in Jurassic times. Birds probably were numerous, some of the forms being toothed, while others may have approximated to modern types. Mammals were represented by only the inferior grade of marsupials, and were all of small size. All the remarkable reptiles referred to became extinct before the beginning of the Cainozoic era. So it was with the characteristic Mesozoic molluscan families of Ammonitidæ, Belemnitidæ, and Hippuritidæ. Putting aside the lowly organised Protozoa, it may be said that hardly one Cretaceous species has been met with in Cainozoic or Tertiary strata. See TRIASSIC, JURASSIC, and CRETACEOUS SYSTEMS.

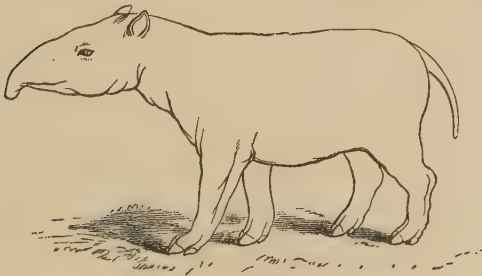
Cainozoic Life.—The plants of early Cainozoic times, although differing specifically and often generically from living forms, yet approach on the whole to existing types. Palms were a common feature of the floras from Eocene into Pliocene times. Indo-Australian types were common in Europe during the early Eocene, but later on forms characteristic of the warmer latitudes of North America began to abound. A commingling of Indo-Australian and American types also marked the Oligocene period, but the American forms gradually increased until in Miocene times they preponderated over all the others. The Pliocene flora of central Europe had a prevalent Mediterranean character. With regard to the lower forms of animal life, all that need be noted here is the general fact that these have a modern aspect, the number of existing genera and species becoming greater as we advance from the lower to the higher stages. The foraminifers attained now their maximum development, and are characteristically represented by the large coin-shaped nummulites. Amongst molluscs the Cephalopods are no longer dominant forms—the most abundant groups being Lamellibranchs and Gasteropods. But the most striking and leading Cainozoic forms were the mammals. In Eocene times the mammals were greatly developed—many of the forms attaining a large size. Among the more notable types of the early European Tertiary are Palæotherium (q.v.), Anoplotherium (q.v.), along with which were carnivores, rodents, insectivores, and bats, and also the earliest representatives of the horse and the monkey tribe. The later Tertiaries are marked by the appearance of Dinotheres, Mastodons, true elephants, rhinoceroses, hippopotamus, deer, antelope, gazelles, various carnivores, such as Machairodus, bears, cats, wolves, &c., and apes. No certain or unequivocal evidence of man is yet forthcoming from Tertiary strata.

While it is true that the general aspect of the plant and animal life of the Cainozoic era approaches to that of the present, yet this is truer for the less highly organised types than it is for those which are higher in the scale of being. Amongst the higher vertebrates of early Tertiary times not a few possessed characters which are now met with only in widely separated forms. Some, for example, were intermediate in character between tapirs and horses; in others (Tillodonts) we meet with a combination of structures now seen in ungulates, rodents, and carnivores; while many of the carnivores had decided marsupial affinities.

Other remarkable composite forms were the *Dinocerata* (q.v.).

Quaternary or Post-Tertiary Life.—The animals and plants of Quaternary age belong for the most part to existing species; a number of the higher vertebrates, however, are extinct. Among these latter, in Europe, were the Mammoth and various other elephants, several rhinoceroses, a dwarf form of hippopotamus, and *Machairodus*. In North America the fauna also included various extinct species, such as *Mastodon*, an elephant, and several gigantic members of the Sloth family (*Megatherium*, *Myiodon*, *Megalonyx*). These last seem to have abounded in South America, where they were associated with great armadillos (*Glyptodon*). The Quaternary period was characterised by marked oscillations of climate, and consequently by secular migrations of flora and fauna. Thus numerous forms which had survived from the Tertiary era eventually became extinct, and a still larger number were banished from the areas which they had occupied in Pliocene times. It is in the deposits of the Pleistocene that we meet with the first unquestioned relics and remains of man. See **PLEISTOCENE SYSTEM, POSTGLACIAL AND RECENT SYSTEM**; works cited at **GEOLOGY**; and the special handbooks of **Palæontology**, as by Woodward (*Vertebrate Palæontology*), Woods (*Invertebrate*), Zittel (trans. by Eastman); *Fossil Botany*, text-books by Scott and Seward.

Palæotherium (Gr., 'ancient wild beast'), a genus of odd-toed hoofed mammalia whose remains occur in the Eocene beds of England and the Continent. Several species have been described, the largest being probably about the size of a rhinoceros. The Upper Eocene gypseous quarries of Montmartre supplied the first scanty materials, which Cuvier, by a series of careful and instructive inductions, built up into an animal resembling the existing tapir. The restoration, however, is not quite correct, for the discovery of a complete skeleton (*P. magnum*) shows that the animal was longer-necked, and of a more slender build than the tapir, and probably was not unlike, in general appearance, the living llama. There can be no doubt, however, that *Palæotherium* resembled the tapir in having the snout terminating in a short proboscis. It had three toes on each foot, each terminated by a hoof. The formula of the teeth is i. $\frac{3}{2}$, c. $\frac{1}{1}$, p.m. ($\frac{3}{2}$ - $\frac{4}{2}$), m. $\frac{3}{2}$, and the structure of the upper true molars, in certain particulars, seems to foreshadow that of some of the Equidæ.



Palæotherium magnum.

It is supposed that animals of this genus dwelt on the margins of lakes and rivers, and that their habits were similar to those of the tapir.

Palæozoic (Gr., 'ancient life'), the name given to the lowest division of the fossiliferous rocks, because they contain the earliest forms of life. They were formerly, and are still generally, known as the Primary rocks. The strata included under these titles are the Cambrian, Silurian, Devonian

and Old Red Sandstone, Carboniferous, and Permian systems.

Palafox y Melzi, JOSÉ DE, Duke of Saragossa, a Spanish soldier, was born in 1780 of a distinguished Aragonese family, and rose to the rank of brigadier-general in the Spanish guards. The brave defence of Saragossa (q.v.), 22d July 1808 to 21st February 1809, which only yielded to the French after a second investment, was nominally his. Palafox y Melzi was carried prisoner to France, and not released until 1813. The year after his return home he was appointed captain-general of Aragon, in 1836 was created Duke of Saragossa, and in 1837 grandee of Spain and captain-general of the guards. He died at Madrid, 15th February 1847.

Palagonite-tuff, usually associated with basalt-lavas, is fine-grained, red, brown, and sometimes greenish or yellowish in colour. Under the microscope it is seen to be composed of minute fragments of volcanic glass, crowded amongst which are granules and crystals of augite, olivine, plagioclase, and magnetite. It occurs in Sicily, the Canary Islands, the Faeroe Islands, Iceland, and Scotland. See **IGNEOUS ROCKS**.

Palanpur, capital of an Indian state in Gujarat, lies 83 miles N. of Ahmedabad by rail. The state has an area of 1766 sq. m. and a pop. of 237,000. The 'Palanpur Agency' comprises, besides Palanpur, seventeen other small native states.

Palanquin, or **PALKI**, an Indian vehicle corresponding somewhat to the Roman litter and the modern European sedan-chair, but, unlike the latter, used for long distances by travellers where railways or good roads do not exist. It is a wooden box, about 8 feet long, 4 feet wide, and 4 feet high, with wooden shutters which can be opened or shut at pleasure, and constructed like Venetian blinds. At each end of the palanquin, on the outside, two rings are fixed, and the *hammals*, or palanquin-bearers, of whom there are four, two at each end, support the palanquin by a pole passing through these rings.

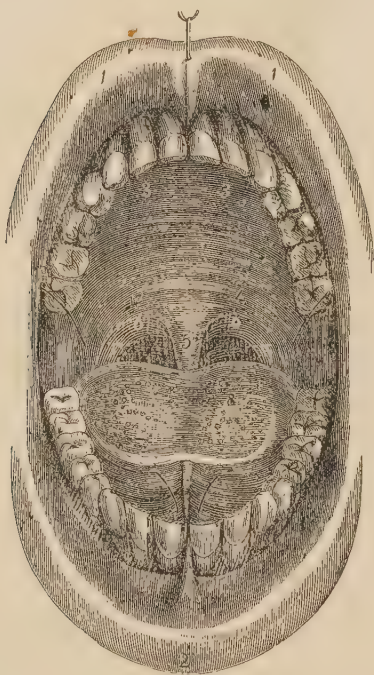
Palapteryx (Gr., 'ancient apteryx'), a genus of fossil birds whose remains are found in the river-silt deposits of New Zealand, associated with the gigantic *Dinornis*, and which, like it, resembled in the form of the sternum, and the structure of the pelvis and legs, the living wingless apteryx. *Palapteryx* seems to have been smaller but of stouter build than *Dinornis*. See **MOA**.

Palapwe. See **SHOSHONG**.

Paladium. See **GUTTA-PERCHA**.

Palate, the roof of the mouth, consists of two portions, the hard palate in front and the soft palate behind. The framework of the *hard palate* is formed by the intermaxillary bones, by the palate processes of the superior maxillary bones, and by the horizontal processes of the palate bones, and is bounded in front and at the sides by the alveolar arches and gums, and posteriorly is continuous with the soft palate. It is covered by a dense structure formed by the periosteum and mucous membrane of the mouth, which are closely adherent. Along the middle line is a linear ridge or raphe, on either side of which the mucous membrane is thick, pale, and corrugated, while behind it is thin, of a darker tint, and smooth. This membrane is covered with scaly epithelium, and is furnished with numerous follicles (the palatal glands). The *soft palate* is a movable fold of mucous membrane enclosing muscular fibres, and suspended from the posterior border of the hard palate so as to form an incomplete septum between the mouth and the pharynx; its sides being blended with the pharynx, while its lower border is free.

When occupying its usual position (that is to say, when the muscular fibres contained in it are relaxed) its anterior surface is concave; and when its muscles are called into action, as in swallowing a morsel of food, it is raised and made tense, and the food is thus prevented from passing into the posterior nares, and is at the same time



The Mouth widely opened so as to show the Palate :

1, 1, the upper, and 2, 2, the lower lip; 3, 3, the hard palate; 4, 4, the soft palate; 5, the uvula; 6, 6, the arches of the soft palate; 7, 7, the tonsils; 8, the tongue.

directed obliquely backwards and downwards into the pharynx.

Hanging from the middle of its lower border is a small conical pendulous process, the *uvula*; and passing outwards from the uvula on each side are two curved folds of mucous membrane containing muscular fibres, and called the *arches* or *pillars* of the soft palate. The anterior pillar is continued downwards to the side of the base of the tongue. The posterior pillar is larger than the anterior, and runs downwards and backwards to the side of the pharynx. The anterior and posterior pillars are closely united above, but are separated below by an angular interval, in which the *tonsil* of either side is lodged. The tonsils (*amygdalæ*) are glandular organs of a rounded form, which vary considerably in size in different individuals. They are composed of an oval mass of lymph tissue which is studded on the free surface by a number of small pit-like depressions—the tonsillar crypts. The space left between the arches of the palate on the two sides is called the *isthmus of the fauces*. It is bounded above by the free margin of the palate, below by the tongue, and on each side by the pillars of the soft palate and tonsils.

As the upper lip may be fissured through imperfect development (in which case it presents the condition known as Hare-lip, q.v.), so also may there be more or less decided fissure of the palate. In the slightest form of this affection the uvula merely is fissured, while in extreme cases the cleft extends through both the soft and hard palate as far for-

ward as the lips, and is then often combined with hare-lip. When the fissure is considerable it materially interferes with the acts of sucking and swallowing, and the infant runs a great risk of being starved; and if the child grows up its articulation is painfully indistinct. The closure of cleft palate by operation must be left in the hands of an experienced surgeon, who should be called to see the child as soon as the defect is noticed. If the separation is too great to admit of closure by operation, a plate or 'artificial palate' may be made to cover the opening.

Acute inflammation of the tonsils, popularly known as Quinsy, is treated of in a separate article. Chronic enlargement of the tonsils is very frequent in scrofulous children, and is not rare in scrofulous persons of more advanced age, and may give rise to very considerable inconvenience and distress. It may occasion difficulty in swallowing, confused and inarticulate speech, deafness in various degrees from closure of the Eustachian tubes (now often termed *throat deafness*), and noisy and laborious respiration, especially during sleep; and it may even cause death by suffocation, induced by the entanglement of viscid mucus between the enlarged glands. If local and constitutional remedies fail to reduce the enlarged tonsils they must be more or less removed by the surgeon, either by the knife or scissors, or by a small *guillotine* specially invented for the purpose.

Enlargement or relaxation of the uvula is not uncommon, and gives rise to a constant tickling cough and to expectoration, by the irritation of the larynx which it occasions. If it will not yield to local treatment it may require to be removed either in whole or in part.

Palatinate (Ger. *Pfalz*), the name for two German states, which were united till the year 1623. They were distinguished as the Upper and Lower Palatinate. The Upper or Bavarian Palatinate, now forming a province of Bavaria, was a duchy, its capital being Amberg. The Lower Palatinate, or the Palatinate on the Rhine, lay on both sides of the Rhine, with an area of 3150 sq. m., and included, besides the Electoral Palatinate proper, the principality of Simmern, the duchy of Zweibrücken, the principalities of Veldenz and Lautern, &c., and was bounded by Mainz, Trier, Lorraine, Alsace, Baden, and Württemberg. Its capital was Heidelberg.

The counts of the Rhenish Palatinate were established in the hereditary possession of the territory of that name, and of the lands attached to it, as early as the 11th century. In 1216 it was granted to the Duke of Bavaria, and with various combinations the Rhenish Palatinate and the Bavarian territories were held by members of the Bavarian house and its branches. Sometimes the electoral dignity was alternately exercised by the Duke of Bavaria and the holder of the Rhenish Palatinate. In 1559 the Rhenish Palatinate and the electoral vote passed to Frederick III., who introduced Calvinism. Frederick V. (q.v.) was the 'Winter King' of the Thirty Years' War, who in 1623 lost his lands to his kinsman the Duke. Bavaria retained the Upper Palatinate and the electoral dignity; but the Rhenish Palatinate was in 1648 given to Frederick's son, and the eighth electorate created for him. In 1706, during the war of the Spanish succession, the elector received again the Upper Palatinate and all the ancient rights, resumed again by Bavaria after the war. During this time the Rhenish Palatinate was repeatedly and cruelly desolated by French armies; and in 1801 France took possession of all on the left bank of the Rhine, giving the rest to Bavaria, Nassau, and Hesse Darmstadt. In 1815 the left bank was restored to Germany, the larger part of the Lower

Palatinate being granted to Bavaria (Rhenish Bavaria), the remainder passing to Prussia, Hesse, and Baden. The Palatinate had to change its religion frequently, being successively Catholic, Calvinist, Lutheran, Calvinist, and Catholic again. For the area and population of the modern provinces, see BAVARIA.

Palatine (from Lat. *palatium*, 'palace'). A *Comes Palatinus*, or Count Palatine, was, under the Frankish kings of France, a high judicial officer (see COUNT), his district being called a *palatinate* or *county palatine*. There were long three counties palatine in England—Lancaster, Chester, and Durham—the two last of which were, no doubt, made separate regalities on account of their respective proximity to the frontiers of Wales and of Scotland. Chester and Durham became palatine under William I., Lancaster not till 1451. Chester had not merely its own courts, judges, constable and steward, but a parliament, and was not represented in the national parliament till 1549. At various dates up to the 16th century Kent, Shropshire, Pembrokeshire, the Isle of Ely, and Hexhamshire, were counties palatine. Cheshire was assimilated by Henry VIII. Durham ceased to be a county palatine under its bishop in 1836; and Lancaster (see LANCASTER, DUCHY OF) yielded its jurisdiction in 1873 to the High Court of Justice. In very early times there were a number of similar privileges in Scotland, the most important of which was that of the Earls Palatine of Strathearn.

Palatine Hill (*Mons Palatinus*), the central hill of the famous seven on which ancient Rome was built, and, according to tradition, the seat of the earliest Roman settlements. See ROME.

Palau. See PELEW ISLANDS.

Palaungs, a people living scattered over the Shan States, and belonging to the Môn-Khmer family. A pacific, unwarlike folk, chiefly occupied in the cultivation of tea, they profess a very orthodox Buddhism; but their real religion is faith in the spirits of nature and of the dead, and their whole life shows an astounding display of rites and superstitious practices, hardly equalled in any other people. Prayers are offered to the spirits of water, of trees, of rice, &c. See Leslie Milne, *The Home of an Eastern Clan* (1923).

Palazzolo Acreide, a town of Sicily, 22 miles W. of Syracuse, on the site of the ancient Acra, which was founded by a colony from Syracuse 664 B.C.; there are many archaeological remains, including a fine Greek theatre; pop. 15,000.

Pale, in Irish history (see the article IRELAND), means that portion of the kingdom over which the English rule and English law was acknowledged. It varied very greatly at various dates, but for a long period meant generally Dublin and the greater part of the adjoining counties. For the Jewish Pale in Russia, see JEWS.

Palem'bang, capital of a residency (formerly an independent kingdom) near the south end of Sumatra, stands on the river Musi, 50 miles from its mouth; the houses of the town are built on great log rafts on either bank. Manufactures, trade in silk goods, carved wood, ornaments in gold and ivory, and krises, as well as shipbuilding, are carried on. In the middle ages Palembang was one of the most important centres of Arabian trade with China. Pop. 74,000; and of the residency, an important oil district, 828,000.

Palencia (the ancient *Pallantia*), a walled city of Spain, in Old Castile, stands in a fruitful plain, 180 miles by rail NNW. of Madrid and 29 NNE. of Valladolid. The Gothic cathedral was built 1321–1504. The first university of Castile was founded here in 1208, but was removed to

Salamanca in 1239. Blankets and coarse woollen cloths are manufactured. The vine is cultivated, and there is a good trade in wool. Pop. 20,000.—The *province* of Palencia has an area of 3256 sq. m. and a pop. of 200,000.

Palenque, a ruined Maya city between the Michol and Chacamas rivers, in the north of the Mexican state of Chiapas, $6\frac{1}{2}$ miles E. of the village of Santo Domingo de Palenque. The ruins extend over 20 to 30 acres, and were buried in a dense tropical forest; trees grew over and about the buildings, and rose even from the tower. The ruins consist of vast artificial terraces, or terraced truncated pyramids, of cut stone, surmounted by edifices of peculiar and solid architecture, also of cut stone, covered with figures in relief, or figures and hieroglyphics in stucco, with remains of brilliant colours. Most of the buildings are of one story, but a few are of two, three, and some may have been of four stories. The principal structure, known as the Palace, is 228 feet long, 180 feet deep, and some 25 feet high, standing on a terraced truncated pyramid of corresponding dimensions; the front contained fourteen doorways, each about 9 feet wide. Other important buildings are the so-called temples of the Cross, of the Foliated Cross, and of the Sun. The meaning and source of the cross symbol have been much disputed—a tree of life and a maize-plant (symbol of the maize-god); a reminiscence of the Buddha's tree imported from south-east Asia; a Christian cross derived through Nestorian China from Italy, &c.

See Stephens's *Incidents of Travel in Central America, &c.*

Palermo, formerly the capital of Sicily, now in point of population the fifth city of Italy, an archbishopric, and a seaport. It stands in the north-west corner of the island, on a bay that faces east, and at the mouth of a fertile valley called the Conca d'Oro ('Golden Shell'), 120 miles by rail W. of Messina, and occupies a picturesque site, being backed by mountains—on the north by Mount Pellegrino, with a (pilgrimage) grotto-chapel (1624) to St Rosalia, whose festival is one of the great annual events of the city. The streets are for the most part handsome, and there are many fine old houses. The oldest public buildings date from the Norman period, and belong to two styles of architecture—Saracen and Byzantine. The most conspicuous of them all is the cathedral of St Rosalia, built (1169–85) by an Englishman, Archbishop Walter; it contains sepulchral monuments to Roger I., the emperors Henry VI. and Frederick II., and in the crypt the tombs of the archbishops. Others to be named are the chapel (1143) in the royal palace, with magnificent mosaics; the Norman hall, in the same pile; and the churches of Martorana (with fine mosaics), St John of the Hermits (1132), and St Cataldo; and the mansions of Ziza, Cuba, La Favara, and Mignano, all outside the city. The royal palace, built by Roger I., is principally of Spanish construction; in it Piazzì established his observatory. The other public buildings—archbishop's palace, town-house, law-courts, university, arsenal, &c.—do not call for particular mention. The university was founded in 1447. There are also a national museum, and the town library (1775) and the national library (1804), both with large collections of volumes and manuscripts. Industry is little developed; machinery, essences, sumach, turnery, iron-founding, books, gloves, and shoes represent almost the only branches. But Palermo is an important seaport, with a large, though not growing, trade. Oranges, lemons, dried fruits, sumach, tartar, grain, oils, manna, sulphur, wine, animal produce, and lemon-juice are the principal exports. Pop. (1921) 400,348. The first we know of

Palermo, the ancient *Panormus*, is that it was a Phœnician city, and the stronghold of Carthage in Sicily. It was conquered successively by Pyrrhus (276 B.C.), the Romans (254 B.C.), the Vandals (440 A.D.), Belisarius (535), the Saracens (835), the Pisans (1063), and the Normans from Apulia (1071). Henceforward it was the capital of the kingdom of Sicily (q.v.), first of the Norman kingdom, then of that of the Angevins and their Spanish successors. It suffered severely from earthquakes in 1693, 1726, and 1823. The city revolted against the Bourbon kings of Naples in 1820 and 1848, and was freed from them in 1860 by Garibaldi. But since then it has been only a provincial capital.—The province of Palermo has an area of 1985 sq. m. and a pop. (1921) of 868,937.

Palestine. The name now given to the whole of Southern Syria. Although the Philistines disappeared considerably over 2000 years ago, and never actually occupied but a small part of it, their memory has remained in the successive names Palaistiné (Gr.), Palestina (Latin), and Palestine. 'The Land of Canaan,' the 'Land of Israel,' and, most suitable of all, 'The Holy Land,' are all more expressive terms.

The area of Palestine has varied much during the centuries. 'From Dan to Beersheba' fairly describes its length, and from the Mediterranean to the Syrian Desert its breadth; yet at few periods has the whole area belonged to one race or one government. The northern boundary has always been uncertain. The lower course of the Kasimiyeh (Litani) River is a natural line which was chosen in the Palestine Exploration Fund survey, but the new northern frontier begins at the Ras en Nakura (Ladder of Tyre), and runs east upon the southern edge of the lofty ranges of Upper Galilee. The Upper Jordan Valley is left to Palestine, but the eastern shore of the Lake of Galilee is given to French Syria, a division which is against all the teachings of topography and history. As indeed is the division further south between Western Palestine directly under the British High Commissioner and Transjordan under its Emir.

Physical Description of the Holy Land.—The simplest way of grasping the main features of Palestine is to think of it as disposed in a series of four parallel lines running from north to south. These are (1) the Maritime Plain; (2) the Western Highlands; (3) the Jordan Valley; (4) the Eastern Plateau.

(1) The maritime plain is a strip of relatively level land lying between the foot of the mountains and the sea. It has an average elevation of 200 feet and a breadth varying between 200 yards at the western end of Carmel and over 20 miles at Gaza. The plain is built up of alluvial deposits carried down from the mountains, superimposed upon thick beds of gravel, sand, and marl, laid down at a period, not geologically very remote, when the sea washed against the foot of the western range. These beach deposits again rest upon a calcareous sandstone of perhaps the Miocene period, which is entirely denuded from the mountains further inland.

The maritime plain may be regarded as divided naturally into three parts. North of Carmel the plain exists as a great bay running into the Galilean hills, which borders the Bay of Akka. Anciently a part of Phœnicia, it is separated from the Plain of Tyre by the steep Ras en Nakura. Once thickly inhabited and well cultivated, this Plain of Akka is now marshy in places along the course of the sluggish Nahr Na'mein (the ancient Belus) and the Nahr el Mukutta or Kishon, which skirts the northern foot of Carmel.

South of Carmel the plain gradually widens, and as far south as Jaffa was of old known by the name

of Sharon. This district was once a forest, of which to-day only a few scattered groups of oaks survive. Several winding sluggish streams, with marshy banks, cross the plain, notably Nahr ez Zerka, the ancient Crocodile River, where crocodiles have been seen within living memory; Nahr el Mufjir, the 'Dead River' of the Crusaders; Nahr Iskanderuneh, the 'Salt River'; and Nahr el 'Aujeh, along which General Allenby's army long stood on the defensive in 1917-18. After heavy winter's rain the coastal side of the plain becomes not uncommonly water-logged. South of Jaffa the plain widens out to the 'country of the Philistines,' where stood their great cities—Gaza and Askalon on the seaboard and Ashdod, Ekron, and Gath inland. The district consists of rolling downs deeply eroded to the underlying rocks in places by winter torrents. It is a corn-growing country with rich alluvial soil, which only requires water to become immensely productive, as is seen in the irrigated orange gardens around Jaffa. Near the sea-coast water is met with in many parts at no great depth. Almost the whole sea-coast from Jaffa southwards is bordered by lofty wind-born sand-dunes which in places attain a breadth of 2½ miles. The whole coast of Palestine is strewn with the 'wreck of harbours.' Akka is half a ruin and its harbour useless. Haifa, on the southern extremity of the bay, alone along this coast is adapted—and that none too well—for modern ships.

South of Carmel, Athlit, the Château des Pèlerins of the Crusaders, is now a mighty ruin; Tantura, the ancient Dor, Kaisariyeh, the desolate ruin of Palestine's once proud Roman capital Cæsarea, and Arsuf, the ancient Apollonia, are all sites of ancient maritime activity. Jaffa, the Joppa of earlier days, is but an open roadstead, while farther south the ruins of Askalon show no surviving remnant of its harbour. Gaza is now separated from the sea by two miles of sand-dunes.

Palestine has been described as a bridge between Asia and Africa, but this really applies only to portions of the land and more particularly to the maritime plain. The great route followed by all the armies, as well as by the commerce, of all the nations lay along this plain. From Egypt it enters Palestine at Gaza, traverses the plain either near the coast or gradually approaching the hills, and then crosses into the Plain of Esdraelon by one of the famous passes, either that by Tell Mutasellim (Megiddo) or by Tell Dothan (Dothan). It was one of the most famous and most frequented roads in all the East.

(2) The central mountain backbone in Palestine, a southward prolongation of Lebanon, consists of strata of limestone of various density—some hard as marble, some soft as chalk, belonging to the Carboniferous and Eocene age, the whole having a thickness of about 3500 feet. These limestone rocks are subdivided from above downwards into Senonian, Turonian, and Cenomanian. The beds rise from beneath the calcareous sandstone of the maritime plain at the Shephelah and form a vast crenellated arch, the central axis of which passes in a meridional direction under the summit of the tableland upon which lie Jerusalem, Bethlehem, and Hebron. Here the strata are horizontal, and the softer Senonian chalks and limestones have been denuded, exposing the hard Turonian rock. The ascent on the western side is gradual, especially in the northern districts, but the last drop to the Jordan Valley is commonly abrupt. In districts bordering upon the Upper Jordan Valley several outflows of volcanic rock overlie the limestone in places. The mountain chain is divided by nature into three distinct areas, known familiarly to us by the names Galilee, Samaria, and Judæa.

Upper Galilee, the continuation southwards of the Lebanon range, rises to many heights of over 3000 feet, notably at Jebel Jermak (3934 feet), Palestine's highest mountain. Lower Galilee consists of a series of parallel ranges of hills running from west to east, intersected by wide open valleys. The highest point is only about 1800 feet above sea-level. The district of Galilee is relatively well supplied with springs, and in the autumn months enjoys heavy 'dews'; for these reasons, and because of its gently sloping hills, fertile valleys, and rich soil, it has always been recognised as the richest agricultural province in Western Palestine.

South of it the Merj el Amir, the Plain of Esdraelon, makes a wide break in the range. The existence of this plain is due to a 'fault' in the underlying rocks. The main expanse is triangular in shape (20 miles, 15, and 15 in measurement), and lies about 250 feet above sea-level. In winter months parts of it become a swamp; in the spring it is a mass of verdure. At its north-west corner it drains by the Kishon through a narrow break in the hills into the Plain of Akka; towards the east the wide fertile Vale of Jezreel descends steeply to the Jordan

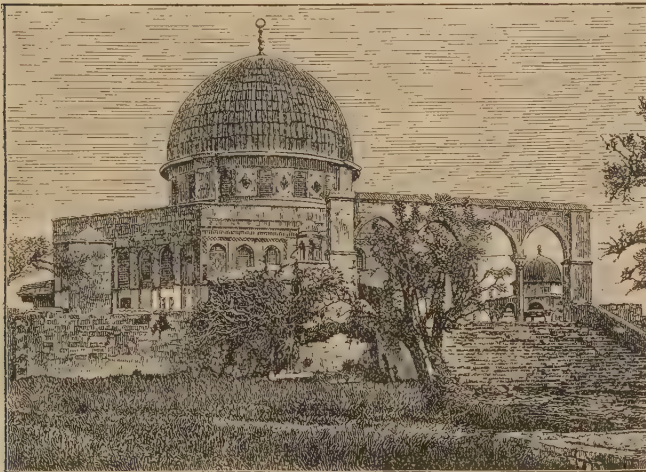
wide. Compared with the more northern regions it is, except at favoured spots, bare and sterile. The hard rock strata tend to be horizontal and retain but shallow soil; the springs are few and 'dew' scanty. This district is characterised by its comparative isolation. It is traversed by no trunk road; it has but little natural fertility or attractiveness, and nature has provided it with defences on three sides. Thus it was that the Hebrew people were able to maintain their own in a security and isolation impossible to the inhabitants of other parts of the Holy Land. Only on the north, where the frontier was always ill defined, was there easy access. Its other borders require some mention. On the east the boundary was in theory at the Jordan and the Dead Sea; but between these and the inhabited part of the Judean plateau lies a far more effectual barrier in the strip, some miles wide, of almost waterless 'wilderness'—the Jeshimon or 'Devastation' of the Old Testament. Here for eight months in the year the scorched hillsides show no blade of grass, and not a spring exists for miles. The westerly breezes, which bring moisture elsewhere, in traversing this region become heated, and in rising suck up the scanty humidity of the soil.

The western side of the plateau is approached by three historic passes—the famous 'Bethhoron' pass from the Vale of Ajalon, the scene of many a battle in past ages and the route of the British army in 1917; the pass up the Wady es Surar (the Vale of Sorek), up which the Jaffa-Jerusalem railway runs; and the route up the Wady es Sūr (Vale of Elah), which reaches the plateau at Beth Sūr, five miles north of Hebron, up which the Syrians advanced to the defeat of Judas Maccabæus. But Judæa had a second natural defence. Between the foot of the mountains and the plain there is a strip of fertile hilly country known as the Shephelah—the 'lowlands.' The existence of this district is due to the calcareous sandstone, which underlies the maritime deposits, coming to the surface here and abruptly breaking off.

Along this line of cleavage a series of hills and valleys running north and south parallel with the mountains has developed. The soft stone is full of caves, natural and artificial. Here were the frontier forts, and here were waged many border fights between the dwellers in the mountains and those in the plains.

To the south of Judæa lies the Negeb or 'dry-land' (the 'South' of the Old Testament). Beginning at Beersheba, it extends as a series of mountain ridges running east and west, until it loses itself in the actual desert to the south. Springs are few; the most famous are 'Ain Guderat and 'Ain Kedes, which belong to the district of 'Kadesh Barnea.' What settled inhabitants it had in its most prosperous days were chiefly clustered around a few monastic establishments of the Byzantine period. It has always proved an effective defence to Southern Judæa.

(3) The Jordan Valley is one of the natural wonders of the world. This great depression lies along a great 'fault' or dislocation of strata, which begins in Northern Syria, passes down the Jordan Valley, and continues southwards through the Wady el 'Arabah into the Gulf of Akaba. All along this crack the strata to the east have risen many hundreds of feet, so that on the east side of



Dome of the Rock, Jerusalem.

Valley at Beisan, the ancient Beth Shean. A chain of isolated hills link up on this eastern side the mountains of Galilee with those of Samaria. Of these Jebel et Tōr, Mount Tabor (1843 feet high), is the most famous; south of this lies Jebel Dahi or 'Little Hermon,' and still further south, beyond the Vale of Jezreel, are the barren mountains of Gilboa.

The district south of Esdraelon, known in the Old Testament as Mount Ephraim and later as Samaria, is more open, and, on account of its softer rocks, more fertile than the loftier and wilder plateau to its south. The great roads from the maritime plain cross its north-western corner. In its centre lies Nablus (Neapolis), near, if not on, the site of ancient Shechem. It stands astride the great west and east route between Jebel Sulimiyeh or Ebal (3032 feet) and Jebel et Tōr or Gerizim (2849 feet). The long ridge of Carmel, which runs north-west from the mountain mass of Samaria, belongs geographically to this region. It is a vine-growing district, as its name implies; something of its ancient fertility has been restored in the Jewish colony at Zammarrin.

South of Samaria lies Judæa, the cradle of the Hebrew race. It is a tableland from 2000 to 3000 feet high, about 35 miles long and some 12 to 17

the Jordan layers of Nubian and Lower Carboniferous sandstone appear which are deeply buried in the west. In the Jordan Valley itself a long slice, as it were, of the earth's crust seems to have dropped down some thousands of feet along the line of this fault. During the early Glacial period this valley was occupied by a vast inland sea over 200 miles long by 30 miles broad. The existence of ancient beaches shows that, at its greatest extent, its shores were for a considerable period over 100 feet above the level of the Mediterranean. The diminution of the vast rainfall of the Pluvial period (which was contemporaneous with the Glacial period in Europe) led to the gradual drying-up of the ancient lake, leaving a dried lake-bottom of stratified gravel and marl with three collections of water. In the north—just above sea-level—is Baheiret el Kheit or Lake Huleh, a shallow lake some 9 miles long lying in the midst of a marshy plain. Here the waters of the Jordan from the three sources, the Nahr Banias, the Nahr Leddan, and the Nahr Hasbany, converge and flow out to the south as the Es-Sheri'at el Kebireh or Jordan, a stream 60 feet wide. This in 9 miles descends over 600 feet to the Bahr Tabariyeh or Lake of Tiberias (or Galilee), some 13 miles long by 7 miles broad. On or near its northern shores stood Capernaum, Bethsaida, and Chorazin, famous in sacred history, and now represented by shapeless ruins, while on the western shore is the only surviving town, Tiberias. Below this lake the valley receives the Arabic name of El Ghor. The river itself runs a very winding course through a narrower valley of its own making—which it floods at times—known as El Zor. The Nahr Yarmuk or Heiromax and the Nahr ez Zerka or Jabbok are important tributaries from the east. Sixty miles south of the Lake of Galilee lies the Dead Sea, its surface nearly 1300 feet below sea-level. It is some 47 miles long and 10 miles broad, and its waters are five times as salt as the open ocean. A low promontory of stratified marl (part of the old lake-bottom), called *El Lisan*, 'the tongue,' projects from the eastern shore, dividing the lake into a deeper two-thirds—where a depth of 1300 feet occurs in places—and a shallower, saltier bay, some 30 feet deep. On the south-western shore of this bay is a mountain ridge, Jebel Usdum, the main part of which consists of pure rock-salt.

(4) The eastern plateau. East of the Jordan Valley there is a rapid ascent to a wide plateau—the fertile edge of the Syrian Desert. Here a rich soil, abundant rainfall, and in some parts springs and streams, combine to create a fruitful district. It is divided by the deep channels of the rivers Yarmuk, Zerka, and Mojib, into three main districts. That between Hermon and the Damascus district in the north and the Yarmuk in the south is the old land of Bashan, and consists of the lava-strewn Jaulan (ancient Golan) to the west, the Hauran, a vast wheat-growing expanse in the centre, and between that and the eastern desert the low-lying volcanic expanse of laval rocks, known as El Leja (Trachonitis), which forms the inviolable refuge of the untamable Druzes. South-east of this volcanic activity has thrown up a lofty mountain mass, reaching in places a height of 6000 feet, known as Jebel Hauran or Jebel Druze—the ancient Mount Bashan.

Between the Yarmuk and the Zerka is the fertile and once well-wooded Jebel Ajlun, a district in which once flourished most of the Greek cities of the Decapolis. South of the Zerka lies El Belka' (Peræa), a pastoral land, the northern half of Moab, the other half being south of the Mojib (the ancient Arnon), around their ancient capital, Kir, now Kerak. South of the Dead Sea lay Edom,

inhabited at a later age by the Nabataeans, whose wonderful fortress capital was at Petra.

Climate, Fertility, and Natural Resources.—In a land like this, ranging in altitude from nearly 4000 feet above to almost 1300 feet below sea-level, there must necessarily be considerable variations in climate. Rain falls only in the colder months—almost all in December, January, February, and March—but the 'former rains' moisten the ground for ploughing in October and November and the 'latter rains' continue the annual fall into April, and on their abundance largely depends a successful harvest. In the mountains the rainfall is between 20 and 30 inches, in the plain somewhat less, and in the Lower Jordan Valley considerably less. In some seasons heavy falls of snow occur over the higher ground. In the mountains the summer heat is by no means extreme, being tempered by cool breezes. A temperature of over 100° F. in the shade is exceptional. In the maritime plains the greater moisture makes the heat more trying, while those parts of the Jordan Valley below sea-level are tropical and dangerous because of endemic tropical malaria. The most trying—and most unhealthy—days in Palestine are those when the dry Shurkiyeh or Sirocco wind blows from the south-east, spoiling some periods of the otherwise pleasant seasons of spring and autumn. Palestine is not a land of natural riches, and has lost its ancient prosperity with the destruction of its trees and the once elaborate terracing of its mountain slopes. It has no mineral products of importance, and the harvest of the soil can only be obtained by hard manual labour. At best, large districts can never be more than barren deserts. Wheat and barley are cultivated everywhere, and in the Plain of Esdraelon, in the Hauran, and in parts of the Jordan Valley, yield excellent crops. Tobacco of an inferior quality, simsim for sesame oil and durra or Egyptian maize are also grown. Olives, figs, pomegranates, quinces, grapes, and almonds all do well. Apricots, oranges, and citrons reach considerable perfection in suitable and well-chosen spots. Melons and the prickly pear flourish in the plains. In the Jordan Valley rice, bananas, American maize, dates, colocynth, sugar, and cotton all are, or have been, grown, and could be widely cultivated. Droughts have occurred from time to time in all ages, and locusts invade the land in some years in countless millions and eat up everything. The barrenness of much of the land greatly strikes the western tourist, especially if he has not spring's myriad wild flowers to delight his eye. With regard to the fauna, the most characteristic animals are the coney or hyrax, which is still plentiful in the wild rocks bordering the Dead Sea, the striped hyena and the cheetah, the jackal and the fox, the gazelle and the fallow deer, the ibex or wild goat, and the little jumping jerboa of the Jericho plain. The lion is extinct, the bear almost so; the wolf, now no longer indigenous, appears occasionally in the track of flocks of sheep driven from the mountains of Armenia on their way to Egypt. Porcupines, hedgehogs, and tortoises are not uncommon. The mole-rat (a rodent) in appearance and habit closely resembles our insectivorous European mole. Water tortoises, crabs, and cray-fish occur in the waters of the Jordan; there are also many species of fish peculiar to that region. Bird-life is plentiful. Of the larger birds, vultures, eagles, pelicans, flamingoes, storks, wild duck, and geese are common. Snakes—some deadly—and scorpions abound. Bees thrive well, and of insect life generally there is no lack.

History.—Considerable light has been thrown upon pre-Hebrew Palestine by the results of modern excavation both inside and outside the land.



PALESTINE

English Miles
0 10 20 30 40
Kilometres
0 10 20 30 40

MEDITERRANEAN SEA

We know that no inconsiderable degree of Semitic civilisation was flourishing there many centuries before the Exodus, and that during much of that time Palestine was dependent upon Egypt both in politics and in culture. About the 15th century B.C. we have in the Tell el Amarna Babylonian cuneiform tablets a picture of the gradual decay of Egyptian power and influence, and many authorities consider that they can identify the Hebrews under the name Khabori, one of the invading tribes mentioned in these letters. The tribal life of the Hebrews gave place to a monarchy, which in turn divided into two, one centred in the recently conquered Jerusalem and the other successively at Shechem, Tirzah, and Samaria. The northern kingdom ended with the capture by Sargon of Samaria (722) and the removal of its inhabitants to Assyria; the kingdom of Judæa succumbed at the final capture of Jerusalem and the destruction of the temple at the hands of Nebuchadnezzar, king of Babylon (586 B.C.). Half a century later (539) the Jews, by the permission of Cyrus, king of Persia, commenced to return, the temple was in time rebuilt, and by 445 the walls of Jerusalem were, in spite of the opposition of the Samaritans and Arabs, restored. In 333 Alexander the Great conquered Syria and Palestine, and after his death the latter became a prey alternately of the Græco-Syrians and of the Ptolemies. Many Greek settlements were made, particularly east of the Jordan, the more important of which united to form the League of Decapolis. Persistent efforts to paganise the Jews were made by Antiochus IV., leading at last to a rising of the orthodox and pious Jews under the Hasmonæan Mattathias (167) and his sons. After many heroic battles at length the Jews achieved their freedom, and shortly after a revived monarchy. But the rule of Aristobulus II., the last degenerate monarch of the once noble Hasmonæan house, ended in the establishment in Palestine of the growing Roman power. In 37 B.C. Herod the Great, aided by the Romans, captured Jerusalem and commenced a brilliant but unhappy reign as king. Monuments of his ambitious building activities abound in Palestine to-day, notably at Jerusalem, Hebron, Cesarea, and Samaria. The simmering rebellion of the Jews, which was gathering head during the days of Jesus Christ and the early church, broke in 67 A.D. into frightful activity, and ended in a veritable sea of blood with the capture of Jerusalem (70 A.D.) by Titus. A second insurrection under Bar Cochba (q.v.) was ruthlessly suppressed in 135, and Palestine became first a pagan and then, after the conversion of Constantine, a Christian province of the Roman empire. Churches and monasteries multiplied, and pilgrims commenced to come in increasing numbers from distant lands. In 616 Chosroes II., king of Persia, conquered the land, barbarously destroying churches and massacring the Christians. Scarce had the tide turned again in favour of the Byzantine Emperor Heraclius when the followers of Mohammed, flushed with victory, utterly defeated the Byzantine forces on the Yarmuk, and all the Holy Land passed under the rule of the Khalif Omar (636). After long and varying fortunes, and on the whole not inconsiderable prosperity under the Arabs, the land, towards the end of the 11th century, passed into the hands of the Seljuk Turks, whose ferocious treatment of the Christian pilgrims stirred Europe to embark upon the Crusades. In 1099 the Crusaders captured Jerusalem, and Baldwin (1100) became first monarch of the Latin kingdom of Jerusalem. For a time the land greatly prospered; but as years went on a steady deterioration occurred in the character of the leaders. At length in the battle of Hattin (1187) Saladin destroyed the flower of

the chivalry of the Franks and captured Jerusalem with all Palestine except a strip along the maritime plain. To this and a few inland fortresses the Christians clung with ever-lessening hold, until, after the storming of Acre in 1291, they completely withdrew. During these centuries several wild tribes from Asia stormed the unhappy land, plundering and massacring—the Kharezmians (1244), the Mongols (1259–60), and the followers of Tamerlane (1400).

In 1517 Selim I., Sultan of the Ottoman Turks, wrested the land from the Mamelukes of Egypt and incorporated it into the Turkish empire. Under these Turks the condition of the land steadily deteriorated, and the only recognised law was that of the robber chief. In 1799 Napoleon, and in 1831 Ibrahim Pasha, son of the ruler of Egypt, each conquered Palestine; each in turn met serious reverse from British arms at Acre. Since the middle of the 19th century there has been a steady increase in the number of resident Europeans—missionaries and commercial agents, consuls and colonists, the last either German or Jewish settlers. The German colonists were originally from Württemberg, and migrated to the Holy Land in 1860, under the leadership of a pietist called Hoffmann, who, on the strength of the literal interpretation of certain Old Testament prophecies, directed his followers to found 'Temple Colonies.' The first colony was at Haifa at the foot of Carmel, later they occupied Jaffa and Jerusalem, and Sarona and Wilhelma near Jaffa. Originally mainly agriculturists, these colonists have become shopkeepers, hotel proprietors, tourist agents, carpenters, &c., in many parts of the land. As many of the younger men were called up for military service in the German or Turkish armies, these prosperous colonies have suffered a considerable set-back.

The Jewish colonies are on a more extended scale, and are likely now considerably to increase in size and in number. The beginning of this Jewish agricultural movement was the founding of the agricultural school of Mikveh Israël by the Alliance Israélite in 1870. In Southern Palestine the more important settlements are Rishon le Zion, 'the First in Zion,' founded 1881, with about 3000 acres and over 1000 inhabitants, Rechoboth, founded 1890, with over 2500 acres and nearly 1000 inhabitants, and Petach Tikveh, founded 1883, with 8000 acres, including valuable orange groves, and over 3000 inhabitants. All these and a dozen smaller ones are in the neighbourhood of Jaffa. In Jaffa itself is a new modern Jewish quarter known as Tell Aviv, 'the Hill of Spring' (Ezek. iii. 15). On the slopes of Carmel is Zichron Jacob, near the native village of Zammarin, beautifully situated 800 feet above sea-level, surrounded by cornfields and orchards. It was founded in 1883 by Baron Edmund de Rothschild in memory of his father, and now has about 4700 acres and a population of nearly 2000. There are several branch colonies. In Galilee Rosh Pinah, the 'corner-stone,' near Safed, founded in 1882, is the best-known colony. It has about 9500 acres under cultivation and upwards of 1000 inhabitants. Other colonies exist in the Plain of Esdraelon, in the mountains of Galilee, on the shores of Lake Huleh, and to the north and south of the Lake of Galilee. The vicissitudes of these colonies have been great. The most successful have received unstinted financial assistance from their supporters in Europe, and even now are scarcely self-supporting. Mistakes have been made in the past in the selection of the type of persons fitted to make useful colonists. Many have been sent out whose last desire was to become themselves actual workers on the soil, whose idea

of colonisation was to make the fellahin do all the hard work. Then, too, the question of health was not at first scientifically studied, and great numbers have suffered, especially in the plains and in the Jordan Valley, from malaria and black-water fever. But now things are greatly improving. There is a large agricultural station at Haifa for the training and assistance of colonists, and the health service, both government and Jewish, are embarking upon a vigorous campaign to put down malaria. The whole colonisation movement is the best and most obvious result of the propaganda of 'Zionism,' and if allowed to develop gradually, will be an ever-increasing benefit to all the people of Palestine.

Railways in Palestine have undergone considerable extension during and since the Great War. Before that event there was a single-track narrow-gauge railway, constructed by French capital, from Jaffa to Jerusalem, and another line—part of the Turkish Hejaz railway—from Haifa, across the Plain of Esdraelon and south of the Sea of Galilee to ed Dura'a, a station on the great Damascus to Medina line. During the war several emergency lines were constructed, some of which have now been removed. The railways now in use consist of: (1) a double track, on the standard gauge (4 feet 8½ inches) from Kantara on the Suez Canal to Rafa (this is, strictly speaking, an Egyptian line, but it is administered by Palestine). At Rafa the line branches, one track running to Beersheba, the other passing northwards through Gaza and Lydd to Haifa. (2) The old French line to Jerusalem is now relaid on the standard gauge, and runs from Jaffa to Jerusalem, effecting a junction with the Kantara-Haifa line at Lydd. (3) On the narrow gauge (3 feet 6 inches) there is a line from Akka to Haifa and thence to Semakh on the shore of the Lake of Galilee. (4) From Afûleh on the above line a branch runs to Nablus and on to Tûlkeram on the main Kantara-Haifa line. Altogether there are some 353 miles of line on the broad gauge and 129 miles on the narrow gauge in Western Palestine. In Transjordan under British control there are some 200 miles of the old Hejaz line running from Nasib on the French-Syrian frontier to Ma'an. The railway system was transferred from military to civil administration, 1st October 1920. Railway headquarters are now at Haifa, to which place the locomotive shops have been transferred. The Welsh steam coal used for the locomotives is landed at that port. There is an excellent daily service of trains from Egypt to Palestine in connection with the Egyptian State Railway. Roads, which were few and very bad till the end of last century, have now been constructed in many directions. The increasing motor traffic and the soft nature of the stone used in road-construction make them very dusty in summer and muddy in winter, but they have now become such a necessity that their proper maintenance is an obvious and urgent responsibility of the government.

The years 1917-18 witnessed the complete delivery of this land from Turkish domination by the army of General Allenby in two dramatic phases, one ending with the capture of Jerusalem (8th December 1917), the other with the conquest of all Palestine and Syria as far north as Aleppo, when an armistice was concluded, 31st October 1918.

The population of Western Palestine in the 1923 census was 757,182, and in Eastern Palestine up to, but not including, Damascus, is estimated at about 400,000, but is probably less. Of the inhabitants of Western Palestine 78 per cent. are Moslems, 1 per cent. Druzes, nearly 10 per cent. Christians, and 11 per cent. Jewish. The last-mentioned own about 2 per cent. of the land itself, but are acquiring more rapidly.

This land has now passed by mandate to the administration of Great Britain, who has pledged herself to establish there a 'National Home' for the Zionists, while guarding the interests of the native population, whose 'national home' they and their ancestors have had here for many centuries. The carrying out of this policy in opposition to the wishes of the indigenous population, the adjudication of the claims of the Christians of the various churches in connection with the holy sites and with their propaganda generally, and to the satisfaction of the religious feelings of the Mohammedans towards their holy cities—Jerusalem, in particular, being only second in sacredness to Mecca and Medina—together furnish a problem which will tax the powers of British diplomacy and statecraft to its utmost for years to come.

Exploration of the Land.—This naturally divides itself into three main headings: (a) Travel, (b) Survey, (c) Archaeological Excavations.

(a) *Travel.*—The stream of pilgrims began in the 2d century, and has never ceased. Among the writers whose accounts of the Holy Land are most important may be mentioned Eusebius, who in the 4th century produced an onomasticon or gazetteer of the land, Jerome, Eucherius, Theodorus, Antoninus Martyr, and Procopius. All these wrote accounts of the condition of the country and of Jerusalem before the Mohammedan conquest. After the conquest pilgrims were allowed to come and go unmolested, and Arculphus, Willibald, Bernard, and others have left us descriptions which belong to the 7th, 8th, and 9th centuries. In the 10th century Moslem writers, like El Mukadassi and Nazir-i-Khusran have recorded much of value in their descriptions of the land. The Crusaders left copious accounts of their wars, occupations, and employments, and pilgrims from all lands have left travel-tales in many languages. Modern exploration, with fuller knowledge of what was worth recording, began in the 19th century with Seetzen, Burckhardt, Buckingham, Irby and Mangles, Tobler, De Saulcy, Van de Velde, and Williams. To Robinson in his *Researches* (1838-52) belongs pre-eminently the credit of putting on a scientific basis the scattered work of his predecessors. Since his time many writers have built upon the foundations he laid. Of the innumerable modern writers none have surpassed the great work of Sir George Adam Smith in his *Historical Geography of the Holy Land*.

(b) *Surveying.*—The earliest map of Palestine known is the mosaic map of the 6th century discovered at Madaba. A long stretch of time separates this from the quaint production of Marino Sanuto in the 15th century. The writers of the 19th century produced many maps as accurate and detailed as the existing imperfect surveys allowed. It was not until the establishment of the P. E. F. (1865) that the idea of a really scientific survey was seriously contemplated. Between 1871 and 1877 a complete survey of the Holy Land was undertaken by the P. E. F., with the able assistance of such distinguished members of the Royal Engineers as Stewart, Anderson, Conder, Warren, Wilson, and Kitchener. As a result of this work a complete map on the scale of one inch to a mile was published in 1880—other maps on a smaller scale being produced from it. The *Survey of Western Palestine*, seven massive volumes, dealing with every aspect of the land—topographical, archaeological, zoological, and botanical—was issued in 1881-84. Meanwhile Conder made a hurried survey, much hampered by the Turks, of Eastern Palestine, which was later (1885) considerably added to by the work of Dr G. Schumacher, financed by the P. E. F. During 1883-84 Professor Hull completed a survey and geological reconnaissance of the Arabah. These

labours have been supplemented by the *Karte des Ostjordanlandes*, by G. Schumacher, published (1908) in Leipzig, and the map of *Arabia Petrea*, by A. Musil (1906), in Vienna. In 1913 the P. E. F. again resumed surveying, and completed the map of Palestine by a survey of the Negeb to the frontier of Egypt, made by Newcombe and Greig, both officers of the Royal Engineers, assisted by the archaeologists Woolley and Lawrence. During the Great War all these maps were put through a searching test, as they were used by combatants on both sides. Errors have been corrected and much detail has been filled in, particularly through photography by aeroplane. There are now few Eastern lands more thoroughly surveyed and mapped than Palestine.

(c) *Archaeological Excavation*.—While the surface work has thus been gradually becoming more complete, recent times have witnessed the increasing exploration of the buried remains of past civilisation. In 1890 Professor Flinders Petrie, on behalf of the P. E. F., inaugurated, and laid the scientific foundations of, this work in his excavations at Tell el Hesi (Lachish), where his pupil F. J. Bliss succeeded him. During 1894–97 Messrs F. J. Bliss and A. C. Dickie made various excavations in Jerusalem. During 1898–1900 Messrs F. J. Bliss and R. A. S. Macalister excavated several 'tells' in the Shephelah, and during 1902–5 and 1907–9 R. A. S. Macalister made his historic and thorough excavation of Tell el Jezeri (Gezer). During 1911–12 Messrs D. Mackenzie and F. G. Newton partially excavated 'Ain Shems (Bethshemesh); in 1920–21 Professor Garstang made a preliminary excavation of part of Askalon; and during 1923–25 R. A. S. Macalister and Garrow Duncan explored the hill Ophel in Jerusalem. While this British society was carrying out this work, other foreign societies were not idle. Among the chief excavations made may be mentioned those by the Germans at Tell Mutasellim and Tell Tanaak, by the Austrian professor Sellin at Jericho, by Reisner, on behalf of the university of Harvard, at Samaria, by Fischer, on behalf of the university of Pennsylvania, at Beisan.

Under the favourable conditions established by the archaeological department of the new government an increasing activity in archaeological work is manifesting itself. One of the first acts of the High Commissioner was to appoint a director of antiquities and an international board for the protection of ancient monuments and the control of scientific excavation.

BIBLIOGRAPHY.—This is enormous; only a few of the most important books need be mentioned. *Survey of Western Palestine* (7 vols.), *Survey of Eastern Palestine*, *The Geology of Palestine and Arabia Petrea, Fifty Years' Work in the Holy Land*, published by the Palestine Exploration Fund. The thirteen volumes of the 'Palestine Pilgrims Text Society's' library contain translations of all the important descriptions of the land and the holy places from the 4th century to the period of the Crusades. *Palestine under the Moslems* (P. E. F.) gives translations of Moslem writers, Baedeker's *Palestine and Syria*, by Socin and Bensing; *The Land and the Book*, by Thomson; *Historical Geography of the Holy Land*, by G. A. Smith; *The Historical Atlas of Palestine*, by G. A. Smith; *History of Civilization in Palestine and Bible Sidelights from the Mound of Gezer*, by R. A. S. Macalister; *Palestine and its Transformation*, by Huntington; *The Land of Three Faiths*, by P. Graves; *Palestine*, by Hyamson (the modern Jewish view); *The Handbook of Palestine* (1922), by H. C. Luke and E. Keith Roach—are among the most useful books dealing with a variety of aspects. See, too, JERUSALEM, JEWS, SAMARIA, ZIONISM, &c.

Palestine, capital of Anderson county, Texas, 151 miles by rail N. of Houston. There are cotton-seed oil, saw, and grist mills, brass and iron foundries, brick-yards, salt-works, &c. Pop. 11,000.

Palestrina, the ancient *Præneste*, an Italian city, 22 miles E. by S. of Rome, on the slope of an offset of the Apennines, contains the palace of the Barberini family, the owners (by purchase from the Colonna) since 1630. It was the birthplace of the composer Pierluigi da Palestrina. It is built almost entirely upon the gigantic substructions of the ancient Temple of Fortune, one of the greatest religious edifices in all Italy, celebrated not only for its splendour, but also for its oracle, which was consulted down to the time of Constantine. Fine mosaic pavements belonging to it still exist. Portions of the ancient city walls of Cyclopean blocks of limestone also still remain. Præneste was a member of the Latin League, until in 499 B.C. it joined the Romans. Yet it took a prominent part in the Latin war (340–338 B.C.) against Rome. Having given shelter to the younger Marius in 82 B.C., it was taken and sacked by Sulla. Its elevated and healthy situation, at no great distance from the capital, made it a favourite summer-resort of the Romans. Augustus and Tiberius frequented it; Horace found it a pleasant retreat; Hadrian built there an extensive villa; and Marcus Aurelius also resorted there. Numerous valuable works of art and other remains have been recovered, dating principally from the 7th, and from the 3d century B.C., the former showing Phœnician influence, the latter being Etruscan. Pop. 8000.

Palestrina, GIOVANNI PIERLUIGI DA, the greatest of Italian musical composers, was born at Palestrina in 1524. He studied music at Rome under Goudimel, and in 1551 was made *maestro di capella* of the Julian Chapel of St Peter's by Pope Julius III. In 1554 he published a collection of Masses, which the pope so highly approved of that he appointed their composer one of the singers of the Sixtine Chapel. Being a married man, he lost that office on the accession to the pontificate of the severer Paul IV. But in 1555 he was made choir-master of the Lateran, and in 1561 was given the similar post in St Maria Maggiore, and held it till 1571, when he was restored to his office in the Julian Chapel. The Council of Trent, having undertaken to reform the music of the church, entrusted to Palestrina the task of remodelling this part of religious worship. He composed three masses as examples of what could be done; one of them, the Mass of Pope Marcellus (to whose memory it is dedicated), saved music to the church by establishing a type infinitely superior, in its blending of devotional with artistic feeling, to anything that had preceded it, a type which, amid all the changes that music has since gone through, continues to attract admiration. Palestrina must be considered the first musician who reconciled musical science with musical art, and his works form a most important epoch in the history of Music (q.v.). He died in the arms of St Philip Neri on 2d February 1594. His compositions, very numerous, are all sacred, except two volumes of Madrigals; they have been published at Leipzig (1868 *et seq.*). The authoritative Life was written by the Italian Baini (Rome, 1828).

Paley, FREDERICK APTHORP, classical scholar, grandson of the author of the *Evidences*, was born at Easingwold, near York, in 1816. He had his education under Dr S. Butler at Shrewsbury, and at St John's College, Cambridge, but, not obtaining mathematical honours, by the regulations of the time was shut out from the classical tripos, and likewise did not obtain a fellowship. He resided, however, at Cambridge till his conversion to the Roman Catholic faith in 1846, and later from 1860 till 1874, when he was appointed professor of Classical Literature at the abortive Roman Catholic college at Kensington. He next

went to live at Bournemouth, was twice classical examiner to London University and for the classical trips at Cambridge, and continued till the sudden close of his life (11th December 1888) his arduous labours in classical scholarship. In early life at Cambridge he helped to found the Camden Ecclesiological Society, and published books on Gothic architecture; but the important work of his life began in 1844 with the first part of his edition of *Æschylus* with Latin notes. Here-edited *Æschylus* for the 'Bibliotheca Classica,' as well as *Euripides*, *Hesiod*, the *Iliad*, and completed the *Sophocles* of *Blaydes*, all for the same series; and also prepared minor editions of similar works, or parts of these, for the 'Cambridge Texts' series. His *Propertius*, *Ovid's Fasti*, and *Martial* were less successful; but his three comedies of *Aristophanes*, *Theocritus*, and his *Select Private Orations of Demosthenes* (in conjunction with Dr Sandys) were recognised as works of the very highest value. He published prose translations of the *Philebus* and *Theætetus* of *Plato*, the 5th and 10th books of *Aristotle's Ethics*, the *Odes* of *Pindar*, and the *Tragedies of Æschylus*, and renderings in verse of the 5th book of *Propertius* and *Fragments of the Greek Comic Poets* (1888). Other works were a treatise on *Greek Particles* (1881), *Greek Wit* (1881), and an unsatisfactory edition of the *Gospel of St John* (1887). Paley received the degree of LL.D. from *Aberdeen* in 1883. A sagacious textual critic and sound exegete, he left behind him traditions of a high type of scholarship, of the age when yet scientific philology was not, and German might be neglected. In his later years he adopted a late date for *Homer*.

Paley, WILLIAM, a celebrated English divine, was born at *Peterborough*, son of a minor canon of the cathedral, in 1743. His family belonged to the *West Riding of Yorkshire*, and not long after his birth his father returned to his native parish of *Giggleswick* to become master of the grammar-school there. In 1759 he entered *Christ's College, Cambridge*, as a sizar, and led for two years an idle (though not dissipated) life, but thereafter became a severe student, and in 1763 came out senior wrangler. After three years as an assistant-master at *Greenwich*, he was elected in 1768 a fellow and tutor of *Christ's College*, and here he lectured on moral philosophy till his marriage in 1776 and presentation to the rectory of *Musgrave* in *Westmorland* and the vicarage of *Dalston* in *Cumberland*, which were soon exchanged for the more profitable living of *Appleby*. In 1780 he was collated to a prebendal stall in *Carlisle Cathedral*, in 1782 he became archdeacon, and in 1785 chancellor of the diocese. In the latter year he published his *Principles of Moral and Political Philosophy*, for which he received £1000. In this work he propounds his ethical theory—a form of what is usually known as utilitarianism. He begins by adducing a series of strong objections against the popular doctrine of the moral sense, next takes up the question of the source of obligation, and resolves it into the will of God, enforced by future punishment, it being admitted candidly that virtue is prudence directed to the next world. The will of God, in so far as it is not rendered explicit by revelation, is to be interpreted by the tendency of actions to promote human happiness, the benevolence of the Deity being assumed. Objection may fairly be taken to the principles on which Paley rests his system, but the lucidity and appositeness of his illustrations are beyond all praise; and if his treatise cannot be regarded as a profoundly philosophical work, it is at anyrate one of the clearest and most sensible ever written, even by an Englishman. In 1790 appeared his most original work, *Horæ Paulineæ*, the aim of which is to prove, by a great variety of

'undesigned coincidences,' the great improbability of the common hypothesis of the unbelief of that day, that the New Testament is a cunningly devised fable. It was followed in 1794 by his famous *View of the Evidences of Christianity*, in which dexterous use is made of *Lardner's Credibility* and *Bishop Douglas' Criterion of Miracles*. The treatment is on the historical method, flanked by auxiliary arguments drawn from the superior morality of the gospel, the originality of *Christ's* character, and the like. But the bases of controversy have now entirely shifted, and the work, able as it is, is no longer, even at *Cambridge*, regarded adequate as a defence. The champion of the faith was splendidly rewarded. The *Bishop of London* gave him a stall in *St Paul's*; shortly after he was made subdean of *Lincoln*, with £700 a year; *Cambridge* conferred on him the degree of D.D.; and the *Bishop of Durham* presented him to the rectory of *Bishop Wearmouth*, worth £1200 a year. Perhaps his latitudinarianism and essentially unspiritual temperament, as well as such homely sarcasms as comparing the 'divine right of kings' with the 'divine right of constables,' may have hindered him from yet higher preferment. After 1800 he became subject to a painful disease of the kidneys, yet in 1802 he published perhaps the most widely popular of all his works, *Natural Theology, or Evidences of the Existence and Attributes of the Deity*, largely based on the *Religious Philosopher* of *Nieuwentyt*, a Dutch disciple of *Descartes*. An excellent edition is that by *Lord Brougham* and *Sir Charles Bell* (1836–39). Paley died May 25, 1805.

A complete edition of his works was published by one of his sons, the *Rev. Edmund Paley* (7 vols. 1825); later editions are those by *Wayland* (5 vols. 1837) and *Faxton* (5 vols. 1838). The best biography is that by *G. W. Meadley* (*Sunderland*, 1809); and see *Sir Leslie Stephen, English Thought in the Eighteenth Century* (1876).

Palghat, a town of *Malabar* district, 68 miles SE. of *Calicut* by rail. Its old fort was of great strategic importance. For the *Palghat Gap*, see *GHÂTS, MADRAS PRESIDENCY*. Pop. 45,500.

Palgrave, SIR FRANCIS, historian, was born in *London* in July 1788, the son of *Meyer Cohen*, a Jewish stockbroker. He was privately educated, and showed a quite remarkable precocity, having at eight translated into French a Latin version of the *Battle of the Frogs and Mice*, which his father printed in 1797. His father's fortunes failing in 1803, he was articled as a solicitor's clerk, and here he remained until 1822, when he took chambers in the Temple and was employed under the *Record Commission*. On his marriage (1823) he assumed his mother-in-law's maiden name of *Palgrave*. He was called to the bar in 1827, and soon acquired considerable practice in pedigree cases before the *House of Lords*. As early as 1818 he had edited a collection of *Anglo-Norman chansons*; in 1831 he contributed a *History of England* to the 'Family Library'; and in 1832 he published his *Rise and Progress of the English Commonwealth*, also *Observations on the Principles of New Municipal Corporations*. The same year he was knighted. From 1833 to 1835 he served on the *Municipal Corporation Commission*, and in 1838, on the reconstruction of the *Record Service*, he was appointed deputy-keeper of *Her Majesty's Records*, an office he held till his death at *Hampstead*, 6th July 1861.

Besides the works already mentioned, *Palgrave* edited for the government: *Calendars of the Treasury of the Exchequer* (3 vols. 1836), *Parliamentary Writs* (1830–34), *Rotuli Curie Regis* (1835), *Ancient Kalendars and Inventories of the Treasury of Her Majesty's Exchequer* (1836), and *Documents and Records illustrating the History of Scotland* (1837). In his private capacity he produced the *Merchant and the Friar*, and a learned and

still valuable *History of Normandy and of England* (4 vols. 1851-64). His collected historical works were edited by his son, Sir R. H. I. Palgrave, and grandson, G. Palgrave Barker (1919-22).

Palgrave, FRANCIS TURNER (1824-97), a gifted poet and critic, eldest son of the preceding, was born in London. He was educated at Charterhouse School, became scholar of Balliol College, Oxford, and Fellow of Exeter, filled for five years the office of vice-principal of the Training College for Schoolmasters at Kneller Hall, was private secretary to Earl Granville, an official of the Privy-council, professor of Poetry at Oxford in 1886-95, and was a contributor to *Chambers's Encyclopædia*. He is best known as the editor of the admirably selected *Golden Treasury of English Lyrics* (1861; 2d series, 1897) and other anthologies. See the *Life* by his daughter (1899).

Palgrave, SIR ROBERT HARRY INGLIS (1827-1919), also a son of Sir Francis, was born in Westminster, and educated at Charterhouse. He rose to a position of eminence as a banker, edited the *Economist* (1877-83), wrote much on banking, taxation, and finance, edited the *Dictionary of Political Economy* (1894-1906; new ed. 1923, &c.), and was a contributor to *Chambers's Encyclopædia*.

Palgrave, WILLIAM GIFFORD (1826-88), another son of Sir Francis, was born in Westminster, and educated at the Charterhouse School and Trinity College, Oxford, graduating with great distinction in 1846. Next year he obtained a commission in the Bombay Native Infantry, which, however, he soon resigned to become a priest in the Society of Jesus. After a course of study at Laval in France and at Rome he was sent at his own request as a missionary to Syria, where he acquired a wonderfully intimate knowledge of Arabic. Summoned to France in 1860 by Napoleon III. to give an account of the Syrian massacres, he went disguised as a physician on a daring expedition at the emperor's expense through central Arabia, traversing the entire Wahabi kingdom, and returning to Europe through Bagdad and Aleppo (1862-63). With the consent of the emperor, he published his *Narrative of a Year's Journey through Central and Eastern Arabia* (2 vols. 1865). Palgrave quitted the Society of Jesus in 1864, and was sent by the British government in 1865 to treat for the release of Consul Cameron and the other captives in Abyssinia, receiving later various consular and diplomatic appointments, till he died at Monte Video. His other works are *Essays on Eastern Questions* (1872); *Hermann Agha: an Eastern Narrative* (2 vols. 1872); *Dutch Guiana* (1876); *Ulysses: Studies in Many Lands* (1887); *A Vision of Life* (1891, unfinished).

Pāli is the term first applied to the canon of the Theravāda school of Buddhism which flourished first in northern India and later in Ceylon, Siam, and Burma, and then to the language in which the canon was redacted. This language is essentially a literary dialect, representing the outcome of a prolonged period of intercourse between Buddhist monks from different parts of India, and it is difficult to decide on what local speech it is based. Late tradition asserts that the Buddha used the speech of Magadha, but Pāli shows none of the salient characteristics of the Māgadhī speech, and it is more probable that the teaching of the Buddha was at first handed down in the Ardha-Māgadhī dialect of a district west from the area of Māgadhī proper. Pāli, however, seems to represent the dialect of Avanti, and this accords well with the fact that it bears a much closer resemblance to the western than to the eastern dialect of the inscriptions of Asoka. Part of the canon seems

to have been redacted in this dialect from originals in Ardha-Māgadhī, part composed originally in it, while, after the canon was definitely closed, Pāli was freely employed as a suitable literary medium, not only for commentaries on the canon but for original works on Buddhist dogma and discipline, though at the present day it has usually been superseded by the use of vernaculars for this purpose.

See E. Müller, *The Pāli Language* (London, 1884); W. Geiger, *Pāli, Literatur und Sprache* (Strassburg, 1916); R. O. Franke, *Pāli und Sanskrit* (Strassburg, 1902); M. Winternitz, *Geschichte der indischen Literatur*, II. i. (Leipzig, 1913); Pāli Text Society's *Pāli-English Dictionary* (1921-25).

Pāli, the commercial capital of Jodhpur (q.v.), 45 miles by rail SE. of Jodhpur city.

Palikao, a place on the canal between Peking and its port on the Peiho. Here in 1860 was fought an engagement between the Anglo-French troops and the Chinese, and hence the French general, Cousin-Montauban (1796-1878), who was minister of War in August and September 1870, received his title of Count Palikao.

Palikars, a name for the Armatolos (q.v.).

Palimpsest. See PALÆOGRAPHY.

Palindrome (Gr. *palin*, 'backwards,' and *dromos*, 'a running'), the name given to a kind of verse very common in Latin, the peculiarity of which is that it may be read the same backwards as forwards. A few examples will suffice.

Si bene te tua laus taxat sua lautē tenebis.
Et necat eger amor non Roma regente taceat,
Roma reges una non anus eger amator.

A Greek palindrome, sometimes inscribed on English fonts (e.g. Hadleigh and Worlingworth, in Suffolk), runs: *Νίχον ἀνδρῆμα μὴ μόναν ἑψω* ('Wash my sin, and not my face only'). A Roman lawyer gets the credit of *Si nummi immunitis*, which Camden translates 'Give me my fee, and I warrant you free.' It is said that in the reign of Queen Elizabeth a certain lady of rank, having been compelled to retire from the court on account of some *fama*, the truth of which she denied, took for her motto: *Ablata at alba*, 'Retired but pure.' The English language has few palindromes, but one at least is inimitable. It represents our first parent politely introducing himself to Eve in these words: 'Madam, I'm Adam.' Compare Henry B. Wheatley's book on *Anagrams* (1862); G. R. Clark, *Palindromes* (Glasgow, 1887).

Palinurus, the helmsman of Æneas, was lulled to sleep at his post, and fell into the sea. When Æneas visited the lower world he related to him that on the fourth day after his fall he made the coast of Italy, and was there barbarously murdered, and his body left unburied on the strand. The Sibyl prophesied that his death should be atoned for, a tomb erected to him, and a cave (Palinurus, the modern *Punta dello Spartivento*) named after him.

Palisander Wood, a name sometimes given to Rosewood (q.v.).

Palissy, BERNARD, the great French potter, was born about 1509 in the diocese of Agen, and, after wandering for ten or twelve years all over France as a glass- and portrait-painter, about 1538 married and settled at Saintes. There he employed himself also as a land-surveyor, when the chance sight of an enamelled cup made him resolve to discover how to make enamels—an art at this time little known save in North Italy. So, neglecting all else, he devoted himself to experiments for sixteen years, by which time he had exhausted all his

resources and was burning his furniture and flooring as fuel. His neighbours, even his wife, mocked at him; his children cried to him for food; but in spite of all these discouragements he persisted, and was at length rewarded with success (1557). His ware, bearing in high relief plants and animals, coloured to represent nature, soon made him famous; and, though as a Huguenot he was in 1562 imprisoned at Bordeaux, he was speedily released by royal edict, and appointed 'inventor of rustic figulines' to the king. Removing to Paris in 1564, he established his workshop at the Tuileries, and was specially exempted by Catharine de' Medici from the massacre of St Bartholomew (1572). During 1575-84 he delivered a course of lectures on natural history and physics, and was the first in France to substitute facts for fancies, as also to give right notions of the origin of springs, the formation of fossil shells, the fertilising properties of marl, and the best means of purifying water. In 1588 he was again arrested as a Huguenot, and thrown into the Bastille, where he died in 1589. Palissy's writings, published between 1557 and 1580, and edited by France (Paris, 1880), possess much interest; but the man himself is more interesting still. Many regard him as an impostor.

See works by H. Morley (2 vols. 1852), and C. L. Brightwell (1921); and French Lives by Audiat (1868), Bury (1886), Dupuy (1902).

Palit, or PERLIS. See MALAY STATES.

Paliurus, a genus of trees and shrubs of the family Rhamnaceæ, nearly allied to *Zizyphus* (see JUJUBE), but very different in the fruit, which is dry, orbicular, and girded with a broad membranous wing. *P. Spina-Christi*, often called Christ's Thorn, and by the Germans Jews' Thorn (*Judenborn*), is a deciduous shrub or low tree, with slender, pliant branches and ovate three-nerved leaves, each of which has two sharp spines at the base, one straight and the other re-curved. It is a native of the countries around the Mediterranean, of India, and many parts of Asia. It is often used for hedges in Italy and other countries, its sharp spines and pliant branches admirably adapting it for this purpose.

Palk Strait, the northern portion of the shallow passage between the south coast of India and the island of Ceylon (q.v.).

Palladio, ANDREA, Italian architect, was born at Vicenza, 30th November 1518. After studying the writings of Vitruvius and the monuments of antiquity at Rome, he settled in his native city, and soon acquired a high reputation throughout the country from his designs for numerous buildings in Vicenza and the neighbourhood. He is the most conspicuous of the architects who, following Brunelleschi, led the way in establishing the modern Italian school of architecture, as distinguished from the earlier Italian Style (q.v.) of the Renaissance. His style, known as the Palladian, is modelled on the ancient Roman as apprehended by Vitruvius, reproducing its dignity and strict proportions, but often to the neglect of usefulness; and his buildings are constantly encumbered by a superfluity of pilasters and columns, broken entablatures, and inappropriate ornament, even where there is real beauty of detail. The palaces Barbarano, Della Ragione, Chiericati (now the Museo Civico), Tiene, and the Olympic theatre at Vicenza; the country mansions of Capra, Maser, and Rotunda in the vicinity; and the churches of San Giorgio Maggiore and Il Redentore, the façade of San Francesco della Vigna, and several palaces, in Venice, are his greatest achievements. He died at Vicenza, 19th August 1580. Palladio wrote a work on architecture (*I quattro Libri dell' Architettura*, 1570, and often reprinted) which had a great influence

upon the styles of his successors, especially upon Inigo Jones, the 'English Palladio,' whose notes on the book are published in Leoni's Eng. trans. (1715). The term Palladian was long synonymous with the perfect in architecture.

See the Monograph by B. F. Fletcher (1903); and Italian Lives by Zanella (1880) and Barichella (1880).

Palladium, among the ancient Greeks and Romans, an image of Pallas, who was generally identified with Athena (q.v.), upon the careful keeping of which in a sanctuary the public welfare was believed to depend. The Palladium of Troy was especially famous, and was the gift of Zeus to the founder of Ilium. It has been supposed it may have been originally a meteorite (see METEORS). Ulysses and Diomedes stole the Palladium, and so helped to secure victory for the Greeks; and both Athens and Argos boasted to have afterwards secured the possession of the charm.

Palladium (sym. Pd; atom. number 46; atom. wt. 106.5; sp. gr. 11.4) is one of the so-called noble metals, in colour and ductility closely resembling platinum. It is not fusible in an ordinary wind-furnace, but melts at a somewhat lower temperature than the last-named metal; and, when heated beyond its fusing-point, it volatilises in the form of a green vapour. It undergoes no change in the open air at ordinary temperatures; but at a low red heat it becomes covered with a purple film, owing to superficial oxidation. It is soluble in nitric acid, and in aqua regia. It combines readily with gold, which it has the property of rendering brittle and white. (When it forms 20 per cent. of the mass the alloy is perfectly white.) See OCCLUSION.

It was discovered in 1803 by Wollaston in the ore of platinum, of which it seldom forms so much as 1 per cent. Another source of this metal is the native alloy (termed *ouro poudre*) which it forms with gold in certain mines in Brazil; it is from this alloy that the metal is chiefly obtained.

Palladius, RUTILIUS TAURUS ÆMILIANUS, a Roman author of the 4th century A.D., who wrote a work, *De Re Rustica* (On Agriculture), in fourteen books, the last of which is a poem of eighty-five elegiac couplets.

Palladius, ST. See SCOTLAND (*Church History*); also PATRICK (SAINT).

Pallas. See ATHENA, MINERVA.

Pallas, PETER SIMON, traveller and naturalist, was born 22d September 1741, at Berlin, studied medicine and natural history at Berlin, Göttingen, and Leyden, and, already famous, was in 1768 invited to St Petersburg by the Empress Catharine. Appointed naturalist to a scientific expedition to observe the transit of Venus, he spent six years (1768-74) exploring the Urals, the Kirghiz Steppes, part of the Altai range, great part of Siberia, and the steppes of the Volga, returning with an extraordinary treasure of specimens in natural history. He wrote a series of works on the geography, ethnography, flora and fauna of the regions visited. He settled in the Crimea in 1796, and there he died, 8th September 1811.—The Sand-grouse (q.v.) is often called Pallas's Sand-grouse.

Pallavicino, SFORZA, an Italian historian, was born at Rome, 20th November 1607. Having taken priest's orders in 1630, he became in 1638 a member of the Jesuit Society, and was created a cardinal in 1659 by Pope Alexander VII. He died at Rome, 5th June 1667. The best known of his writings is *Istoria del Concilio di Trento* (Rome, 1656-57), intended as a reply to the equally celebrated and liberal work of Paul Sarpi, whose narrative is not altogether acceptable to Catholics.—FERRANTE PALLAVICINO (1618-44) wrote pasquin-

ades which bitterly offended the papal curia and the Barberini family; and being betrayed into his enemies' hands near Avignon, he was tried, condemned by a foregone conclusion, and beheaded.

Pallice, LA, a harbour opened in 1889 to receive large vessels for La Rochelle in France, whence it is less than 3 miles distant.

Palliser, SIR WILLIAM, C.B., was born at Dublin on 18th June 1830, and entered the army as a cavalry officer. In 1863 he invented the chilled shot (see SHELL) that bears his name, and a system of strengthening cast-iron ordnance by the insertion of a steel tube. He retired in 1871, sat for Taunton as M.P., and died 4th February 1882.

Pallium, the name given in the Roman Catholic Church to one of the ecclesiastical ornaments worn by the pope, by patriarchs, and by archbishops. It is worn by the pope at all times, as a symbol of his reputed universal and abiding jurisdiction. By archbishops it cannot be worn until it has been solemnly asked for and granted by the pope, and even then only during the solemn service of the great church festivals, and on occasions of the ordination of bishops or of priests, and other similar acts of his episcopal office. The pallium is a narrow annular band of white woollen web, about 3 inches wide, upon which black crosses are embroidered, which encircle the neck of the archbishop, and from which two narrow bands of the same material depend, one falling over the breast, the other over the back of the wearer. It is made wholly or in part from the wool of two lambs, which are blessed annually on the festival of St Agnes.

Palm (*Palme* or *Palmaceæ*), a family of monocotyledons, the products of which are of extreme importance and utility to man. They are arborescent, with erect stems, usually slender as compared with the extreme height to which some of the species attain, and simple or rarely branching; some are stemless, their leaves springing direct from the ground; others are sarmentose, twining about the stems and branches of neighbouring trees, by means of hooks or prickles, or trailing on the ground with stems of almost incredible length and extreme slenderness, as in the case of many of the Calami. Externally the stems are hard and horny, often coated with a siliceous deposit hard as flint, and finely polished; they frequently are armed with spines, and marked with the scars of dead leaves, or clothed in the upper part with the remains of the dead leaf-stalks enveloped in masses of fibre. The interior of the stem is generally soft and pithy, intermingled with bundles of fibre longitudinally. So soft and easily extracted is the internal substance of the stems of many palms that the outer hard case may readily be formed into a cylindrical tube. The leaves vary much in form superficially, but all the variations belong to two types—the fan-veined and the pinnate-veined. In the former the general outline is that of a fan, with veins arising from the top of the leaf-stalk and radiating like the ribs of a fan. In the other type the leaves are more or less elongated, with a distinct midrib extending to within a little of the extremity of the blade, which is always there cleft in two down to the point of the midrib, and with the veins springing from the sides of the midrib like the pinnales of a feather. Leaves of this type are sometimes entire, but more generally pinnate, and impart much elegance and grace to the figure of the particular species to which they belong. The size of palm-leaves varies extremely, some being only a few inches in length, as in some species of *Malortia*, while in *Manicaria saccifera* they attain the enormous proportions of 35 feet in length by 5 or 6 feet in breadth. The inflorescence is a simple

or many-branched spadix enclosed in a spathe of one or several valves. The flowers are small individually, but numerous, usually of a yellow tint, and in some species powerfully odorous. They are unisexual, bisexual, or polygamous, the male and female flowers being borne in some species on different plants. The fruit when ripe is berry-like, drupaceous, or, as in the coconut, nut-like.

Palms are natives chiefly of the tropical regions of the earth. A few are found in extra-tropical countries extending to 36° N. lat. in America, 34° N. lat. in Asia, and in Europe *Chamærops humilis*, which is the only indigenous species, extends to 44° N. lat.; no species are found beyond 43° S. lat. *Trachycarpus excelsa* from Japan, a hardier palm than *Chamærops humilis*, with which it has been confused, may be seen in London gardens. *Chamærops* is not to be met with north of the Alps. Linnæus, whose knowledge of palms was limited to the more arborescent species, very appropriately named them the 'Princes of the Vegetable Kingdom.' Their stately habit, the elegant proportions of the stems, and the grace and beauty of the leaves of the majority of the larger species, coupled with the great variety and utility of the products of all, mark them as a most distinguished and valuable group of plants, gratifying the eye by their adornment of the landscape, and ministering abundantly to the necessities and the pleasures of both savage and civilised man. Their stems when young and tender are delicious and nutritious food; when old and mature those of certain species yield valuable farinaceous substances; some are valuable as timber-trees, and the terminal bud of several consists of a mass of tender mucilaginous leaves, which are esteemed a delicate and delicious vegetable. Many yield by incision or otherwise an abundance of sweet sap, from which sugar, refreshing drinks, wines, spirits, and vinegar are obtained. Their leaves are used for thatch, and for the making of mats, baskets, hats, umbrellas, thread, cord, and clothing. They yield excellent and inexhaustible materials, and they are in some cases a natural substitute for writing-paper, the records and writings of many eastern peoples being inscribed upon them. Other useful products are oils, vegetable ivory, and edible fruits.

The family comprises well over 1000 species.

The genus *Chamædorea* is composed of about sixty species, all of slender, graceful habit, their smooth stems often not exceeding an inch in diameter, though they may be twenty or more feet high. They are used in South America for making



Fig. 1.—*Chamædorea aurantiaca*.

bridges, as the bamboo is in China and India. The flowers of several of the species—including those of *C. aurantiaca* (fig. 1)—are highly esteemed as a culinary vegetable in some of the countries of Central America, but for this purpose they must be extracted from the spathe before it bursts. The fibre of *Leopoldinia Piassaba* is mentioned in the latter part of this article. The fruit of *Leopoldinia major*, called by the natives of Brazil *Jará-assu*, is collected by them and burned, and the ash, after being washed, is used as a substitute for salt. It is described, however, as being

bitter rather than saline. *Euterpe edulis*—also a native of Brazil—produces fruit in size, shape, and colour like that of the sloe. From the fruit of this species a beverage is made by infusion, which is much relished. *E. oleracea* produces an edible and nutritious cabbage. The *Nibong* of the Malays of the Eastern Archipelago is *Oncosperma filamentosum*, the cabbage of which is more highly esteemed than that of any other palm indigenous to that region. From the fruit of *Enocarpus Bataua* a wholesome beverage called *Patawa-yukissé* is made on the Rio Negro. The fruit of *Oreodoxa regia*, an extremely handsome palm, a native of Cuba, is too acrid for human food, but is used there for fattening hogs.

Areca Catechu is the Betel-nut Palm (see ARECA). The fruit enters into the masticatory of that name so much used in India. It contains gallic acid, much tannin, a principle analogous to catechu gum, a volatile oil, a red insoluble matter, a fatty substance, and some salts. A spurious kind of catechu is obtained from the nuts in two colours—one dark or black, which is extremely astringent; the other yellowish brown, which is less astringent and more pure. Besides being used as a masticatory and in medicine in cases of dysentery, the substance is employed in tanning leather and in dyeing calico. The terminal shoot of this palm furnishes an excellent cabbage, as also do several other *Arecae*. But the true Cabbage Palm is *Oreodoxa oleracea*, a noble species indigenous to the West Indies, 100 feet high, with a diameter of stem of about 4 feet. The leaves are pinnate, about 20 feet long, the pinnules in full-sized leaves being often 3 feet in length. The terminal bud or cabbage is enclosed among many thin snow-white brittle flakes. It has the flavour of the almond, but with greater sweetness, and is boiled and eaten with meat. As its removal causes the death of the tree, it is regarded as an extravagant delicacy only rarely to be enjoyed, because of the great importance of the other products which the tree yields. The nuts yield a useful oil by decoction. The outer hard crust of the stem is employed in making gutters, and the pith yields a kind of sago if extracted immediately the tree is felled; but, if allowed to lie and decay on the ground, it becomes the breeding-ground of a peculiar grub, which is greatly esteemed as a delicate article of food in Martinique and San Domingo.

Ceroxylon Andicola, a native of Peru, growing at an elevation of 8000–10,000 feet above sea-level, is a handsome species rising to the height of 160 feet or more. The stem exudes from the annular cicatrices of the fallen leaves a resinous substance called by the inhabitants *cera de palma*. It is composed of about two parts of a yellow resin and one part of wax, the texture of which is more brittle than beeswax. A sub-resinous matter is also extracted from it named *ceroxilin*, which assumes the form of silky crystals, is soluble in alcohol, and phosphorescent by friction. The exudation, mixed with certain proportions of wax or tallow, is employed in candle-making. Besides the resinous exudation the trunk yields a valuable and durable timber, the leaves are excellent and durable material for thatch, and they supply a strong, useful fibre for the manufacture of ropes and cordage. The *Paxiuba* Palm (*Iriarteia exorrhiza*) is a native of Central and South America, and is a singular and interesting tree on account of its peculiar habit of growth. The roots all spring from the stem above ground, every new root emerging from a point somewhat higher on the stem than the one which preceded it. And as the old roots decay as the new are produced and penetrate the ground, a tree of some age presents the curious spectacle of being supported on three or four legs long enough and

wide enough apart to enable a man to pass between them erect. The timber is used in flooring and for making umbrella-sticks, musical instruments, &c. Blowpipes (q.v.) for poisoned arrows are made from the stems of *I. setigera*.

The Sugar Palm (*Arenga saccharifera*, see fig. 2) is a native of the Moluccas, Cochin-China, and the Indian Archipelago, and is of immense value to the



Fig. 2.—*Arenga saccharifera*.

natives of these countries on account of its various products. It yields an abundant sweet sap, from which a chocolate-coloured sugar named *jaggery* is made. The sap fermented makes an intoxicating drink variously named by the inhabitants of the different countries *neroo* or *brum*. From the pith of the stem sago is obtained in great quantity, a single stem yielding as much as from 150 to 200 lb. The leaves supply *Gomuto fibre*, which is celebrated for its great strength and durability when formed into cordage and ropes, and at the base of the leaves a fine woolly material, named *baru*, is developed in mature trees, which is employed in caulking ships, stuffing cushions, and making tinder.

Caryota urens (see fig. 3), one of the noblest palms of India, yields some remarkable products. The flesh of the fruit, which resembles a plum in size and structure, is very acrid, and corrodes and burns the lips and mouth. From the terminal bud a sweet watery liquor is obtained, which, when boiled, yields *jaggery*. The terminal bud is also



Fig. 3.—*Caryota urens*.

eaten as a cabbage. From the pith of the stem sago is obtained, which is made into bread, and

prepared in various other ways, and is a valuable article of food to the natives. The tree is named *Kittul* in Singhalese, and the fibre called *Kittul*, obtained from its leaves, is most valuable to brushmakers (see FIBROUS SUBSTANCES).

The genus *Calamus* and its immediate allies have in some cases the habit of grasses. Certain species—viz. *C. Rotang*, *C. tenuis*, and *C. viminalis*—furnish the rattan-canes employed in making ropes and cables, chair-bottoms, couches, baskets, mats, &c. The walking-sticks known as Malacca-canes are made from the stems of *C. Scipionum*, a species which grows not in Malacca, but in Sumatra, and the canes are chiefly exported from Siak in that island. The stems of the Great Rattan (*C. rudentum*) and others are of prodigious length, extending to hundreds of feet, clinging by hooks attached to their leaves to the trunks and boughs of neighbouring trees, or trailing on the ground. They are extremely hard externally, and usually smooth, with a dense siliceous crust on the surface. *Dremonorops Draco* furnishes the finest quality of the resinous substance known as *Dragon's Blood* (q.v.), although a similar substance is obtained from various other plants. In this case it is exuded from the surface of the fruit, and is separated from it by rubbing or shaking the fruits together in a bag. An inferior quality of the same substance is also obtained from the tree by incision

of the stem, and by steaming the fruit after the natural exudation has been collected. Few species are more singular than *D. adspersus* (see fig. 4), which resembles a creeping or twining grass rather than a palm, the stem rarely exceeding in thickness stout wheat straw. *Zalacca edulis* is regularly cultivated by the Burmese for the sake of its pleasantly acidulous fruit, which grows to the size of a walnut.



Fig. 4.—*Dremonorops adspersus*.

The succulent scaly pulp which encloses the seed is the edible part.—*Raphia vinifera*, a native of Guinea, yields a rather abundant sap, from which a strongly spirituous wine is obtained. One of the most beautiful and singular of palms is *R. vinifera* var. *tædigera*, an inhabitant of the banks of the Amazon. The trunk of the tree is short, from 6 to 10 feet high, but from the summit the leaves rise almost perpendicularly to the height of 40 feet or more, arching gracefully outward towards the apex. The footstalks of these enormous leaves alone are often 12 or 15 feet long by 4 or 5 inches in diameter. The integument of these footstalks is thin, extremely hard and elastic, and light as a quill, and, being easily split into straight strips, is made into window-blinds, baskets, &c., by the Indians.

The true sago of commerce (see SAGO) is derived from various species of the genus *Metroxylon* or *Sagus*, although other species of palms, as has already been stated, and also plants widely different botanically, such as *Cycas revoluta*, also yield a kind of sago. *M. Sagu* is the species from which

the largest quantity of true sago is obtained. It is a native of the Indian Archipelago, cultivated in Malacca, Borneo, Sumatra, Celebes, and the Moluccas. The tree is small, rarely exceeding 30 feet in height of stem, which consists of a hard shell about 2 inches thick enclosing a mass of spongy pith—the sago. This pith is gradually absorbed after the tree reaches maturity, leaving the stem quite hollow. The proper time to fell the trees, before the pith begins to diminish in bulk or quality by absorption, is indicated by the upper leaves becoming covered with a sort of farina or white dust. When felled the stem is cut into lengths of 6 or 7 feet, which are split, the better to remove the pith. There are various modes of extracting the fecula from the insoluble substances with which it is combined in the stem, but washing and straining are the principal features of every process. A single tree, it is said, will yield from 500 to 600 lb. of sago.—The Bache, or Moriche (*Mauritia flecuosa*), a native of Guiana, supplies the chief wants of the people wherever it grows; the stems furnish timber for building their dwellings, the leaves thatch for the same, and material for mats, couches, hammocks, &c.; the pith yields sago; the juice by fermentation gives an excellent beverage; the kernels of the fruit are ground into meal and made into bread; and the fibre is converted into cordage and clothing.—The Palmyra Palm (*Borassus flabellifer*) is one of the most common of its tribe in India. In some parts of the country it grows spontaneously, and it is found as far north as 30°; in others it is the subject of careful cultivation. It furnishes the greater part of the palm-wine or toddy of India. The fruit is about the size of a child's head, somewhat triangular, and within a thick, fibrous rind contains three seeds about the size of a goose's egg. The seeds when young are eaten by the natives, being jelly-like and palatable. The toddy is obtained by wounding the spathe before the inflorescence expands. After a few days a clear, sweet liquor exudes from the wound, and is carefully collected in pots suspended under the wounded spathe. A tree yields about three quarts daily. The liquor is drunk fresh, and will only keep sweet for about three days, when it undergoes fermentation and becomes sour, and is distilled into arrack. Jaggery is also made from the juice. The young plants when a few inches high are cooked and eaten as a vegetable. The leaves, which are fan-shaped and large, are turned to the various uses alluded to in connection with species already described, and in India they are almost universally used for writing upon with an iron stylus.

The Double Coconut, or Sea Coconut as it has been called, is *Lodoicea Seychellarum*. The nuts of this tree are seen occasionally in museums and in the cabinets of collectors of curios, often beautifully polished and carved by native workmen, and formed into caskets and other ornaments. For long their origin was shrouded in mystery. They were frequently found floating about in the ocean before the discovery of the tree, and an absurd belief was entertained by Malay and Chinese sailors that they were the fruit of some marine tree. The tree, a native of the Seychelle Islands, is very elegant, attaining a height of from 50 to 80 feet, with leaves 20 feet long supported on stalks of equal length. The fruit is one of the largest produced by any of the palms, being a foot or a foot and a half in length. The kernel near the base is divided into two parts—hence the name Double Coconut—and while young part of the fleshy substance in which it is enclosed is edible. The chief products of the tree are timber and fibre for cordage, and a downy kind of fibre which envelops the

young leaves is used for filling mattresses and pillows.

The Talipat Palm of Ceylon (*Corypha umbraculifera*) is notable for the variety of uses to which its leaves are put in Ceylon and other parts of India to which it is indigenous. The leaves are of immense size, and, being palmate with the leaf-stalk attached near the middle, they are readily formed into umbrellas and tents; the cane-like ribs being removed and the blades neatly stitched together, they may be folded up with great facility. They are also very much used for the books of the inhabitants. Many of these alleged to be made of Egyptian papyrus are formed of the leaves of this palm. The tree grows to the height of 100 feet, and has a very grand and imposing appearance.—A closely allied species (*C. Taliera*) is the Talipat Palm of the Indian peninsula. It grows to about the same height as the preceding species, with leaves of a more durable kind for the purposes of thatch, but not so adaptable to more delicate and artistic uses.—*Licuala peltata* is the Chittah-pat of Assam, the leaves of which are extensively used for making umbrellas, punkahs, and hats. The stems of *L. acutifida* are made into walking-sticks, named by Europeans *Penang Lawyers*.—*Copernicia cerifera*, a native of northern Brazil, produces an edible fruit; and from the leaves, after they have been removed from the trees and dried, is obtained an inferior kind of vegetable wax, which is used in candle-making and to adulterate beeswax. See CARNAHUBA.

Of the American Palmetto Palm, a native of the Carolinas and Florida, the most important species is the Cabbage Palmetto (*Sabal Palmetto*), which sometimes grows to 50 feet in height and 15 inches in diameter, with leaves 5 feet long and broad. It is found also in the Bermudas. Its products are timber and the leaves, the former being exceedingly durable, very porous (see MOULTRIE), and especially valuable for wharf-building, as it resists water and is not attacked by the teredo. The fruit is not edible.—The Palmetto of Europe is *Chamærops humilis*, which inhabits the countries on both shores of the Mediterranean, occupying great tracts. It rarely reaches 10 feet in height, and usually is much less, its growth being exceedingly slow. The leaves are fan-shaped and abound in excellent fibre, made in Algeria into *crin végétal*, a substitute for horse-hair. *Nannorrhops Ritchieana*, a native of Sind and Afghanistan, and *C. excelsa*, a native of China and Japan, both produce excellent fibre. The leaves of *Thrinax argentea* supply the material called *chip*, of which ladies' hats are made. The trunks of *T. parviflora*, a native of Jamaica, though of slender diameter, are said to be very suitable for piles and marine buildings subject to immersion, as they are impervious to the influence of water, and are not attacked by borers or worms. *Sabal mauritii-forme*, a native of New Granada (fig. 5), is a low-growing but very handsome palm, not remarkable for any products of special utility.

The *Piritu* of Venezuela, the *Paripou* of Guiana, and the *Papimba* of the Amazon are one species of palm—*Bactris speciosa*. It produces fruits somewhat triangular in shape, about the size of an apricot, and bright reddish yellow in colour. They have a peculiar oily flavour, and are eaten boiled or roasted, when they resemble chest-nuts. They are also ground into meal, which is baked in cakes.—The Great Macaw or Gru-gru tree (*Acrocomia sclerocarpa*) is a native of Jamaica, Trinidad, and the adjacent islands and continent. In Brazil it is called *Macahuba*, and in Guiana *Macoya*. The tree grows from 20 to 30 feet high, with a crown of leaves, each of which measures from 10 to 15 feet in length. The fruit yields

an oil of yellow colour, sweetish taste, and odour of violets, which is employed by the natives as an emollient for painful affections of the joints; and in Europe it is used in the manufacture of toilet soaps. The nuts are capable of receiving a high polish, and are converted by the natives and the negroes into ornaments.—The Tucum Palm (*Astrocaryum Tucuma*), a native of



Fig. 5.—*Sabal mauritii-forme*.

the Rio Negro and the Upper Amazon, yields a very superior fibre, the cordage from which is knitted into hammocks, which are in great demand with the Brazilians. The fleshy outer covering of the fruit is eaten by the natives.—The Murumuru Palm (*A. Murumuru*) produces a very agreeable fruit with the fragrance of musk. Cattle eat the fruit with avidity, but evacuate the hard stony seeds undigested. In times of scarcity these seeds are carefully collected and used to feed pigs, which are very fond of them, and find no difficulty with their powerful teeth and jaws in masticating them.—*Attalea funifera* furnishes piassava, the whalebone-like fibre now much used for making brooms and brushes. The tree attains the height of 20 or 30 feet. At the base of the leaves a valuable thick, dark-brown, very long fibre, Bahia bass, is obtained, sometimes 12 feet long; Para or Monkey bass, a softer, shorter kind, usually about 3 feet in length, is got from *Leopoldinia Piassaba* (see FIBROUS SUBSTANCES). The fruit of *Attalea funifera* is the *Coquilla* nut, much used in turnery for the making of knobs to walking-sticks and umbrellas, handles to bell-pulls, &c. The nuts are extremely hard and susceptible of a fine polish, and exhibit a beautifully mottled surface of light and dark brown.—The fruit of *A. Cohune* yields from its kernel a valuable oil called *Cohune Oil*, which is said to be superior in quality to the best coconut oil. It is a native of Honduras and the Isthmus of Panamá. The trunk, which attains the height of about 40 feet and is crowned with leaves some 30 feet long, yields by tapping a kind of palm-wine.—The *Palm-oil* of Africa is the product of the fruit of *Eleis guineensis*. The tree is cultivated now in the West Indies and tropical South America for the sake of the oil. It attains a height of 60 feet, with a spreading crown of pinnate leaves, each about 15 feet long, the footstalks of which are armed with stout hooked spines. The flowers have a strong peculiar smell, like anise and chervil in combination. The fruit forms a large head, consisting of a great number of orange-coloured drupes; when ripe each drupe has an oily pulp with a stone and kernel in the centre, and it is from this

pulp that the oil is obtained. To extract the oil the pulp is first bruised to a paste in wooden mortars, and is then boiled in water. The oil which rises to the surface of the water is reddish or orange in colour, and has an agreeable odour of violets; it is allowed to cool, and is then skimmed off. In warm countries it retains its oily consistence, but in cooler climates it acquires the solidity of butter. It is used as butter is in Europe. The quantity of palm-oil now imported to Europe is enormous. It is employed in cooking, in the manufacture of margarine, candles, toilet and common soaps, and as a lubricant of railway-carriage wheels, &c. The kernel yields palm-kernel oil. Palm-kernel cake and meal are used as cattle-foods. The tree yields from its trunk abundance of palm-wine.—The *Coguito* of Chile is *Jubæa spectabilis*, a tree of about 50 feet in height, with a spreading crown of leaves. From its trunk a syrup is extracted, called *miel de palma*, which is much esteemed by the Chileans and Europeans in cookery in various ways. It is obtained by cutting down the tree and lopping off its crown of leaves, when the sap flows from the wound, and is carefully collected. By cutting off a fresh slice from the wound daily, or when the flow of sap becomes weak, it may be kept flowing for several months; a good tree is said to yield as much as ninety gallons of sap, which on being boiled down assumes the consistence of treacle.

Much information on palms and their products will be found in the *Historiæ Palmarum*, by Martius; in the *Flora Brasiliensis*, by Drude; in a *Popular History of Palms*, by Seemann; and in *Pflanzenfamilien*. See ARECA, COCONUT, CHAMEROPS, DATE PALM, DUM PALM, FIBROUS SUBSTANCES, NUT, &c.

Palm, a measure of length, originally taken from the width of the hand, measured across the joints of the four fingers. In Britain a palm is, somewhat loosely, understood to be the fourth part of an English foot, or 3 inches.

Palma, (1) the capital of the island of Majorca (q.v.) and of the Balearic Islands, stands on the Bay of Palma, on the south coast. The cathedral, a Gothic edifice (1232–1601), contains the tomb of King Jayme II. of Aragon and a valuable collection of church ornaments. The tomb of Raymond Lully (q.v.) is in the church of St Francis. There are, further, a beautiful exchange (1426–46), an old Moorish palace, and a 16th-century town-hall, with pictures. Palma is one of the most aristocratic cities in Europe. Pop. 77,000. It makes boots and shoes, silver chain purses, jewellery, matches, silks, woollens, &c. The port is protected by a mole, and the town by a wall and batteries.—(2) A town of Sicily, 14 miles S.E. of Girgenti; pop. 18,000.—(3) The name of one of the larger of the Canary Islands (q.v.), with an area of 718 sq. m.; pop. 50,000. Drawn-thread work, bananas, and almonds are exported.

Palma, JACOPO, commonly called PALMA VECCHIO (i.e. Old Palma), painter of the Venetian school, was born about 1480 at Serinalta, near Bergamo, and died at Venice just about the middle of the year 1528. At first working under the influence of the Bellinis, he subsequently painted in the spirit and style of Giorgione and Titian, and may be placed at the head of the second class of great Venetian artists. His pictures are either religious subjects or portrait groups. Of the former the best are a series of six figures of saints, St Barbara and others, in the church of Santa Maria Formosa at Venice. The best portrait group is three sisters, generally called the 'Three Graces.'—His brother's grandson, likewise called JACOPO (1544–1623), and nicknamed IL GIOVANE

(the Younger), painted religious pictures of greatly inferior merit, though he modelled his style on that of Titian, Palma Vecchio, and Tintoretto.

Palma Christi. See CASTOR-OIL PLANT.

Palm Beach, a great winter resort on the east coast of Florida, about 264 miles S. of St Augustine; the Gulf Stream is within about a mile of the shore; pop. 1000.

Palmblad, VILHELM FREDRIK, a Swedish historian, was born 16th December 1788 at Liljested, in East Gothland, studied at Uppsala, and became professor of Greek there in 1835. He died 2d September 1852. Amongst his works (which deal with geography, history, and classical philology) are the *Biografisk Lexikon* (23 vols. 1835–59) and the historical novel *Aurora Koningsmark* (1847).

Palmellaceæ. See ALGÆ, GORY DEW.

Palmer (Lat. *palmifer*, 'a palm-bearer'), properly so called, was a pilgrim who had performed the pilgrimage to the Holy Sepulchre, and had returned or was returning home after the fulfilment of his vow. The Palmers were so called from their carrying branches of the oriental palm, in token of their accomplished expedition. On arriving home they repaired to church to return thanks to God, and offered the palm to the priest, to be placed upon the altar.

Palmer, EDWARD HENRY, the 'Sheikh Abdullah,' was born 7th August 1840 at Cambridge, and while a schoolboy there picked up Romany (the Gypsies' tongue), while a clerk in the City, Italian and French. In 1859 he all but died of consumption; in 1860 at Cambridge began to devote himself to oriental studies—Arabic, Persian, and Hindustani; in 1863 obtained a sizarship at St John's; and in 1867, graduating with a third-class in classics, was yet elected a Fellow of his college. During 1868–70 he was engaged for the Palestine Exploration Fund in the survey of Sinai, and, with Charles Tyrwhitt Drake, of the Desert of the Wanderings, acquiring meanwhile a marvellous knowledge of the wild Arab tribes. In 1871 he was appointed Lord Almoner's professor of Arabic at Cambridge (his stipend £40, 10s., augmented next year by £250); and in 1874 he was also called to the bar. So ten years went by of work and play—he was a wonderful conjurer—of sorrow, too, and trouble, for he lost his first wife and got involved in money difficulties, till in 1881 he turned London journalist, writing principally for the *Standard*. Finally, in June 1882, on the eve of Arabi's Egyptian rebellion, he was pitched on by government for the perilous mission of winning over the Sinai tribes to Britain and hindering the destruction of the Suez Canal. He made two expeditions—the first his great ride from Gaza to Suez (July 15–31), and the second when, starting from Suez with Captain Gill, R.E., and Lieutenant Charrington, R.N., he and they on August 11 were betrayed and murdered in the ravine of Wady Sadr. Eight months later the three were buried in St Paul's.

Of a score of works by Professor Palmer may be mentioned his *Desert of the Exodus* (1871), *Arabic Grammar* (1874), *Song of the Reed* (1876), *Poems of Behâ ed Din Zohair* (1876–77), *Persian-English and English-Persian Dictionary* (1876–83), *Haroun Alraschid* (1880), and a translation of the *Koran* (1880). See his *Life* by Sir W. Besant (1883); also Capt. A. E. Haynes, *Man-hunting in the Desert* (1894).

Palmer, ROUNDELL. See SELBORNE (LORD).

Palmer, SAMUEL. See ENGRAVING.

Palmerston, HENRY JOHN TEMPLE, VISCOUNT, was born at the family mansion, Broad-

lands, near Romsey, Hants, 20th October 1784, and belonged to the Irish branch of the ancient English family of Temple, taking name from Temple in Leicestershire. Sir W. Temple, the diplomatist and patron of Swift, was a member of this family, which removed to Ireland about 1601, and which was ennobled in 1722, when Henry Temple was created a peer of Ireland with the dignities of Baron Temple and Viscount Palmerston. His grandson, Henry, second Viscount (1739-1802), was father of the great minister, and superintended his education at Broadlands, until he sent him to Harrow. Young Temple in 1800 went to the university of Edinburgh, where he attended the lectures of Dugald Stewart and other professors. In 1802 he succeeded his father as third Viscount, and in 1803 he matriculated at St John's College, Cambridge. His eminent abilities were early recognised, for he was scarcely of age when the Tory party in the university selected him (1806) as their candidate to succeed Pitt in the representation. Unsuccessful at Cambridge then and again in 1807, he entered parliament in the latter year for Newport, in the Isle of Wight, his colleague being Arthur Wellesley, then Chief-secretary for Ireland. In 1811 he exchanged Newport for the university of Cambridge, enjoyed the distinction of representing his *alma mater* for twenty years, and only lost his seat when he became a member of the Grey administration and supported the Reform Bill. For the last two years of the unreformed parliament he sat for the now extinct borough of Bletchingly. At the first election after the Reform Act he was returned for South Hampshire, but lost his seat at the general election of 1835. He immediately afterwards found a seat for the borough of Tiverton.

Having traced his representative, we now turn to his official career. Palmerston entered life as a member of the Tory party, and accepted the office of Junior Lord of the Admiralty and Secretary at War (without a seat in the cabinet) in 1809. This office he held during the successive governments of Perceval, Liverpool, Canning, Goderich, and Wellington—a period extending from 1809 to 1828. There was ample scope at the War Office for Palmerston's administrative talents and activity. The military system swarmed with abuses, and the labour thrown upon the Secretary at War during the Peninsular campaigns was prodigious. In 1816 an attempt was made to assassinate Palmerston by an insane army-lieutenant, named Davis, who fired a pistol at him as he was entering the Horse Guards; the bullet, however, only inflicted a slight wound. Palmerston early attached himself to the Canning section of the Liverpool administration. His official connection with the Tory party ceased in 1828, when the 'Great Duke' insisted on accepting Huskisson's resignation, which was followed by Palmerston's retirement. The Duke's government was swept away in the reform flood of 1830; and Earl Grey, who became prime-minister, offered the seals of the Foreign Office to Palmerston. The European horizon was so disturbed at this crisis that a great political authority declared that if an angel from heaven were in the Foreign Office he could not preserve peace for three months. Palmerston falsified the prediction. Louis-Philippe then filled the throne of France; and for the first time on record England and France acted in concert, and without jealousy, under Palmerston's foreign ministry. He took a leading part in securing the independence of Belgium, in establishing the thrones of Queen Isabella of Spain and Queen Maria of Portugal on a constitutional basis, in endeavouring, in alliance with Austria and Turkey, to check Russian influence in the East, and in

the war with Mehemet Ali. In 1841 Palmerston went out of office with the Whigs on the question of free trade in corn; but on their return in 1846 he resumed the seals of the Foreign Office. His second foreign administration furnished various subjects of hostile party criticism, among which may be mentioned the civil war in Switzerland, the Spanish marriages (see GUIZOT), the European revolutions in 1848, the rupture of diplomatic relations between Spain and Great Britain, and finally, the affair of Don Pacifico (a Gibraltar Jew living in Athens, who claimed the privileges of a British subject), and the consequent quarrel with Greece. His strenuous self-asserting character, his brusque speech, his frequently hasty interferences in foreign affairs, were little calculated to conciliate opponents at home, and secured him many enemies abroad—the name 'Firebrand Palmerston' still clinging to him on the Continent. A vote of censure on the foreign policy of the government was in 1850 carried in the House of Lords on the motion of Lord Stanley (afterwards Earl of Derby). A counter-resolution, approving the foreign policy of the government, was thereupon moved by Roebuck in the Lower House. The debate lasted four nights. In a speech of five hours' duration—'that speech,' said Sir Robert Peel, 'which made us all so proud of him'—Palmerston entered upon a manly and dignified vindication of his foreign policy; and Roebuck's motion was carried by a majority of forty-six.

In December 1851 the public were startled at the news that Palmerston was no longer a member of the Russell cabinet. He had expressed to the French ambassador in London his approbation of the *coup d'état* of Louis Napoleon, without consulting either the premier or the Queen; and, as explanations were refused, Lord John Russell advised his resignation. Palmerston, in the general opinion, was 'smashed;' but he soon got his 'tit for tat;' for in the following February, soon after the meeting of parliament, he avenged himself by shattering the Russell administration to pieces on a comparatively trifling question—a Militia Bill. He refused an offer from the Earl of Derby to join the government which he was commissioned to form, but accepted the post of Home Secretary in the coalition administration of the Earl of Aberdeen in 1852. The fall of this coalition government in the winter of 1854-55, on Roebuck's motion for a Sebastopol committee, placed Palmerston in his seventy-first year in the position of prime-minister, to which he was unanimously called by the voice of the nation; in his own phrase he was 'the inevitable.' He vigorously prosecuted the Russian war until Sebastopol was taken and peace was made. His government was defeated in March 1857 on Cobden's motion condemnatory of the Chinese war. Palmerston appealed to the country, and met the House of Commons with a largely increased majority. But his administration fell in February 1858, over the Conspiracy Bill, intended to protect the French emperor against the machinations of plotting refugees. A short Conservative administration followed; but in June 1859 Palmerston was again called to the post of First Lord of the Treasury, which he continued to fill up to his death, the chief events of this premiership being the American civil war (with its *Trent* and *Alabama* incidents), Napoleon's war with Austria, and the Austro-Prussian war with Denmark. His last great speech was his defence of the policy of his government, delivered in July 1864, in reply to the attack of Disraeli. He died at his country seat, Brocket Hall, 18th October 1865, and was buried in Westminster Abbey. Both his titles became extinct with him.

It was his ambition to be considered the minister of a nation rather than the minister of a political party; and his opponents have been constrained to admit that he held office with more general acceptance than any English minister since the time of the great Lord Chatham. As an orator he was usually homely and unpretending, but always sensible and practical. He was a dexterous tactician, of irrepressible spirit, and a ready, witty, and often brilliant debater. He was popular as a minister, because he was thoroughly English in his ends and aims; even his robust health, off-hand manner, jaunty bearing, and physical vigour were elements of his popularity. He always and ardently desired to promote the prosperity, influence, and grandeur of Great Britain, and his national spirit was heartily appreciated by his countrymen.

The title is taken from a village 3 miles W. of Dublin. See *Life of Palmerston*, by Lord Dalling (3 vols. 1870), continued by Evelyn Ashley (2 vols. 1879); and smaller works by Anthony Trollope (1882), Lloyd Sanders (1888), and the then Marquis of Lorne (1892). The *Correspondence of Queen Victoria* (1907) shed a flood of light on the (generally embarrassed) relations between the Queen and a minister she distrusted and disliked.

Palmerston. See PORT DARWIN.

Palmer-worm, a name given to many large kinds of grub, the larvæ of coleopterous insects, destructive to various vegetable substances.

Palmetto-leaves, the leaves of the Palmyra palm, imported into Europe for the manufacture of hats and mats. For this palm and those known as Palmetto (*Sabal* and *Chamærops*), see PALM.

Palmi, a picturesque Italian coast-town in Calabria, 21 miles NNE. of Reggio. It has been the scene of many disastrous earthquakes, including that of 1908. Pop. 15,000.

Palmieri, LUIGI, meteorologist, born 22d April 1807, taught mathematics, became in 1847 professor at Naples, and in 1854 director of the observatory on Vesuvius. He invented many meteorological instruments, and wrote on volcanoes and seismology. He died 6th September 1896.

Palmiet (*Prionum Palmita*), a South African juncaceous plant, aloe-like in appearance, spreads by runners on the banks of streams, where it grows to 6 feet high.

Palmipedes, also called NATATOIRES, or SWIMMERS, the web-footed birds, in some classifications an order of Birds (q.v.).

Palmistry, or CHIROMANCY (Gr. *cheir*, 'the hand, and *mantikê*, 'divination'), is the art of 'reading the palm'—the art which professes to discover the temperament and character of any one, as well as the past and future events of his life, from an examination of the *palm* of his hand, and of the lines traced upon it. As a considerable body of very complicated rules and directions have been laid down by authorities, ancient and modern, to enable the student to read the palm, palmistry claims to be regarded as a 'science,' or at least as a branch of an interpretative science of the hand in general, to which the name *Chirosophy* has been given. The other branch of this general science has been called *Chiromancy*, and is concerned with the interpretation of the form and character of the hand and fingers, while Chiromancy treats of the palm only (see DIVINATION).

Palmistry has an ancient literature of its own in India. Aristotle in his *Historia Animalium* observes (i. 15) that long-lived persons have one or two lines which extend through the whole hand; short-lived persons have two lines not extending through the whole hand. Other references to this subject occur in the doubtful works, the *Problemata* and the *Physiognomika*, attributed to him. Pliny,

too, in his *Natural History* (xi. 114) directly asserts that Aristotle regarded numerous broken lines in the palm of the hand as a prognostic of short life. Of the cultivation of palmistry among the Romans there is little evidence; but Juvenal describes the woman who 'frontemque manumque præbebit vati' (*Sat.* vi. 581). In the 2d century Artemidorus of Ephesus, the author of a work on the interpretation of dreams, is said to have devoted a whole treatise to the subject, which, however, is not extant.

In writers of the middle ages there is much reference to the subject, and the names of Paracelsus, Albertus Magnus, and Cardanus have been associated with it. But the most important work on chiromancy belonging to this period seems to be *Die Kunst Chiromantia*, of Johann Hartlieb, which was printed at Augsburg in 1475. In the 16th century we find several treatises on the subject, of which the most important seem to be those of Johannes ab Indagine, and of Barthelémy Cocles of Bologna, doctor of natural philosophy and of medicine. The former has been Englished by Fabian Wither (1651). In the end of the 18th century palmistry found an important exponent in the celebrated Marie Anne Lenormand (1772-1843), who in her *Souvenirs Prophétiques d'une Sibylle* (1814) foretold the downfall of Napoleon. In modern times D'Arpentigny (1843) expounded principally chiromancy. On his book and those of Desbarrolles (1859, 1874) subsequent writers have chiefly founded.

Palmitic Acid, Palmitin. See FATS.

Palm-oil. See PALM.

Palm Sunday (Lat. *Dominica Palmarum*, or *Dom. in or ad Palmas*), the Sunday before Easter, is so called from the custom of blessing branches of the palm-tree, or of other trees substituted in those countries in which palm cannot be procured, and of carrying the blessed branches in procession, in commemoration of the triumphal entry of our Lord into Jerusalem. The date of the origin of this custom is uncertain; the procession cannot be traced back beyond the 8th century, though the name Palm Sunday is found two or three centuries earlier. The Greeks appear to have adopted the festival long before the Latins; their procession is at matins. In the Roman Catholic Church the celebrant blesses the branches before the mass, and they are then distributed to the people; the clergy in procession pass out of the church, the doors are closed, and the ancient hymn known in English as 'All glory, laud, and honour' is sung by the choir within and those without, until, on the sub-deacon's knocking at the door, it is again thrown open, and the procession re-enters. During the singing of the Passion in the solemn mass which ensues, the congregation hold the palm-branch in their hands, and at the conclusion of the service it is carried home to their respective houses, where it is preserved during the year. Afterwards it is burned, and the ashes employed, as a rule, for Ash-Wednesday. At Rome the pope himself distributes the palm branches to all the churches of the city. In Moscow until 1700, and in parts of Germany until the beginning of the 19th century, a wooden image of an ass was led about the streets, followed by the people bearing the consecrated branches.

Palm-tree. See PALM.

Palmyra, in ancient times, from about 100 A.D. to the 14th century, more especially in the 2d and 3d centuries, a wealthy and magnificent city of northern Syria, situated in an oasis on the northern edge of the Arabian desert, about 150 miles NE. of Damascus and nearly midway between that city and the Euphrates. The Semitic

name was Tadmor, Palmyra (= 'city of palms') being the Greek and Latin equivalent. According to the old tradition, it was founded by Solomon. There is stronger probability that it was an Arabic settlement, planted at a spot that formed a convenient station on the great caravan route between the Persian Gulf and the Mediterranean. At all events, after the decline of Petra (q.v.; also NABATÆANS) in 105 A.D., Palmyra took its place as the chief commercial centre in northern Arabia. Its merchant aristocracy reaped great advantage from the long-protracted wars between Rome and Parthia by acknowledging the supremacy of Rome. From both Hadrian and Septimius Severus it received special favours and privileges. One of its chiefs, Odaenathus, husband of the more famous Zenobia (q.v.), extended his power over most of the adjoining countries, from Egypt to Asia Minor. Aurelian at length crushed in 272 the attempt of the Palmyrenes to found an independent empire. After the Roman empire became Christian, Palmyra was made a bishopric. When the Moslems conquered Syria, Palmyra also submitted to them. From the 15th century it began to sink into decay, along with the rest of the Orient. Magnificent remains of the ancient city still exist, chief among them being the great temple of the Sun (or Baal); the great colonnade, nearly a mile long, consisting originally of some 1500 Corinthian columns; and sepulchral towers, overlooking the city. The ancient Palmyrenes, besides conducting and controlling the caravan

on the premises. Opened in 1891, the magnificent buildings were hardly completed when the earthquake of 1906 sadly injured them. The city of Palo Alto, chartered in 1909, has sprung up, one mile to the north-east, since the founding of the university. There is also a Roman Catholic theological seminary. Pop. 6000.

Palo de Vaco. See COW-TREE.

Palolo (*Eunice viridis*), an edible Annelid, common around Samoa and Fiji and some other Pacific islands. It has an extraordinary breeding swarm in October and November every year, on or near the day of the last quarter of the moon. Just before sunrise the waters become thick with worms, like vermicelli soup. The swarming worms, which

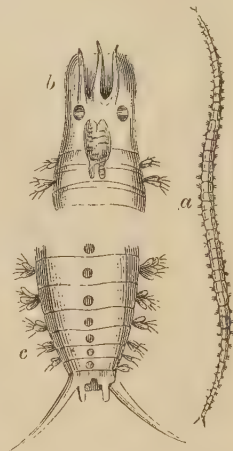
are eagerly collected by the natives, are really headless parts of worms, laden with eggs and sperms, which they liberate by rupture. The head-ends remain in the burrows in the coral-reefs, and grow new posterior ends. There is an Atlantic Palolo, *Eunice fucata*, common at Tortugas for instance, which swarms within three days of the day of the last quarter of the moon between 29th June and 28th July. There is also a Japanese Palolo.

Palos, a small Spanish port at the mouth of the Río Tinto, 5 miles E. by S. of Huelva. Once an important place, whence Columbus started on his great voyage, it has now sunk to a village.

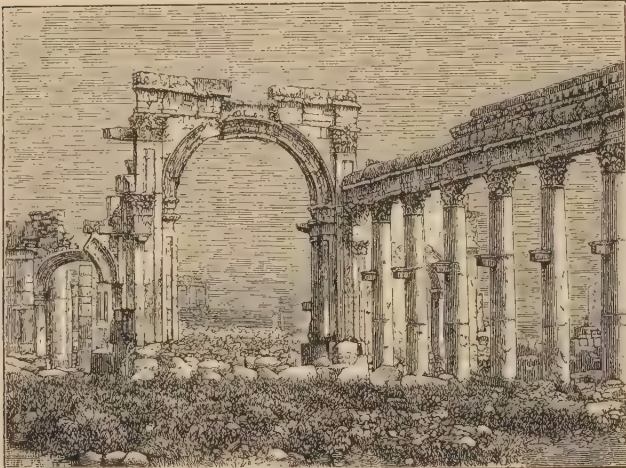
Palpitation is the term used of the condition in which a person becomes painfully aware of the beating of his own heart. This occasionally happens even when the heart's action is apparently quite natural; but much more generally the pulsations are found to be greatly increased in force, and in most cases in frequency

as well. It may be either functional or a symptom of organic disease of the heart. Here we shall merely consider it as a functional disorder. Although it may be persistent, it far more frequently comes on in paroxysms, which usually terminate within half an hour, recurring afterwards quite irregularly, sometimes daily or several times a day, and sometimes not till after a long interval. The attack often comes on under some mental or physical excitement, but sometimes when the patient is quite composed, or even asleep. If the paroxysm is a severe one the heart feels as if bounding upwards into the throat; and there is a sensation of oppression over the cardiac region, with hurried or difficult respiration. Excluding organic diseases, the causes of this affection are either (1) an abnormally excitable condition of the nerves of the heart, or (2) an unhealthy condition of the muscle.

(1) Amongst the causes of disturbed innervation



a, *Eunice viridis*, half natural size; b, c, anterior and posterior extremities (mag.).



Portico of the Great Colonnade, Palmyra.

trade across the desert, extracted salt, tanned leather, and worked in gold and silver.

Palmyra Wood, properly the wood of the Palmyra palm (see PALM); but the name is generally used for all kinds of palm-tree wood imported into Britain; much of which is the wood of the coconut palm, *Cocos nucifera*, and the allied species *C. plumosa*.

Palni Hills, a range of Southern India, linking the southern extremities of the Eastern and Western Gháts; average height of the higher ridge, 7000 feet. The climate of the Palni Hills is singularly pleasant and equable, many preferring the sanatorium of Kodaikanal to Ootacamund.

Palo Alto, 33 miles SE. of San Francisco, the seat of a university founded at a cost of \$30,000,000 by Senator Leland Stanford, designed to provide, gratis, education from the Kindergarten stage to the most advanced instruction; all the pupils board

may be especially noticed the abuse of tea (especially green tea), coffee, spirits, and tobacco. Any irritation of the stomach and intestinal canal may be reflected to the heart; and hence palpitation may frequently be traced to flatulence, undue acidity, and intestinal worms, especially tapeworms. Everything that causes pressure on the heart, such as abdominal dropsy or an enlarged uterus, is also liable to occasion this affection.

(2) The muscle of the heart possesses certain inherent qualities, such as that of contraction, of excitability, of conducting a stimulus from one part to the next, and that of acting in a regular and rhythmic manner. When the muscle is degenerated or stretched by dilatation, or imperfectly supplied with nutriment, some of these qualities deteriorate, and the heart in consequence acts with unnatural force and irregularity.

The age at which palpitation most usually comes on is from fifteen to twenty-five; and the affection—especially if it arise from anæmia—is very much more common in the female than in the male sex.

The treatment of palpitation must entirely depend upon its cause. The use of all nervous stimulants (tea, coffee, alcohol, and tobacco) should be suspended or abandoned. If the patient is clearly plethoric, with a full strong pulse, he should take saline cathartics, and live upon comparatively low diet (including little animal food) until this condition is removed. When, on the other hand, the palpitation is due to an anæmic condition, the remedies are preparations of iron, aloetic purgatives, an abundance of animal food, bitter ale, the cold shower-bath, and moderate exercise.

Palsy. See PARALYSIS.

Paltock, ROBERT, born in London apparently in 1697, and educated at St Paul's School, was bred to the law, and while in Clement's Inn secured his title to remembrance by writing the wondrous tale of *Peter Wilkins, a Cornish Man*, published anonymously in 1750, and often reprinted. The authorship, known to some in 1802, remained generally a mystery till 1835, and first appeared on the title-page in 1839. Paltock died 20th March 1767.

Paludan-Müller, FREDERIK, Danish poet, born at Kjørteminde in Fünen on 7th February 1809, led a quiet, uneventful life, and died at Copenhagen on 29th December 1876. Whilst still a student at the university in that city he gained the ear of the public with a play, *Love at Court* (1832); a poem, *The Dancer* (1833); and a lyric drama, *Amor and Psyche* (1834)—all three decidedly romantic in temper, the second especially showing Byronic influence. But his fame rests on that typical classic of Danish poetry, *Adam Homo* (3 vols. 1841-49), a humorous, didactic poem, full of deep and suggestive thought, with no small share of satiric wit and irony, and strong realistic touches, and of the most finished literary workmanship; on *Kalanus* (1854), a contrast between Alexander the Great and the Indian sage Kalanus, as representatives of Greek culture and Hindu religion, a work written in the loftiest spirit of idealism; and on *Adonis* (1874), an exquisitely finished little mythological poem. Along with *Kalanus* he published the poems *Paradise*, *Abel's Death*, *Cain*, *Ahasuerus*, and *Benedict of Nursia*; and he wrote also two prose romances, *The Source of Youth* (1865) and *Ivar Lykke's History* (3 vols. 1866-73). See Georg Brandes, *Danske Digtere* (1877), and F. Lange, *Frederik Paludan-Müller* (1899).

Pamir', the nucleus of the central Asian highland system, is a lofty plateau-region, with a mean elevation of 13,000 feet, uniting the western terminations of the Himalaya and the Tian-Shan Mountains, and both with

the Hindu-Kush. It is traversed by mountain-ridges that rise from 4000 to 5000 feet above the plateaus, and the culminating points attain in some cases 25,500 feet above sea-level. Between these ridges are a series of broad valleys, to which the generic name 'pamir' is given. On the west side this plateau-region sinks rapidly in terraces to the deserts of Turkestan. These lofty plateaus are exposed to great extremes of heat and cold, and are visited by terrible snow and sand storms. Nevertheless the Kirghiz drive up their flocks and herds for summer pasture, and from time immemorial traders have crossed them along celebrated routes. It was crossed by Marco Polo (q.v.). Mammal and bird life is plentiful. Amongst the lakes are Karakul, 120 sq. m., and Shivakul, 100 sq. m.

Pamlico Sound, a shallow body of water, some 75 by 10 to 25 miles, on the coast of North Carolina, separated from the ocean by long, narrow islands of sand, with narrow passages.

Pampa. See ARGENTINA.

Pampas (Quichua, 'plains') is a term properly confined to the immense treeless plains of the Argentine Republic, which rise, almost imperceptibly, in a series of terraces from the coast to the base of the Cordilleras. Extending some 2000 by 500 miles, they differ greatly in various districts. The north-eastern portion, in the Paraná basin, is one of the most fertile regions in the republic; and stretching from this through Buenos Aires and the south of Córdoba and Santa Fé is the rich grassy pampa-land proper, supporting great herds of cattle, horses, and sheep. The rest is for the most part waterless and sterile. The soil, which is a diluvium composed of sandy clay, and abounds in the bones of extinct mammals, is more or less impregnated with salt, especially in the west, where strips of desert, known as *travesías*, are numerous. Great tracts of pasture have been converted into farmland, but stock-raising is still the most important industry. The half-white herdsmen are called Gauchos (q.v.).—The name Pampas is also given to the level districts of Peru, where those of the Sacramento occupy an area estimated at 180,000 sq. m., covered with primeval forest.

Pampas Grass (*Cortaderia argentea*, from the vernacular *cortadera*), a grass which grows in



Pampas Grass (*Cortaderia argentea*).

damp places in the pampas of South America. A noble grass now well known in British gardens as an ornamental plant, it is quite hardy, and its

tufts have a splendid appearance. The leaves are 6 or 8 feet long, the ends arching gracefully over; the flowering stems 10 to 14 feet high; the panicles of flowers silvery white, and from 18 inches to 2 feet long. It is dioecious; the spikelets two-flowered, one flower stalked, and the other sessile; the paleæ of the female elongated, awn-shaped, and woolly. The herbage is too coarse to be of value.

Pampas Hare. See VISCACHA.

Pampeluna, or PAMPLONA, a fortified city of northern Spain, stands on a tributary of the Ebro, 111 miles by rail NW. of Zaragoza (Saragossa) and 50 S. by W. of Bayonne in France. It has a citadel (a copy of that of Antwerp), a Gothic cathedral (1397), a viceregal palace, a fine aqueduct, and some manufactures. It was called by the ancients *Pompeopolis*, because built by Pompey in 68 B.C. It was taken by the Goths in 466, by the Franks in 542, and by Charlemagne in 778. From 907 it was the capital of Navarre. The town was seized by the French in 1808, but captured by Wellington in 1813. It again capitulated to the French in 1823. In the Carlist wars it was held by Queen Christina's adherents (1836-40), and in 1873-76 it was vainly attacked several times by the Carlists. Pop. 33,000.

Pampero. See ARGENTINA.

Pamphylia, anciently a country on the south coast of Asia Minor (q.v.), between Lycia and Cilicia. The inhabitants—a mixed race of aborigines, Cilicians, and Greek colonists—spoke a language the basis of which probably was Greek, but which was disfigured and corrupted by the infusion of barbaric elements. See Dr Lanckoroński, *Die Städte Pamphyliens und Pisidiens* (1890 et seq.).

Pan, among the Greeks, a divinity of pastures, forests, and flocks, usually described as a son of Hermes. His worship originated in Arcadia, but spread gradually over the rest of Greece, although it did not reach Athens until after Marathon. Pan is represented as having horns, a goat's beard, a crooked nose, pointed ears, a tail, and goat's feet. Sometimes he appeared to travellers, startling them with sudden fear, whence a sudden fright was called a *panic* fear. During the heat of the day he used to sleep in the shady woods, and was exceedingly wroth if his slumber was disturbed by the halloo of the hunters. He was the patron of all persons occupied in the care of cattle and of bees, in hunting and in fishing. He is also represented as fond of music, and of dancing with the forest nymphs, and as the inventor of the syrinx or Pan-dean pipes. Cows, goats, lambs, milk, honey, and new wine were offered to him. The fir-tree was sacred to him, and he had sanctuaries and temples in various parts of Arcadia, at Trœzene, at Sicyon, at Athens, &c. The Romans identified the Greek Pan with their own god Faunus. Plutarch (*De Orac. Defectu*) is the first to tell the story that in the reign of Tiberius one Thamus a pilot, when steering near the islands of Paxæ, was commanded by a loud voice to proclaim that 'the great Pan is dead.' As soon as he had reached Palodes he cried the news aloud from the poop of his ship, whereupon was heard a great noise of lamentation, as of nature itself expressing its grief. The coincidence of this story with the birth or the crucifixion of Christ gave occasion to an explanation that it marked the end of the old world and the beginning of the new when the old oracles became dumb. Rabelais has the story, there is a well-known allusion to it in Milton's *Ode on the Nativity*, and it has been finely treated by Schiller and Mrs Browning. The Devil of popular Christian superstition owes some of his attributes to Pan.

Pamplona. See PAMPELUNA.

Panamá, formerly called the Isthmus of Darien (q.v.), consists of the neck or narrowest part (35 miles) of Central America, connecting Costa Rica with Colombia. A department of Colombia, it rebelled in 1903, and became an independent republic. It has an area of 32,400 square miles and a population of 450,000, exclusive of about 23,000 in the Canal Zone (area, 502 sq. m.). This zone was ceded by treaty to the United States in 1903 with a view to the construction of a canal, and consists of a strip of territory extending 5 miles on either side of the present canal, and stretching 3 miles into the sea at each terminal, but not including the towns of Colón and Panamá, which are, however, under United States jurisdiction in matters relating to sanitation and quarantine. In return for this cession Panamá received a lump sum of £2,000,000, and £50,000 annually as from 1913 onwards. The isthmus is traversed by a low chain of mountains, forming the barrier between the Atlantic and Pacific Oceans. Numerous streams, the largest of which is the Tuira (160 miles long, and navigable for more than 100 miles), fall into both oceans. Off the Pacific shore are numerous beautiful islands, among which Las Perlas, so called from their pearl-fisheries (now almost discontinued), Naos, and Taboga are the chief. There are no good natural harbours. The chief trading ports are Panamá (see below) and Colón (Aspinwall). A railway, 47 miles in length, and completed in 1855, connects these ports; it was built by and belongs to the United States, and lies within the canal zone. The exports embrace bananas, sugar, hides, tallow, caoutchouc, indigo, vanilla, coffee, gold dust, coconuts, tortoiseshell, timber, &c. Commerce is entirely in the hands of foreigners. Gold, once abundant, is still worked, and copper, iron, &c., exist. The Canal Zone, formerly a fever-infested region, has now a death-rate lower than that of the average United States city. 'Panamá hats' are made not in Panamá but in Ecuador and Peru.

PANAMÁ, the capital of the country, stands on a projecting volcanic rock on the Pacific side of the isthmus; the massive walls the Spaniards built to protect their treasure city still stand in places. *Old Panamá*, founded in 1518, was captured and destroyed by the buccaneers under Morgan (1671). *Modern Panamá* was built two years later, 4½ miles distant from the old city. In 1920 it had a population of about 60,000, the majority Indians, negroes, and half-breeds. The town derives its renewed importance from the completion of the Panamá Railway in 1855. Fires have destroyed Panamá repeatedly, as well as its sister city Colón. The principal buildings are the cathedral (1760), a Spanish structure, built of yellow stone; the town-hall, in which the Colombians signed the declaration of their independence; and the bishop's palace (1880).

Panamá Canal. See CANALS.

Panathenæa, the most famous festival of Attica, celebrated at Athens in honour of Athena, patron goddess of the city. All writers who mention it speak of a Lesser and Greater Panathenæa, the former held annually, the latter every fourth year. The procession of the festival was sculptured by Phidias and his disciples on the frieze of the Parthenon.

Panax. See GINSENG.

Panay. See PHILIPPINE ISLANDS.

Pančevo, a town of Yugoslavia (till 1920 Hungary), inhabited by 20,000, mainly Serbs and Germans, stands 9 miles NE. of Belgrade, on the Temes, not far from its junction with the Danube.

The people breed silkworms, brew beer, distil brandy, make starch, grind flour, &c. The Austrians took the place from the Turks in 1716, routed them there in 1739, burned the town in 1788, and in 1849 defeated the Hungarians under Kiss.

Panchatantra ('The Five Cases-of-Good-Sense'), or **TANTRĀKHYĀYIKA** ('Collection of Tales of Cases-of-Good-Sense'), is the title of a collection of Hindu tales which has exercised a greater influence than any other Indian work on the literature of the world. The oldest form of the work (before 500) is now lost, but from it was made a translation into Pahlavi by order of the Sassanian king Khosru Anūshīrvān (531-79); from the Pahlavi were made versions in Syriac (c. 570) and in Arabic (before 760). The latter, which bears the name *Kalīlah wa Dimnah*, from the names of two jackals who are prominent characters in the original, was the source whence the *Panchatantra* won widespread and remarkable influence on the literature of western Europe.

In India itself the original is represented by a very large number of varying recensions, of which the *Tantrākhyāyika* of Kashmir (before 1000) is closest to the original; the Southern *Panchatantra* is current in the Dekkan, and the so-called *textus simplicior* (c. 1000) and the more elaborate version of a Jain Pūrṇabhadra (1199) are of north-western origin. Metrical versions, derived from a common source, are preserved in the *Kathāsaritsāgara* of Somadeva (c. 1065) and the *Bṛīhatkathāḍmanjarī* of Kshemendra (c. 1040), both Kashmirian poets. In Bengal there is current the *Hitopadeśa* of Nārāyaṇa (before 1373), which is based on the *Panchatantra* but also on another work; in it the number of books is reduced to four, and the order of the first two is inverted. There are also many versions and imitations in Indian vernaculars.

The *Panchatantra* belongs to the class of literature known in India as *Nītīśāstra* ('Science of Conduct'), being composed for the instruction of princes and those engaged in the direction of affairs, private or public, in regard to prudent and effective action rather than morality, though in the main the lessons taught are in accord with a practical ethical standard for ordinary life. The mode of teaching adopted is the use of fables, especially beast fables, and the literary form is remarkable and ingenious. The five books composing the work are independent, but are connected by an introduction showing a king dissatisfied with the ignorance of his sons entrusting their education to a Brahman, Vishnuśarma, who composes the text, and by narrating it to his pupils redeems them from sloth and vice. In each book there is a frame story into which subsidiary stories are introduced by the dramatic device of placing them in the mouths of the characters in the frame story, and occasionally the structure is further complicated by the introduction of stories within these subsidiary stories. The tales are in prose, but the doctrines they inculcate are often summed up in verse, and the narrative is enlivened by the insertion of gnomic verses, maxims, quotations from works on law and conduct, epic poetry, &c. While in the *Hitopadeśa*, and some other versions, the style has been simplified partly in order to adapt the works for use in learning Sanskrit, in the original a distinct effort was clearly made to achieve literary effect.

The first and longest book deals with the estranging of friends, and by narrating how two jackals severed the firm friendship of a lion and a bull it warns kings of the dangers of paying heed to the perfidious counsel of those whose interest it is to sow divisions between a prince and his true adherents. The second proves by the tale of the effective alliance between the dove, mouse, crow,

tortoise, and deer the advantage of the winning of friends. The third tells the story of the war of the crows and the owls as a warning of the danger of trusting to unknown men or to enemies. The fourth uses the frame story of the ape and the crocodile to show how men lose by imprudence their hard-won gains. The fifth warns us of the danger of inconsiderate action, and narrates the tale of the Brahman and his mongoose, famous in the parallel of Llewelyn the Great and his faithful hound Gellert.

The pioneer work of Benfey in his translation (Leipzig, 1859) is supplemented and superseded in many details by J. Hertel in a long series of works, including editions of the Southern *Panchatantra* (1906), of Pūrṇabhadra's version (1908-12), the *Tantrākhyāyika* (1910; trans. 1909), and a monograph on the *Panchatantra* (Leipzig, 1914). See also F. Edgerton, *The Panchatantra* (New Haven, 1924).

Panch Mahals. See GUJARAT.

Pancras, St, the son of a heathen noble of Synnada in Phrygia, lost both parents whilst a boy, and was taken to Rome by an uncle, and there baptised, but immediately afterwards was slain (304) in the Diocletian persecution, being only fourteen years old. The first church that St Augustine consecrated in England was dedicated to St Pancras; it stood at Canterbury.—The London terminus of the London, Midland, and Scottish Railway, St Pancras Station, is situated in the metropolitan borough of St Pancras.

Pancreas (from the Gr. *pan*, 'all,' and *kreas*, 'flesh') is a conglomerate gland, lying transversely across the posterior wall of the abdomen, varying in length from 6 to 8 inches, having a breadth of about an inch and a half, and a thickness of from half an inch to an inch. Its usual weight is about three ounces. The head of the pancreas lies in the concavity of the duodenum. For the action of the pancreatic juice, and an illustration of the pancreas, see DIGESTION.

The diseases of the pancreas are few, and do not signify their existence by any very marked symptoms. The most common form of disease is cancerous deposit in the head of the gland, which frequently induces jaundice by obstructing the common biliary duct near its opening. An accurate diagnosis of disease of this organ is extremely difficult, and cannot lead to efficient treatment; all that can be done in these cases being to palliate the most distressing symptoms. The pancreas of ruminating animals is a favourite article of food under the name of sweetbread. See GLANDS.

Pancsova. See PANČEVO.

Panda (*Ailurus fulgens*), a rare and remarkable animal in the bear section of Carnivores. It



Panda (*Ailurus fulgens*).

lives among rocks and trees by the sides of streams at great altitudes in the south-east Himalayas, and

in eastern Tibet. Like a large cat in size, it has long, thick, brilliant reddish-brown fur, black beneath, high pointed ears, stout plantigrade limbs, with large, very slightly retractile claws, and woolly soles. The bushy tail is almost as long as the body, and has beautiful rings of red and yellow. The molar teeth are very broad, with numerous cusps; the diet consists of fruits, roots, and other parts of plants. A captive panda in the Zoo in London sucked water like a bear, and ran like a weasel in a jumping gallop. In its native haunts it climbs trees dexterously. The call varies from a curious bird-like chirp to a loud squeal. By the large bear-like *Ailuropus melanoleucus*, with snow-white fur and black legs, the panda is linked to the bears, but in several features it is nearer the raccoons of the New World.

Pandanaceæ, a family of monocotyledons, mostly natives of the tropics, though *Pandanus* is found in Australia, and Freycinetia in Australia, New Zealand, and Norfolk Island. They are trees or bushes, often sending down adventitious roots, sometimes weak and decumbent, or climbing. The leaves are imbricated linear-lanceolate and spiny, or pinnate and palmate without spines. The flowers are unisexual, naked, polygamous, or arranged on a spadix, and wholly covering it. The stamens are numerous; the ovaries usually clustered, one-celled, each crowned with a stigma; the fruit consists of fibrous, one-seeded drupes, collected or almost combined, or of berries with many seeds. Some species are valuable for the fibre of their leaves, some for their edible fruit, &c. See SCREW PINE.

Pandavas. See MAHÁBHÁRATA.

Pandean Pipes, a series, fastened side by side, of short reeds or pipes, graduated in length so as to give out different notes when blown across their mouths. See PAN.

Pandects. See JUSTINIAN.

Pandharpur, a town of British India, 112 miles SE. of Poona, on a branch of the Kistna. It is highly revered by the Hindus on account of a temple dedicated to an incarnation of Vishnu. Pop. 25,000.

Pandit. See PUNDIT.

Pandora (i.e. the 'all-endowed'), according to Greek myth, was the first woman on the earth. When Prometheus had stolen fire from heaven Zeus instigated Hephestus to make woman out of earth to bring vexation upon man by her graces. The gods endowed her with every gift necessary for this purpose, beauty, boldness, cunning, &c.; and Zeus sent her to Epimetheus, the brother of Prometheus, who forgot his brother's warning against accepting any gift from Zeus. A later form of the myth represents Pandora as possessing a vessel or box filled with every form of human ills, which spread over the earth. A still later version makes the box filled with winged blessings, which mankind would have continued to enjoy if curiosity had not prompted Pandora to open it, when all the blessings flew out, except Hope.

Pandours (French spelling of Serbo-Croatian *pándūr*, from mediæval Lat. *bänderius*), were light-armed Croatian infantry in the Austrian service against the Turks. Their appearance was exceedingly picturesque, being somewhat oriental in character, and their arms consisted of a musket, pistols, a Hungarian sabre, and two Turkish poniards. Their habits of brigandage and cruelty rendered them, however, as much a terror to the people they defended as to the enemy, and about 1750 they were put under stricter discipline, and gradually incorporated with the regular army.

Pandulf, CARDINAL, the commissioner sent by Innocent III. to King John in 1213, who returned to England as legate (1218-21), and in 1218 was made Bishop of Norwich. Langton strongly opposed his pretensions as legate, and got his commission cancelled.

Pange Lingua (Lat., 'Now, my Tongue, the mystery telling'), one of the most remarkable of the hymns of the Roman Breviary, and like its kindred hymn, *Lauda Sion*, a most characteristic example of mediæval Latin versification. The Pange Lingua is a hymn in honour of the eucharist, and belongs to the service of the Festival of Corpus Christi. Written by Thomas Aquinas, it consists of six strophes of verses in alternate rhyme. Besides its place in the office of the Breviary, the 'Tantum ergo,' a portion of this hymn, forms part of the service called Benediction with the Blessed Sacrament, and is sung on all occasions of the exposition, procession, and other public acts of eucharistic worship. For an earlier 'Pange Lingua,' see HYMNS (Latin).

Pangenesis. See HEREDITY.

Pangolin, or SCALY ANT-EATER, a name given to the various species of the genus *Manis* belonging to the mammalian order Edentata, and confined to the Oriental and Ethiopian regions. The most



Pangolin (*Manis pentadactyla*).

marked peculiarity of these animals is their covering of horny scales, between which (in the young at least) there are hairs. The pangolin is most nearly allied to the Aardvark (q.v.) of South Africa, and like it is edentate and feeds upon ants. When threatened with danger these animals roll themselves into a ball like the hedgehog.

Panicle. See GRASSES.

Panicum. See MILLET.

Pāṇini, the greatest grammarian of ancient India, whose work has up to the present day remained the standard of Sanskrit grammar. Of his life little is known save that he was born near Attock. His date is still doubtful: Goldstücker placed him in the 7th century B.C.; Weber and Böhtlingk give about 350 B.C., and his reference to *Yavanānī*, Greek writing, accords well with that or a somewhat later date, contemporaneous with Alexander the Great's invasion of India. The precision of statement and analytical skill of his work are equally admirable. See SANSKRIT.

Panipat, a town of the Punjab, is situated 53 miles N. of Delhi, near the old bank of the Jumna, and on the great military road of northern India between Afghanistan and the Punjab. Hence it has been at various times the scene of strife between the people of India and her invaders. The first great battle of Panipat was fought in 1526, when Baber, at the head of 12,000 Mongols, defeated the army, 100,000 strong, of the emperor of Delhi. The second great battle was fought in 1556 by the Mongols under Akbar, grandson of Baber, and third of the Mogul emperors, against Hemu, an Indian general of the Afghan Sher Shah, the latter being

defeated. The *third* battle was fought on 7th January 1761 between Ahmed, ruler of Afghanistan, and the till then invincible Mahrattas, who on this occasion suffered a total defeat and great slaughter. The existing town is enclosed by an old wall, and manufactures copper utensils, cloth, blankets, hardware, silver and glass ornaments. Pop. 27,000.

Panizzi, SIR ANTHONY, principal librarian of the British Museum from 1856 to 1866, was born 16th September 1797, at Brescello, in the duchy of Modena. He studied at Padua, and became an advocate, but, sharing in the revolution of 1821, had to flee. Condemned to death in absence, he settled in Liverpool, where the friendliness of Roscoe procured him employment as a teacher of Italian. Through Brougham's help he was in 1828 made professor of Italian in University College, London, and in 1831 assistant-librarian in the British Museum. As keeper of the printed books (1837) he undertook the new catalogue, and it was he who designed the new reading-room (see BRITISH MUSEUM). He was long a fast friend and correspondent of Prosper Mérimée, and died April 8, 1879, having been made K.C.B. in 1869. He retained to the end a lively interest in the cause of Italian freedom. See his *Life by Fagan* (1880).

Panjab. See PUNJAB.

Panjdeh. See AFGHANISTAN.

Panna, capital of a small Indian state in Bundelkhand, 173 miles SW. of Allahabad. Pop. of town, 11,000; of state, 197,600.

Pannonia, a province of the ancient Roman empire, bounded on the N. and E. by the Danube, on the W. by the mountains of Noricum, and on the S. reaching a little way across the Save; it thus included part of modern Hungary, Austria, Yugoslavia, and Italy. It received its name from the Pannonians, a race of doubtful origin, but who at first dwelt in the country between the Dalmatian Mountains and the Save, in modern Bosnia, and afterwards more to the south-east in Moesia. The Roman arms were first turned against them and their neighbours, the Iapydes, by Augustus in 35 B.C. After repeated defeats the Pannonians settled about 8 A.D. in the more northern countries, which received their name, and of which the former inhabitants, the Celtic Boii, had been in great part destroyed in Caesar's time. The country was now formed into a Roman province. Great numbers of the Pannonian youth were drafted into the Roman legions. In the 5th century it was transferred from the Western to the Eastern Empire, and afterwards given up to the Huns. After Attila's death, in 453, the Ostrogoths obtained possession of it. The Longobards under Alboin made themselves masters of it in 527, and relinquished it to the Avari upon commencing their expedition to Italy. Slavonian tribes also settled in the south. Charlemagne brought it under his sceptre. In the reigns of his successors the Slavonians spread northward, and the country became a part of the great Moravian kingdom, till the Magyars or Hungarians took it in the end of the 9th century.

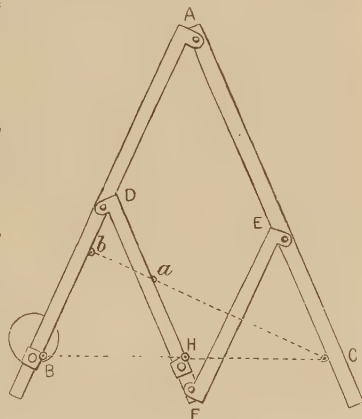
Panorama (Gr. *pan*, 'all,' and *horama*, 'a view'), a word coined by or for Barker in 1788 to mean 'a view all round.' The word is used loosely for all that the eye can see at once, or by a person's simply turning round, from an eminence; also for a series of pictures, such for example as what is called a 'panorama of the Rhine,' folded up in a kind of portfolio. The name is also given to a continuous series of painted pictures exhibited at one end of a room, and moved so as successively to pass into and out of the field of view by some mechanical arrangement. This when seen from a distance

through an opening, and under a combination of direct and reflected light (as invented by Daguerre and Bouton), is called a *diorama*. But the word *panorama* properly belongs to what is now called, by way of distinction, *cyclorama*—a continuous painting on the interior of a cylindrical surface, the spectator standing in the centre. It is claimed that Breising of Danzig proposed such a plan. But Robert Barker (1739–1806), an Irish painter resident in Edinburgh, is entitled to the credit of having not merely conceived the method, but of having successfully carried it out on a large scale; his first 'panorama' being a view of Edinburgh, painted in water-colour on paper pasted on a cylinder of canvas 25 feet in diameter, and exhibited in Edinburgh in 1788. This he took to London in 1789; and in 1793 he erected a special building, one of the rooms of which admitted a circular picture 90 feet in diameter. Robert Fulton is said to have painted and exhibited shortly after this the first panorama seen in Paris. But on the Continent the panorama in this sense first became very popular after the Franco-German war of 1870–71. In various towns of Germany and in Paris panoramas of the war were exhibited in buildings specially built for the purpose.

Panormus. See PALERMO.

Pansy. See VIOLET.

Pantagraph, or PANTOGRAPH (Gr. *panta*, 'all;' *graphein*, 'to delineate'), an instrument invented for the purpose of making copies, reduced or enlarged, of drawings or plans. It is made in various forms, one of which is shown in the figure. Four rods are so hinged to one another that AE is equal to DF, and AD to EF; hence ADFE is always a parallelogram. If from a given point C on AE any straight line BH (or *a*, *b*) be drawn, cutting the other arms, the triangle



ABC will always, no matter how the arms of the instrument be moved, be similar to the triangle DBH. It follows that, if the instrument be pivoted on a point at B (usually by a weight), a pencil-point inserted at H and a tracing-point at C, and the latter traced over the lines of a drawing, the pencil-point at H will trace a reduced copy of the drawing. The proportion of the reduction will be as BH is to BC. B and H are made to slide on their respective rods, so that any proportion of reduction can be made. By changing the places of the pencil and tracing-point, an enlarged copy may be made. The instrument is fitted with little castors to facilitate its free motion. The pantagraph was invented by the Jesuit Christoph Scheiner prior to 1631, and improved by Professor W. Wallace of Edinburgh prior to 1831.

Enlargements or reductions can now be done so much more accurately by means of photography that the pantagraph is nearly obsolete. See COPYING.

Pantellaria, a volcanic island in the Mediter-

reanean, 36 miles in circumference, and lying 60 miles SW. of the Sicilian coast.

Panthalops. See CHIRU.

Panthays, a Mohammedan community occupying the province of Yun-nan in the south-west of China, who asserted their independence in 1855. In 1859 they captured Talifu, the second city of the province, and in 1858 the capital. Their leader Wen-soai (King Suleiman) established his authority over about 4,000,000 of people, of whom not above a tenth were Mohammedans. In 1866 the Chinese government recognised the independence of the Panthays, and in 1872 their king sent his son Hassan on a mission to Europe. Meanwhile the Chinese again attacked the Panthays, defeated them utterly, and finally suppressed their empire. Panthays is an anglicised form of *Pan-si*, their own name. They are still numerous.

Pantheism (Gr. *pan*, 'all,' and *theos*, 'God'), the name given to that system of speculation which, in its spiritual form, identifies the universe with God (*akosmism*), and, in its more material form, God with the universe. It is only the latter kind of pantheism that is logically open to the accusation of atheism; the former has often been the expression of a profound religiosity. The word Pantheist is comparatively modern, and seems to have been coined by the Deist John Toland in 1705, and is used shortly after that date by his opponents and orthodox writers like Waterland. Earlier pantheistic systems, such as Spinoza's, were regularly assailed under the name of atheism. But the antiquity of this mode of belief is undoubtedly great; it is prevalent in one of the oldest known civilisations in the world—the Hindu. Though it may dimly underlie various polytheistic systems, it is obviously in any definite shape a later development of thought than polytheism, and most probably originated in the attempt to divest the popular system of its grosser features, and to give it a form that would satisfy the requirements of philosophical speculation. Hindu pantheism as *akosmism* is taught especially by the Upanishads, the Vedānta and Yoga philosophies, and by those poetical works which embody the doctrines of these systems; for instance, the Bhagavad Gītā, which follows the Yoga doctrine. It is poetical and religious, rather than scientific, at least in its phraseology; but it is substantially similar to the more logical forms developed in Europe. The Hindu thinker regards man as born into a world of illusions and entanglements, from which his great aim should be to deliver himself. Neither sense nor reason, however, is capable of helping him; only through long-continued, rigorous, and holy contemplation of the supreme unity (Brahma) can he become emancipated from the deceptive influence of phenomena, and fit to apprehend that he and they are alike but evanescent modes of existence assumed by that infinite, eternal, and unchangeable Spirit who is all in all. Hindu pantheism is thus spiritual in its character; matter and (finite) mind are both alike absorbed in the fathomless abyss of illimitable and absolute being. Buddhism (q.v.) denies or ignores the existence of God, but in many modes of regarding the universe is rather akin to pantheism than to absolute atheism. Sufism is a pantheist outgrowth of Islam.

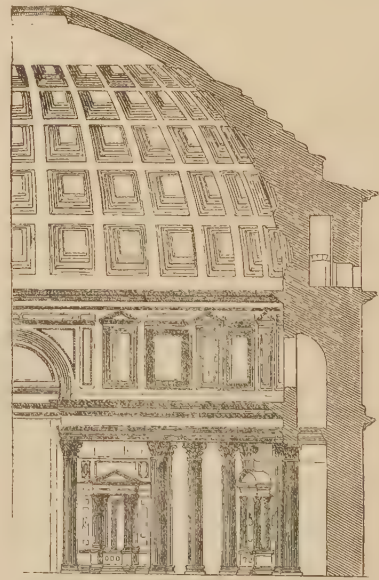
Greek pantheism, though it doubtless originated in the same way as that of India, is at once more varied in its form, and more ratiocinative in its method of exposition. The philosophy of Anaximander may be described as a system of atheistic physics or of materialistic pantheism. Xenophanes, the founder of the Eleatic School (q.v.), has been held to be the first classical thinker who promulgated the higher or idealistic form of pantheism.

Alexandrian Neoplatonism is substantially pantheistic; the universal reason and the world-soul of mediæval thinkers have the same tendency.

Gnosticism is based on an essentially pantheistic doctrine of emanation. Dionysius (q.v.) the Areopagite and Scotus Erigena (q.v.) were pantheists within the Christian fold; and the later Christian Mysticism (q.v.) has a highly pantheistic flavour (see ECKHART, BOEHME). Bruno, Vanini, and Paracelsus were outspoken pantheists; and there were various minor pantheistic sects in the middle ages. Spinoza is perhaps the greatest, certainly the most rigorous and precise of the whole class that either the ancient or the modern world has seen. Schelling's Nature-Philosophy proposed to limit the meaning of the term pantheism to the doctrine of the immanence of all things in God, but leaving doubtful the precise scope of what was meant by immanence; and some forms of Hegelianism are directly pantheistic in character. Neither England, France, nor America has produced a single great pantheistic philosopher; but there is an immense amount of pantheistic sentiment floating about in the poetry, criticism, theology, and even in the speculative thinking of these and all European countries in the present age.

See the articles on the thinkers mentioned, and those on PHILOSOPHY, RELIGION, and THEISM; the works on Pantheism by Jäsche (1826-32), Böhmer (1851), Weissenborn (1859), Fellenz (1873), and Driesenbergh (1880); Saisset, *Modern Pantheism* (1863); Hunt, *Pantheism and Christianity* (1866; 2d ed. 1884); Flint, *Anti-Theistic Theories* (1877); Plumptre, *History of Pantheism* (2 vols. 1881); Urquhart, *Pantheism and the Value of Life* (1919).

Pantheon (Gr. *pantheon*), a temple built in a modified Corinthian style with a great vaulted roof, dedicated to all the gods. The 'Pantheon'



Half-section of Pantheon (from Fergusson).

of Rome is the only ancient edifice in Rome that has been perfectly preserved, and is lighted through one aperture in the centre of its magnificent dome. It was long thought to have been erected by Agrippa in 27 B.C.; but the temple of Agrippa was destroyed by fire with the exception of the portico, and it has been shown that the present Rotonda is the work of Hadrian. In 610 it was

consecrated as a church—Santa Maria Rotonda. Under Pope Urban VIII. the architect Bernini erected on it two little campaniles, but his 'ass's ears' were removed in 1883. The building belongs to the state, and is now a place of sepulture for great Italians. See ROME, ROMAN ARCHITECTURE.—For the Panthéon at Paris, see PARIS.

Panther. See LEOPARD, PUMA.

Pantograph. See PANTAGRAPH.

Pantomime, among the ancient Romans, denoted not a spectacle but a person. The pantomimes were a class of actors who acted wholly by mimicry in gesture, movements, and posturings, corresponding therefore pretty closely to the modern ballet-dancers. When they first made their appearance in Rome cannot be ascertained; probably the *histriones* (Etrusc. *hister*, 'a dancer') brought from Etruria to Rome 364 B.C. were pantomimes; but the name does not once occur during the republic, though it is common enough from the very dawn of the empire. Augustus showed great favour to this class of performers, and is consequently supposed by some writers to have been himself the inventor of the art of dumb acting. The most celebrated pantomimes of the Augustan age were Bathyllus (a freedman of Mæcenas), Pylades, and Hylas. The class soon spread over all Italy and the provinces, and became so popular with the Roman nobles and knights that Tiberius reckoned it necessary to administer a check to their vanity, by issuing a decree forbidding the aristocracy to frequent their houses, or to be seen walking with them in the streets. Under Caligula they were again received into the imperial favour; and Nero, who carried every unworthy weakness and vice to the extremity of caricature, himself acted as a pantomime. From this period they enjoyed uninterrupted popularity as long as paganism held sway in the empire.

As the pantomimes wore masks, no facial mimicry was possible; everything depended on the movements of the body. It was the hands and fingers chiefly that spoke; hence the expressions, *manus loquacissimæ, digiti clamosi*, &c. To such perfection was this art carried that it is said the pantomimes could give a finer and more precise expression to passion and action than the poets themselves. The subjects thus represented in dumb show were always mythological, and consequently pretty well known to the spectators. The dress of the actors was made to reveal, and not to conceal, the beauties of their person; and as, after the 2d century, women began to appear in public as pantomimes, the effect, as may easily be supposed, of their costume, or lack of costume, was prejudicial to morality. Hence pantomimic exhibitions were denounced by the early Christian writers, as they were even by pagan moralists like Juvenal.

The pastoral drama in mediæval Italy gave birth to the opera, and already in the 16th century we find on the Spanish stage ballets with allegorical figures. Into France also about the same time the ballet was introduced. But the improvised Italian comedy was already familiarly known far beyond Italy, with its conventional comic figures, Pantalone and Arlecchino. In England the mask and so-called opera of the 17th century supplied the place of the modern pantomime, which grew out of an attempt to reproduce a popular light dramatic entertainment, varied with song and dance, itself the parent of the modern French *vaudeville*. Colley Cibber mentions as the first example a piece on the *Loves of Mars and Venus*. Geneste gives the year 1723 as the commencement of pantomime in England, with *Harlequin Dr Faustus* by John Thurmond, presented at Drury Lane. John Rich

(1681–1781) produced splendid pantomimes at Lincoln's Inn Fields and Covent Garden, and from that time this form of entertainment became a traditional institution.

In the older English pantomimes the harlequin played a serious as well as merely comic part; columbine (originally his daughter) was a village maiden whose lover was pursued by the constables—the prototypes of the modern policemen. The predominance of the clown seems to be a development mainly due to the exceptional ability of Joseph Grimaldi. Present-day pantomime has the character of a variety entertainment, usually a travesty of a fairy-tale, relying much on spectacular effects, the harlequinade being dropped.

Pa'oli, PASQUALE DE, a famous Corsican patriot, was born at Rostino in Corsica, 25th April 1725, son of that Giacinto Paoli who fought bravely, but without success, for independence against the Genoese and their French allies, and died at Naples in 1756. Thither he was carried in 1739 by his father, but returned to take part in the heroic struggle of his country, and in July 1755 was appointed to the chief command in a full assembly of the people. He struggled bravely against disaffection within and a powerful enemy without, governed the island with rare wisdom and moderation, and would have achieved the independence of Corsica had not the Genoese sold it in 1768 to France. For a year he held out against a French army, under the Comte de Vaux, of 22,000 men, but was at length overpowered and forced to make his escape to England, where he was warmly received and granted a pension by the crown. Boswell, who had visited him in Corsica, introduced him to Dr Johnson, who described him as having 'the loftiest port of any man he had ever seen.' The two became warm friends; at Paoli's house, Johnson wrote to Mrs Thrale, he loved to dine. Twenty years later the French Revolution recalled Paoli to Corsica, of which, as a free department of France, he consented to become lieutenant-general and governor; but the excesses of the Convention soon alienated his sympathies, and he organised a fresh insurrection. Despairing of maintaining unaided the independence of the island, he promoted its union with England, but failed to obtain the post of viceroy, and returned a disappointed man to England in 1796. He died near London, 5th February 1807; and in 1889 his remains were exhumed from Old St Pancras Churchyard, and reinterred in his native island.

See Boswell's *Account of Corsica* (1768), and the Lives of Paoli by Arrighi (Paris, 1843), Klose (Brunswick, 1853), Bartoli (new ed., Bastia, 1891).

Papa (Lat., 'father'), the Latin form of the title now, in the Western Church, given exclusively to the Bishop of Rome (see POPE). Originally, however, meaning simply 'father,' it was given indiscriminately to all bishops. In the Greek Church, whether in Greece Proper or in Russia, papa is the common appellation of the clergy.

Papacy. See POPE.

Papain is a nitrogenous body, isolated from the juice of the tropical Papaw (q.v.). The juice from which it is extracted is a milky, white, inodorous fluid, obtained by making incisions in the ripe fruit. From this papain is isolated by precipitation with alcohol after the fatty matters present have been removed. The juice has been for a long time used in the West Indies for making meat tender; papain has, like pepsin and trypsin, the power of digesting meat-fibre; and this digestion will go on in an alkaline, a neutral, or an acid solution. Hence it belongs to the group of digestive ferments, and like them is employed in some

cases of dyspepsia, being either administered internally or employed for the pre-digestion of food. It has also been used for the removal of warts and for the solution of the 'false membrane' in cases of diphtheria.

Papal States. See CHURCH (STATES OF THE).

Papaveraceæ, a natural order of dicotyledons, herbaceous or half shrubby, usually with a milky or coloured juice. The leaves are alternate, without stipules; the flowers on long, one-flowered stalks. The fruit is pod-shaped or capsular, the seeds numerous (see POPPY). The order is distinguished for narcotic properties. Opium (q.v.) is its most important product. The juice of *Celandine* (q.v.) is very acrid. The *Blood-root* or *Sanguinaria* (q.v.) is another representative of the order. A number of species are used in their native countries for medicinal purposes. The seeds yield fixed oil, which, with the exception of that obtained from *Argemone mexicana*, is quite bland. The flowers of many species are large and showy, most frequently white or yellow, sometimes red. There are in all over 400 known species, natives chiefly of north temperate climates, especially western North America.

Papaw (*Carica Papaya*), a small South American tree, the type of a small family, *Papayaceæ* or *Caricaceæ*, by some included in *Passifloraceæ*, is cultivated in many tropical and subtropical countries. The fruit is eaten either raw or boiled. The seeds when chewed have in a high degree the pungency of cresses. The powdered seeds and the juice of the unripe fruit are most powerful anthelmintics and have valuable digestive properties. The juice of the fruit and the sap of the tree render tough meat tender (see PAPAÏN); even the exhalations from the tree have this property, and joints of meat, fowls, &c. are hung among its branches to prepare them for the table. It bears fruit all the year, and is exceedingly prolific. Sir Harry Johnston notes that in Central Africa and Liberia the male flower produces a fruit apparently seedless—a long, pendulous drupe, quite unlike the melon-like female. The *Chamburu* (*C. spinosa*) of Brazil is remarkable for the extremely acrid and poisonous character of its juice, and the disgusting stercoraceous odour of its flowers.—In the United States the name Papaw is given to the *Asimina triloba*, a small tree of the natural order *Anonaceæ*, the fruit of which, a large oval berry, 3 inches long, with soft, insipid pulp, is eaten by negroes, but not generally relished by others. All parts of the plant have a rank smell.

Papenburg, a small port in the north-west of Hanover, 25 miles W. of Oldenburg by rail and near the Ems, with which it is connected by canals. In the neighbourhood are extensive moors.

Paper. According to the views of historians, papyrus is regarded as coming under the category of paper; if this view be accepted, the Egyptians may be looked upon as the first makers. Papyrus was made by paring the reed into longitudinal ribbons, laying these out on a table well sprinkled with water, and placing a second layer at right angles to the first, the two being cemented together by means of a gum-like substance. This material was dried in the sun, and finally polished. According, however, to the modern acceptation of the term, paper may be defined as an aqueous deposit of any vegetable fibre in the form of sheets. One of the nearest approaches to this in nature is to be found in the construction of wasps' nests. From the time of its discovery up to the beginning of the last century all paper was made by hand, either by dipping a 'mould,' consisting of a sieve covered with network, into a vat containing water in which fibres are suspended, or by pouring the liquid

pulp upon the sieve. The mass, after the water has been allowed to drain, is removed and dried. This constitutes crude paper. For perhaps two thousand years paper was so produced. It seems probable that paper was independently discovered by different peoples, such as the Aztecs and Maoris, and that the discovery came to them through draining natural deposits on the sides of pools. It has been asserted that the Chinese were acquainted with paper in 123 B.C.; but the merit of its discovery is attributed to the Marquis Tsai, a minister of agriculture under the Han dynasty, who is said to have invented and taught in a complete manner the art of paper-making from the mulberry and bamboo, as well as from pieces of hemp, old ropes, and fishing-nets. Tsai Lun was born in the province of Hu-nan, and in 89 A.D. was in charge of the imperial arsenal; the date of his discovery of paper is placed by a Chinese chronicler at 105 A.D. The Chinese seem to have kept the art of paper-making secret for many centuries, for it is not until about 610 A.D. that a knowledge of it was taken to Korea, and thence to Japan. The Arabs acquired their knowledge through their conquests in Tartary, and probably at the capture of Samarkand, and it is said to have been introduced at Mecca in the same year—viz. 707 A.D. According to Karabacek, the Arabs learnt the art of paper-making from the Chinese in the year 751 A.D.

Of the work of identifying the composition of paper of early dates, that of Wiesner is of particular importance. East Turkestan papers of the 4th to the 7th centuries consist of mixtures of crude bast fibres. During the latter half of the period papers are found consisting of rags, which from their character appear to indicate that they have been reduced in stamping-machines and more carefully prepared. The Chinese must be regarded as the discoverers of starch-sizing, and perhaps of sizing with a gelatinous extract from mosses. An old Chinese paper from East Turkestan of the year 768 A.D. appears to be the oldest paper of which the exact date is known; but an older paper, discovered by Sir Aurel Stein in 1901-8, is now in the British Museum. The Moors appear to have brought the art of paper-making to Europe early in the 11th century, and at the same time appear to have much improved the treatment of rags for paper-making. The oldest known linen document in Spain is a treaty of peace between the king of Aragon and Castile, 1178 A.D. Prescott refers to manuscripts on cotton-paper in the Escorial of 1009, and to a linen-paper of 1106. Paper-mills are recorded as being in operation in Toledo making rag-paper in 1085. The first manufacture in France is put at 1260. Italy is recorded as making paper in 1367, and linen-paper was in common use in Germany in 1324.

Kirchner states that there is a large collection of paper MSS. in the Prussian archives in Berlin, dating from the 10th and 11th centuries, but that these papers are of Arabian origin. What appears to be the earliest paper document of known date in Germany is a letter to the town of Aix-la-Chapelle, and kept in the archives of that town. It is dated 1302 A.D. In 1469 the authorities of the Sorbonne invited certain German craftsmen to demonstrate the printing-machine. They trained pupils who went to work in the paper-mills, thus showing that the arts of paper-making and printing were carried on side by side. Encouraged by Louis XI., the paper-makers and printers increased, and the processes were known and practised throughout France.

The Royal Society of Sciences at Göttingen, in the years 1755 and 1763, offered premiums to any one who could trace the date of the discovery of linen-paper, but failed in the attempt. The

difficulty in tracing it appears to be partly due to the gradual introduction of linen into cotton-papers, and partly to the fact that it is extremely difficult, even to the present day, to distinguish some cotton and linen fibres from one another with any degree of certainty. The earliest example of paper of authentic date to be found in Great Britain is to be seen in the Public Record Office Museum. It is a letter from Raymond, son of Raymond, Duke of Narbonne, Count of Toulouse, to King Henry III., praying him to enforce payment of three marks and of one pound in money for three shiploads of salt, sold by R. de Carof to David, a linen-draper of London (1216-1222). The fibres of the above paper have been examined microscopically, and are found to consist of flax fibres in a good state of preservation. The paper is of a loose, velvety texture; but it is significant that the paper has suffered less deterioration during the seven hundred years of its existence than a common newspaper would do in a few days if exposed under similar conditions.

The first English paper-mill was erected at Hertford or Stevenage—the Sele Mill, where John Tait the younger, the son of John Tait who was Lord Mayor of London in 1476, made the first white printing-paper. In *De Proprietatibus Rerum*, printed by Wynkyn de Worde, one of our earliest English printers, in 1495, appear the following words:

And John Tait the Younger joye mote he broke
That late hath in England do make thys paper
thyne
That now in our Englyssh thys booke is printed
inne.

When Henry VII. stopped at Hertford Castle on 25th May 1498, he visited the mill, as is shown by an entry in his household book, which still exists, and under that date is an item 'for a reward given at the paper mylne 16/8.' There is also one in the following year: 'Geven in rewarde to Tate of the Mylne 6/8.' Tate's water-mark was a circle enclosing a star or wheel of eight points. Spielman, who erected the second and a larger mill at Dartford, was jeweller to Queen Elizabeth. It has been assumed that the paper of the first folio edition of Shakespeare, printed by Isaac Jaggard and Edward Blount in 1623, was made at Spielman's mill; but from a careful examination of the copy in the British Museum Library, it appears evident that this paper, as also paper of books of a similar nature, was got together from various mills, and probably derived from Continental sources. Spielman adopted the crest of a fool with cap and bells, which can be seen on his tomb at Dartford Church—a mark which was common at his time, and which, no doubt, he borrowed. The first English patents in connection with paper-making were taken out in 1665.

The first paper-mill in Scotland appears to have been erected at Dalry, on the Water of Leith (now part of Edinburgh), in 1675. The Privy Council granted the permission for the establishment of further mills in Scotland, 'but without hindering any already set up,' and also 'to put the coat-of-arms of this kingdom upon the paper which shall be made at these mills.'

The 'water-mark' of a paper is produced by twisted wire attached to the surface of the mould in the shape of a design or device, which is permanently imparted to the texture of the paper in the course of manufacture. It is probable that water-marking originated in France, where, in the 14th century, the authorities made it compulsory for the manufacturers to seal all their goods by a particular mark by which they could be recognised, and which would serve as a guarantee of its good quality and its origin. The first authentic water-mark is in an account-book dated 1301, and con-

sists of a circle or globe surmounted by a cross. Most of the early marks are of ecclesiastical or biblical origin, adopted by monasteries or great families, who owned or controlled most, if not all, of the factories. The early water-marks are simple. Out of the 600 marks of France of the 14th and 15th centuries the following simple marks are given in order of frequency: anchor, the letter 'P,' hand, bull's head, unicorn, Holy Grail, the letter 'Y,' crossbow, dog, leopard, crown (single), fleur-de-lis, lion, stag's head, bell, pear, dolphin, paschal lamb, crescent, sword (single and crossed), rose, trefoil, pair of scales, dragon, cock, heart, cardinal's hat, dove, post-horn. About the end of the 17th century many marks bearing royal arms or the arms of cities, in paper made either here or in Germany, were as well executed as the best produced at the present day. The initials of firms were introduced into marks of the 15th and 16th centuries; names followed later, and these constitute the chief water-marks of the present day.

We find some quaint remarks by Fuller about the papers of his time (1608-61 A.D.) which may aptly be quoted here. He says: 'Paper partakes, in some sort, of the characteristics of the country which makes it—the Venetian being neat, subtle, and court-like; the French, light, slight, and slender; and the Dutch, thick, corpulent, and gross, sucking up the ink with the sponginess thereof.'

An examination has been made by the authors of between two and three thousand water-mark papers of German origin in their possession, dating from the middle of the 14th century up to the present time. These papers, which are derived from various sources, may be taken as representative of the above-mentioned period, at least in so far as Germany is concerned. They nearly all consist of linen rags or flax, and a large number of them are elaborately, although in some cases somewhat crudely, 'water-marked' with the arms of cities which denote their origin; others being designs similar to those indicated above for France.

The so-called wire-mark in a paper is the mark imparted to the paper by the wire sieve. This mark is either 'laid' or 'wove.' The 'laid' is produced by a number of parallel wires placed side by side in the mould, with sufficient space between to allow the water to pass through, and held at equal distances apart by finer cross wires. In the earlier papers such laid marks were very coarse and crudely finished, and sometimes irregular. Early papers were made in this fashion until John Baskerville, the famous Birmingham printer, introduced in 1750 the woven wire to obviate the roughness of the laid paper. His beautiful edition of *Virgil* of 1757 is chiefly printed on this wove paper. Woven wire as a cover to the paper mould opened up fresh possibilities in water-marking, which took at least one hundred years from this date to come to maturity. Laid and wove papers can easily be distinguished by the ordinary observer by holding the papers up to the light.

The use of the wove wire gave rise in time to shaded water-marking. Specimens of this are to be found in Herring's book of 1855. The process then employed was to make an electrotype of any model or design, forming a matrix or mould, which was mounted upon lead or gutta-percha, and pressed in contact with the wire-gauze. The gauze, bearing in relief the impression of the design, was then mounted as a cover on the wire mould. Sometimes the design is engraved upon a plate, and then transferred to the wire-gauze. Photo-mechanical processes cannot be used, as they do not afford sufficient relief. Paper made upon such moulds varies in thickness in parts according to the depth of impression in the wire. With fine gauze every

gradation of tone may be produced. A portrait of the Emperor Napoleon was so produced, and exhibited at the Industrial Exhibition in Paris in 1849, since which time both Italian and English firms have produced similar effects of a very high order. The same process has been largely used for special bond, bank-note, and such-like papers.

A process for introducing coloured water-marks into the body of a paper was patented by Messrs A. & G. B. Fornari, paper-makers, of Fabriano, Italy, and is fully disclosed in their British patent, 1901. Each sheet is made in two layers, and between them is placed a third layer as a design in any colour. Sheets can be so manufactured as to render the colour design only visible by reflected light. The design or lettering is produced by placing a stencil over the mould cut in the form of the lettering. Certain Italian makers of hand-made papers excel in this production.

The earliest record we have of the use of blotting-paper is in 1465, and of brown paper in England in 1570 and 1571. Evelyn describes his visit to a paper-mill, and from his description it appears that it bears reference to a mill making brown papers.

Up to the middle of the 18th century nothing but rags had been tried in the manufacture of paper with any degree of success, and the demand for paper was steadily outstripping the supply of rags. Certain learned men had paid great attention to this question, among whom may be mentioned Bruyset, Levrier de Lisle, Klaproth, Linnæus, Mayer, Strange, Schäffer, Réaumur, and others. Réaumur published a brochure on the subject in 1719, which appears to have had chiefly in view the utilisation of wood. A book was published by Jacob Schäffer of Regensburg, Germany, the paper of which was made from about sixty different substances. The poems of the Marquis de Villette were printed in book-form in 1786; the leaves of this book consist of paper made from a number of different substances. These books are to be seen at the Patent Office Library.

The British government at the close of the 18th century awoke to the necessity of legislating on behalf of paper-makers. Parliament had enacted that rags, old nets, and ropes (which are used for the manufacture of pasteboards, wrappers, and packing-paper) should be imported duty free. It likewise allowed the free importation of all waste-paper, provided that it was torn to pieces and could be used for nothing but remanufacture. Parliament had also prohibited the burial of the dead in shrouds made of cotton or linen on account of the loss it would occasion to paper-makers. At the end of the 18th century many paper-mills were shut down for want of rags, and the scarcity of foreign supplies was popularly attributed to the use of rags as 'lint' in the European wars.

Matthias Koops (London, 1801) published a book on paper-making, one-half of which is printed on paper made entirely of wood. It would appear from an examination of this paper that the wood was chopped into small fragments and macerated with milk of lime, or a weak lye, in an open pan. In 1800 Koops was granted a patent for the manufacture of paper from straw. The other half of the above-mentioned book is made of paper entirely prepared from straw of a brown colour, and much inferior in colour to the paper Koops made from wood. The manufacture of paper from straw is now a large industry, particularly in Holland, where straw is cheap and is used chiefly in the manufacture of straw-boards.

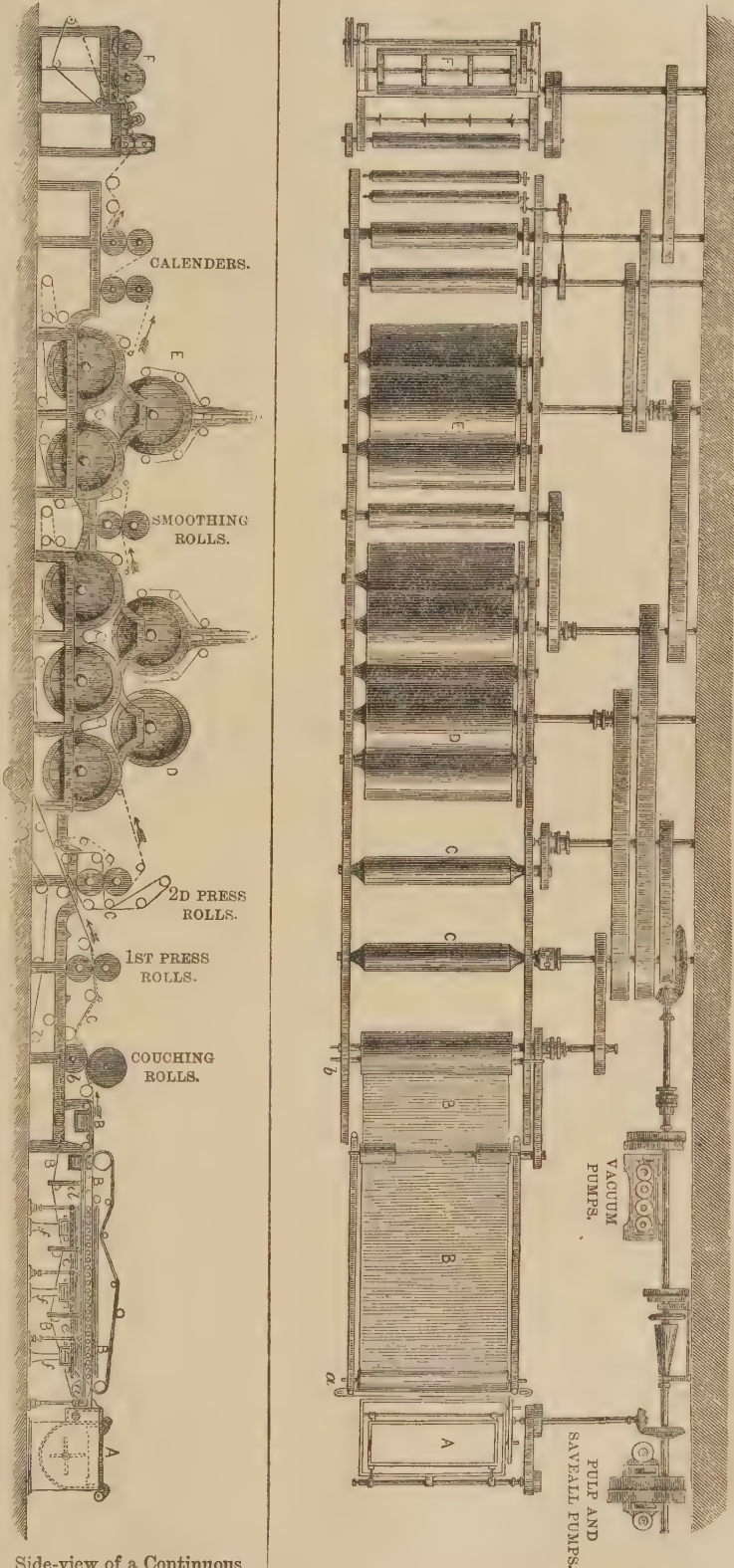
The manufacture of 'mechanical' wood-pulp was first conducted by Keller, a Saxon watchmaker, with the assistance of an engineer called Völter. This is produced by mechanically reducing wood to the condition of pulp. Keller died a poor man,

in spite of the fact that during his lifetime this product had created a large industry. It is now produced in millions of tons per annum, and is the most abundant and cheapest source of supply for common paper.

In 1839 attempts were made to utilise esparto in the manufacture of paper. Thomas Routledge exhibited the fibre at the 1851 Exhibition. Its real introduction to paper-making is said to date from 1852. Some copies of the *Society of Arts Journal*, 28th November 1856 issue, were printed upon esparto paper. Up to 1861 Routledge, on his own statement, was the only paper-maker using esparto in England. When the American war broke out, entailing a short supply of cotton, esparto came into general use. From that time until 1890 the consumption of esparto rapidly increased, Great Britain to this day being practically the only user of it. The amount of esparto consumed annually in the United Kingdom is approximately 200,000 tons per annum, and the consumption is a fairly constant quantity, having long since reached the limits of supply. The grass grows on what is known as the 'Esparto zone,' bordering the shores of the Mediterranean. From early historical times esparto grass has been, and is still, used for such articles as carpets, sandals, ropes, baskets, nets, sacks, &c. It produces a soft paper particularly suitable for fine printing and illustrative work. In 1866 Tilghmann, an American, patented the manufacture of wood-pulp by the sulphite process, the pulp being prepared by macerating wood under pressure with sulphite liquor. He has been described as 'the father of the sulphite process.' Like Keller, he benefited very little by his discoveries. It was left to such men as Mitscherlich, Francke, Ekman, Graham, Kellner, and Partington to bring these processes to a commercial success. Sulphate as distinguished from sulphite wood-pulp is now one of the chief sources of supply. Simultaneously the treatment of wood with caustic soda was developed, and has now been brought to a high state of perfection. Of late years sulphate wood-pulp has taken the place of soda wood-pulp; this differs from the last mentioned only in that the sulphate of soda is used to make up the loss occasioned during the recovery process, the sulphate of soda being chiefly converted into caustic soda.

Paper that is not sized is known as waterleaf, and is more or less of the nature of blotting-paper. In order to render it ink-proof and suitable for most commercial purposes a sizing material has to be used. According to Wiesner, papers after 1339 were sized with gelatine; for centuries prior to that starch had been used, but starch alone does not render paper suitable for writing upon. Gelatine was probably first prepared by macerating vellum and parchments; but as supplies of this material became inadequate, horns, wet-hide pieces, and such-like materials came into use. A cheaper method of sizing, and one which is now universally used except on the highest class of papers, was discovered about 1800 by M. F. Illig, and is known as rosin-sizing. He appears to have kept this secret until 1806 or 1807, when he communicated it in a pamphlet, translated as *Instructions for Sizing Papers in the Pulp, after a Sure, Simple, and Cheap Method*. This size is made by dissolving rosin in a boiling solution of carbonate of soda to produce resinate of soda. By using an excess of rosin a thick viscous liquid is obtained which yields a milky liquid when dissolved in water. This solution is added to the pulp, after which alum is added in sufficient quantity to precipitate the rosin. The effect upon the finished paper is to harden and strengthen it, and render it ink-proof.

Various mineral matters are used in the manufacture of paper, the chief of which is china-clay. It was first used secretly to adulterate paper about the middle of the 19th century. Although used primarily to cheapen the production of papers, it is found to impart useful qualities, and gives to the paper an improved surface for printing upon, and renders it more opaque. Paper can be made to contain up to 20 or 30 per cent. of china-clay, but if the clay be used in such large quantities the strength and durability of the paper is much impaired. For very strong papers, such as those used for bags in banks and for the insulation of electric cables, hemp and manila fibre are used, the source of supply being old ropes and cordage. For common brown papers jute bagging is the chief source of supply, and for cheap yellow wrappers, newspaper wrappers, &c., the jute is used in a semi-bleached condition in admixture with wood-pulp. Hemp, carefully bleached and beaten in a particular manner, is used in the manufacture of India paper. The papermaker converts his own waste papers into paper again by mixing with new material. Waste papers from all sources, such as envelope cuttings, trimmings, surplus copies of newspapers, old books of all descriptions, come into the hands of dealers, and are sorted and graded and sold, largely to cardboard-makers. Common newspaper is made of about four-fifths mechanical and one-fifth chemical wood-pulp, rosin-sized. The better-class printings are made of chemical wood-pulp with different proportions of mechanical; those better still, of chemical wood-pulp containing esparto fibre in varying proportions. Papers such as cheques are made almost entirely of esparto fibre. Esparto,



Side-view of a Continuous Paper-making Machine.

being without strength, requires some admixture with chemical wood-pulp. Blotting-papers are made almost entirely of cotton, beaten in a special manner to render it spongy and absorbent. High-class writings, account-books, drawing and such-like papers are made almost entirely of rags. All hand-made papers are made from rags.

Before completing our account of the mechanical development of paper-making it is necessary to view briefly the whole *modus operandi*. Rags as received are dusted, sorted by hand into different grades, cut into small fragments either by hand or machine, again dusted through a revolving sieve, boiled in spherical boilers with caustic soda or lime under pressure, from whence they are discharged, drained, washed, and 'broken-in' in breakers, beaten to pulp in the beaters, and discharged into a 'stuff' chest, ready for the machine. Esparto is mechanically dusted, picked by hand free from roots, &c., as it passes over a travelling belt into vomiting boilers, where it is boiled with caustic soda under pressure, washed and bleached in 'potchers,' and beaten in the beaters. Chemical wood-pulp is treated, after reduction to small pieces and the removal of the bark, by one or other of the processes already referred to at the pulp-mills, and shipped as pulp, either wet or dry, bleached or unbleached, to the paper-maker, who adds it to his potcher or bleaching-engine if required to be bleached, or direct to the beater. Mechanical wood-pulp, as received from the pulp-mills, is furnished direct to the beater. The waste liquors from the boiling of esparto and soda wood-pulp, together with the washings, are evaporated, incinerated, and the alkali recovered, causticised, and used over again. All weaker liquors, such as rag liquors, are too dilute for recovery, and sulphite liquors are discharged with effluent waters. The mixing of the various ingredients is done in the beater; this is a machine the common form of which is an oblong trough with a midfeather round which the material circulates, the beating being performed by a revolving roll furnished with knives which come in contact with fixed knives. The beating process—i.e. the reduction of the raw material to the condition of finished pulp—takes from two to eight hours, according to requirements. The rosin-sizing, minerals, starch, colour, &c., are added to the beater. On completion of the beating operation the stuff is discharged into the stuff-chest. From the stuff-chest (which is kept agitated to preserve uniformity, and which acts as a reservoir for the machine), the stuff flows over sand-tables to deposit any heavy impurities, and through strainer-plates provided with very narrow slots for keeping back any unbeaten or foreign particles, to the pulp-vat, A, provided with a rotating-hog or wheel, from whence it flows over a lip along a rubber apron to an endless travelling wire-gauze, BB, which carries on each side of it a rubber band or *deckle* strap, which determines the edge of the paper. The wire is supported by a number of small brass rollers. The water passes through the wire-gauze into a shallow trough or *save all*, *ee*. Further water is sucked through by the suction-boxes, which are operated by the vacuum pumps. Towards the end of the wire and close to the suction-boxes a *dandy roll* rotates upon the surface, and imparts to it the laid or wove marks and water-mark. Further water is removed as the web passes between the *couching-rolls*, *b*, which consist of metal or wood, either or both being covered with a thick felt jacket. During its passage the wire receives a lateral 'shake'; this 'shake,' an essential process in paper-making, assists in felting the fibres—that is, causes them to lie in various directions, otherwise they tend to set themselves parallel to the flow of the liquid and movement of the wire. The

frame covering the tubes and wire is pivoted close to the suction-boxes, and the maximum 'shake' is at the end of the wire which first receives the stuff. On some modern machines the upper couching-roll and some of the vacuum-boxes are dispensed with, the lower couching-roll serving as a vacuum or suction-roll. The gauze-wire returns underneath from the couching-roll to the press-roll, the web of paper passing from the couching-roll to an endless felt through the first press-rolls, where it comes in contact with the bare press-roll on its upper surface, and through the second press-rolls, where it receives contact on its under surface. At this point it contains about 25 to 27 per cent. dry fibre and 75 to 73 per cent. moisture. The rest of the moisture has to be removed by heating. This is accomplished by the web being brought over and under a series of steam-heated rollers, and kept in direct contact therewith by means of a series of dry felts. When partially dry it is sometimes submitted to a treatment between *smoothing-rolls*, after which it is completely dried by further steam-heated cylinders and a surface given to it by a series of calendars, the rough deckle edge being removed by rotating circular knives, and finally reeled at F. If necessary it is cut into narrow widths, and at the same time re-reeled on another machine or into the form of sheets. High-class papers have to pass through the *salle*, where the sheets are individually inspected and graded into 'good,' 'retree,' and 'out-sides.' If the paper is to be gelatine-sized, this condition is secured by passing the reel through a trough containing gelatine solution, through squeezing-rolls, and over and under a series of skeleton drums, in each of which a fan rotates; or if the paper is in the form of sheets, these are dipped by hand or passed continually by means of a travelling felt through a bath of gelatine, the sheets being afterwards air-dried in a room at a suitable temperature.

See *Chapters on Paper-making*, by Clayton Beadle (1907); 'Hand-made Papers of Different Periods,' by Clayton Beadle and Henry P. Stevens (*Journal of Royal Society of Arts*, Feb. 26, 1909); 'The Development of Watermarking in Hand-made and Machine-made Papers,' by Clayton Beadle (*Journal of Royal Society of Arts*, May 18, 1906); *Practical Paper-making*, by George Clapperton (1907); *A Text Book of Paper-making*, by C. F. Cross and E. J. Bevan (1916); *The Dyeing of Paper Pulp*, by Julius Erfurt (trans. by Julius Hübner, 1901); *The Chemistry of Paper-making*, by R. B. Griffin and A. D. Little (New York, 1894); *Paper Testing*, by W. Hertzberg (trans. by P. Norman Evans, 1890); *Paper Technology* (1906) and *The Manufacture of Paper* (1909), by R. W. Sindall; *The Paper Trade*, by A. Dykes Spicer (1907); *The Paper Mill Chemist*, by H. P. Stevens (1919); *The Art of Paper-making*, by Alexander Watt (1890); *The Technology of the Paper Trade*, by William Arnot (Cantor Lectures; reprinted from *Journal of Society of Arts*, 1878); *Paper*, by H. A. Maddox (1916).

Paper-hangings. See WALL-PAPER.

Paphlagonia, anciently a province of Asia Minor, extending along the southern shores of the Black Sea, from the Halys on the east to the Parthenius on the west (which separates it from Bithynia), and inland on the south to Galatia. Its limits, however, were somewhat different at different times, and it successively belonged to Lydia, Persia, and Rome. Its capital was Sinope. The Paphlagonians are supposed to have been of Syrian origin, like the Cappadocians.

Paphos, two ancient cities in Cyprus. Old Paphos (now *Kyklia*) was situated in the western part of the island, about 1½ miles from the coast. It probably was founded by the Phœnicians, and was famous, even before Homer's time, for a temple of Aphrodite, who was said to have here risen from the

sea close by, whence name 'foam-sprung.' This was the home of the 'Paphian Aphrodite,' and hither crowds of pilgrims used to come. The other Paphos (*Papho* or *Baffa*) was on the seacoast, about 8 miles west of the older city, and was the place in which the apostle Paul proclaimed the gospel before the proconsul Sergius.

Papias, Bishop at Hierapolis, in Phrygia, in the earlier half of the 2d century, is known to us only from references by Irenæus, Eusebius, and a few others, and from fragments of his lost work preserved in their writings (see especially Eusebius, *Historia Eccl.* iii. 39). Irenæus speaks of him as a 'hearer of John'—evidently meaning the apostle. Eusebius aptly quotes Papias himself against Irenæus on the point; but, while the quotation justifies his criticism thus far, it does not fully bear out his own view that Papias claimed to have been a hearer of two other disciples of the Lord, Aristion and the elder (not the apostle) John. There is, then, no very reliable evidence of personal intercourse with any of the immediate followers of Jesus. On the other hand, some of the links between Papias and the apostles are definitely known; for two daughters of the apostle Philip, living in Hierapolis, related traditions to him, and he was a 'companion of Polycarp' (69–155 A.D.), Bishop at Smyrna, who in his youth had been a disciple of the apostle John. The statement, however, in the *Chronicon Paschale*, that Papias suffered at Pergamum in the year of this contemporary's martyrdom at Smyrna, rests on the compiler's misreading of Eusebius (*Hist. Eccl.* iv. 15).

The only work which he is known to have written is the *Logiōn kyriakōn exegēsis* ('Exposition of Oracles of the Lord'), in five books, which on various grounds, including an expression in a fragment discovered in modern times, may be probably assigned to the period 140–150. It is now generally agreed that the signification of 'oracles' is not to be absolutely limited to 'discourses,' and that by 'Oracles of the Lord' we are to understand a record, or records, of the Lord's sayings, including at least a setting of narrative. Part of the author's design was to supplement his expositions with trustworthy oral traditions. But the scanty remains are enough to show that Papias was, as Eusebius says, 'of very small intellect,' credulous, and fond of recording the wonderful. His doctrinal characteristic is a quaint millenarianism, with traces of the *Apocalypse of Baruch*.

But it is in relation to the New Testament canon, and especially to what is known as the synoptic problem, that Papias is of real importance. The fragment bearing on Mark runs thus: 'This also the elder (John) said: "Mark, having become the interpreter (recorder) of Peter, wrote down accurately whatever he remembered, without, however, recording in order what was either said or done by Christ,"' &c. Many scholars maintain that the words suit the second gospel as we have it, while others who deny this accept them as an account of its groundwork. Still greater interest attaches to the short fragment on Matthew: 'Matthew, then, composed the oracles in the Hebrew (Aramaic) language, and each one interpreted them as he could.' This statement has often been called in question, but the best authorities now hold that Papias is correct as to the Aramaic original, and that the canonical gospel, while evidently not a translation, is a Greek edition, by either Matthew himself or some writer unknown. On the whole, the two-document hypothesis of the origin of the synoptics coincides remarkably with the above two fragments (see GOSPELS). As to the rest of the canon, Papias quoted 1 John and 1 Peter, and was cited as an authority for the 'credibility' of the *Apocalypse*.

There are also some indications that he knew the fourth gospel.

See the *Apostolic Fathers* of Gebhardt, Harnack, and Zahn, of Lightfoot (1891), or of Funk (1901); Smith's *Dictionary of Christian Biography*, and Herzog-Hauck's *Realencyklopädie*; for an English translation, the *Ante-Nicene Library*, vol. i.

Papier-mâché (Fr., 'chewed paper'), a name given (not by the French) to a material consisting of paper-pulp, or of sheets of paper pasted together, and treated to resemble varnished or lacquered wood or sometimes plaster. Among eastern nations, where varnished and decorated articles in papier-mâché (such as boxes, trays, and pen-cases) have long been made, the finest work has been produced in Persia, and next to it in Kashmir. The Japanese kind of papier-mâché, manufactured by glueing together a number of damped sheets of soft and flexible paper upon moulds, is light, strong, and elastic, and was at one time used in that country for helmets and other parts of armour. No doubt it was from one or other of these eastern countries that the art of working in papier-mâché was acquired by Europeans.

Articles of papier-mâché were extensively made in France in the first half of the 18th century, and later in Germany. The painted papier-mâché Vernis Martin snuff-boxes and other articles, made by a coach-painter named Martin, who had a peculiar way of varnishing them, were in the 18th century popular throughout Europe, and fine specimens are still sought after by collectors. Papier-mâché appears to have been introduced into England for the purpose of imitating Japanese trays of lacquered wood. In 1772 Henry Clay of Birmingham took out a patent for making papier-mâché of sheets of specially prepared paper pasted together upon a mould, and produced panels for doors and walls, besides cabinets, screens, tables, tea-trays, &c. The best papier-mâché is made by Clay's method. A second variety is made from paper-pulp to which glue has been added; it is pressed between dies to give it the required shape. A third kind is made of coarse fibrous material, mixed with earthy matters and size, certain chemicals being added to render it incombustible. *Carton-pierre*, which has been extensively employed for the internal decoration of buildings (much in the same way as plaster), is formed of paper-pulp mixed with whiting and glue. It is moulded, backed with paper, allowed to set, and dried in a hot room. *Ceramic Papier-mâché* (Martin's patent, dated March 15, 1858) is a very plastic substance, which can be readily worked into any required form. It is composed of paper-pulp, resin, glue, drying oil, and sugar of lead, well kneaded together. For ordinary papier-mâché wood-pulp is now the principal ingredient, though the high-class article as described above is still made to some extent.

The article after being moulded is heated, dipped in a mixture of linseed-oil and spirits of tar (other mixtures are used) to harden it and make it resist moisture, placed again in a stove, and when taken out planed and filed to give it the required finish. It now gets several coats of tar varnish and lamp-black, each of which is rubbed down with pumice. It is then stoved once more, decorated, treated with transparent varnish, and finally polished by hand.

There are various ways of decorating papier-mâché. For objects with a black varnished surface, what is called 'inlaying' with plates of mother-of-pearl shell, scarcely thicker than stout writing-paper, is largely practised. The pieces of shell are stuck on with varnish, and the design painted on them with a protecting varnish. An application

of acid dissolves away the unprotected parts, and then the interspaces are filled up with varnish. The surface is rubbed with pumice-stone, the superfluous varnish removed, and the shell ornaments displayed. Similarly the surface can be 'inlaid' with cut-out metal devices. Flower and landscape painting is often employed for decoration, as well as ornaments in leaf gold. Inexpensive decoration by transfer-printing, which can be done by boys and girls instead of highly-paid artists, has now been largely resorted to, in order to compete with cheap Japanese lacquer wares. (See LACQUER.) The variety of papier-mâché adopted for architectural ornaments, which are usually more or less in relief, can be readily painted, gilded, or bronzed.

Papilionaceæ (from Lat. *papilio*, 'butterfly'), a sub-family of Leguminosæ (q.v.), the plants of which have flowers of the peculiar structure called *papilionaceous*. The Pea and Bean afford familiar examples. Papilionaceous flowers have five petals, imbricated in estivation (bud), one of which, called the *vexillum*, or *standard*, is superior, turned next to the axis, and in estivation folded over the rest; two, called the *alæ*, or *wings*, are lateral; and two are inferior, which are often united by their lower margins, forming the *carina*, or *keel*. The number of the Papilionaceæ is very great—about 6000 species being known. Found in all parts of the world, they abound in the tropics. Many have superb and beautiful flowers; many are plants of beautiful form and foliage, trees, shrubs, and herbaceous plants; many possess valuable medicinal properties; and many are of great importance as furnishing food for man and for domestic animals, others as furnishing dyes, fibre, timber, &c. See BROOM, LABURNUM, CLOVER, BEAN, PEA, LUCERNE, LIQUORICE, INDIGO, SANDALWOOD, &c.

Papillæ. See SKIN, TASTE.

Papin, DENIS, a French physicist, was born at Blois, 22d August 1647, and studied medicine in Angers, where he practised for some time as a physician. But, becoming acquainted with Huygens, he helped him in his experiments with the air-pump; then, crossing to England, he assisted Boyle in his physical experiments, invented the condensing pump and the steam digester (1681)—a sort of steam cooking apparatus, to which was applied for the first time a safety-valve—and was made a member of the Royal Society (1680). Shortly afterwards he proceeded to Venice for the purpose of helping to conduct a newly-founded academy of science, but was back in London in 1684. Three years later he was appointed professor of Mathematics at Marburg, but from 1696 to 1707 worked in Cassel. Then, returning to England, he died in obscurity, probably in 1712. To Papin belongs the honour of having first applied steam (1690) to produce motion by raising a piston, and with this he combined the simplest means of producing a vacuum beneath the raised piston—viz. by condensation of aqueous vapour. In virtue of this his biographer claims that he is really the inventor of the steam-engine. He is the inventor of the safety-valve, an essential part of his digester; of the siphon; and according to some, of steam-navigation. See SHIPBUILDING; also DIGESTER.

His papers were mostly printed in the *Philosophical Transactions*, *Acta Eruditorum*, *Journal des Savans*, &c. He also wrote *Novelles Expériences du Vide* (Paris, 1674). See LIVES by Ernouf (Paris, 1874) and Gerland (Berlin, 1881). His correspondence with Huygens and Leibnitz was published by Gerland (Berlin, 1881). See *Nature*, vol. xxiv. (1881).

Papineau, LOUIS JOSEPH, Canadian statesman, was born at Montreal in October 1789. At twenty he was elected to the Legislative Assembly, and speedily worked his way to the head of the

Radical or French-Canadian party, and in 1815 was chosen speaker of the House of Assembly for Lower Canada, a post that he held until 1837. He opposed the union of Upper and Lower Canada, formulated the grievances and demands of his party in the Ninety-two Resolutions, and agitated actively against the imperial government. When the province rose in rebellion in 1837, a warrant was issued against Papineau for high-treason, though he took no active part in the fighting. He took refuge first in the United States, then escaped to Paris; but he returned to Canada, pardoned, in 1847. He died at Montebello, in Quebec, 23d September 1871. See book by De Celles (1905).

Papini, GIOVANNI, Italian author, critic, and editor, was born in 1881 at Florence, and educated there. A powerful writer, he has attracted considerable attention by his books, amongst which have been translated *The Twilight of the Philosophers* (1906), *Twenty and Four Minds* (1912), *A Finished Man* (1913), and, following on his conversion, *The Story of Christ* (1921).

Papinianus, ÆMILIUS, down to the time of Justinian the most celebrated of the Roman jurists, lived at Rome during the reign of Septimius Severus, whose second wife is said to have been his relative. Both he and Septimius were pupils of Scævola; Papinianus succeeded the prince as *advocatus fisci*, and afterwards held the office of *prefectus prætorio*. The son and successor of Severus, Caracalla, caused Papinianus to be put to death in 212. His works consist of 37 books of *Questiones*, 19 of *Responsa*, 2 of *Definitiones*, and *De Adulteriis*; from these works 595 excerpts were incorporated in Justinian's *Pandects*.

Pappenheim, GOTTFRIED HEINRICH, COUNT VON, an imperial general of great note in the Thirty Years' War, was born at Pappenheim, in Middle Franconia, Bavaria, 29th May 1594, of a very ancient Swabian family, in which the dignity of Marshal of the Empire became hereditary about the 13th or 14th century, and many of whose members had greatly distinguished themselves in the wars of the middle ages. At twenty he went over to the Roman Catholic Church, and thenceforth signalled himself by his fiery zeal in its cause. After serving under the king of Poland in his wars with the Russians and Turks Pappenheim joined the army of the Catholic League, and in the battle of Prague (1620) stayed the flight of the Austrian cavalry, and by a well-timed and furious charge turned the tide of battle against the Bohemians. In 1623 he received from the emperor the command of a cavalry regiment of the famous 'Pappenheimer Cuirassiers.' In 1625 he became general of the Spanish horse in Lombardy; but in 1626 he re-entered the Austrian service, and after suppressing a dangerous revolt of the peasants of Upper Austria, in which 40,000 of the peasants perished, he joined the army which was opposed to the Protestant League, and, in association with Tilly, carried on many campaigns against the Danes, Swedes, and Saxons. It was Pappenheim who induced Tilly to attack Magdeburg (q.v.), and on his head rests in great measure the guilt of the ferocious massacre. His reckless bravery involved Tilly against his will in the disastrous battle of Breitenfeld; but to some extent he retrieved his character by his heroic efforts to remedy the loss and protect the retreat of the army. After Tilly's death he served under Wallenstein, who detached him with eight regiments to protect Cologne, but, on hearing of the advance of Gustavus, sent an urgent order for his return. Pappenheim arrived at Lützen at the moment when Wallenstein's army was on the point of being completely routed, and at the head of his cuirassiers he charged the left wing of the

Swedes with such fury as to throw it into confusion, and for a moment change the fortune of the battle. He was mortally wounded in the last charge, and died a few hours afterwards at Leipzig, November 7, 1632, with a smile on his countenance, after learning that Gustavus Adolphus was dead. 'God be praised!' he said: 'I can go in peace, now that that mortal enemy of the Catholic faith has had to die before me.'

Pappus. See COMPOSITEÆ.

Pappus OF ALEXANDRIA flourished about the end of either the 3d or the 4th century A.D. Which of these dates is the more probable it is difficult to determine, owing to conflicting evidence, but opinion inclines to the former. Suidas states that Pappus was a contemporary of Theon, thus placing him towards the end of the 4th century, and ascribes several treatises to him. These treatises have not survived, and the only work by which Pappus is now known, his *Mathematical Collection*, receives no mention from Suidas. This work consisted of eight books, the first and the earlier part of the second of which are lost, and its interest is mainly, though not exclusively, historical. From what remains of the second book, it is conjectured that the first two books were arithmetical. The third book explains some of the methods for the duplication of the cube, treats of the progressions and the five regular polyhedra. The fourth book discusses the figure called the *arbelos* ('a shoemaker's knife'), the spiral of Archimedes, the conchoid of Nicomedes, and the quadratrix of Dinostratus. The fifth book contains some theorems regarding isoperimetrical figures plane and solid, and a short account of the semi-regular solids of Archimedes. The sixth book comments on some of the works of Theodosius, Aristarchus of Samos, and Euclid. From the seventh book, which is the longest and most valuable of the *Collection*, is derived a large part of our knowledge of Greek geometry. Many of the writings here analysed are no longer extant, and it is on the indications (in the notable instance of Euclid's *Porisms*, the very obscure indications) which Pappus gives of the object or the contents of them that the geometers of the 17th and 18th centuries relied for their restorations of these writings. The eighth book is devoted mainly to mechanics. The mathematical interest of the *Collection* does not equal the historical, but several of the books contain important theorems, the discovery of which is probably due to Pappus himself. One of these has been long associated with the name of Guldinus (1577-1643). Some others have received a brilliant development from the mathematicians of modern times. The last six books of the *Mathematical Collection* were translated into Latin by Commandinus, an Italian geometer, and were published in 1588; another edition appeared in 1660. Fragments of the Greek text have been printed at various times in England, France, and Germany, but the only complete edition is that of Fridericus Hultsch, *Pappi Alexandrini Collectionis quæ supersunt* (3 vols. Berlin, 1876-78).

Papua. See NEW GUINEA.

Papules, or PIMPLES, are 'solid small elevations of the skin,' and may be either pale in colour or inflammatory and more or less red. Papules occur as an early stage in the development of the eruption in many skin diseases—e.g. in herpes, where they speedily become vesicles; or in acne,

where they become pustules. The papular diseases proper, where the eruption in its fully developed form consists of papules, are lichen and prurigo.

Papyrus, a genus of Cyperaceæ, better included in *Cyperus*, the most important species being the Egyptian Papyrus (*P. antiquorum*, *Cyperus Papyrus* of Linnaeus)—a kind of sedge, 8 to 10 feet high, with a very strong, woody, aromatic, creeping root, long, sharp-keeled leaves, and naked, leafless, triangular, soft, and cellular stems, as thick as a man's arm at the lower part, and at their upper extremity bearing a compound umbel of extremely numerous drooping spikelets, with a general involucre of eight long filiform leaves, each spikelet containing six to thirteen florets. By the ancient Egyptians it was called *papu*, from which the Greek *papyrus* is derived, although it was also called by them *byblos* and *deltos*. The Hebrews called it *gomé*, a word resembling the



Papyrus.

Coptic *gom*, or 'volume;' its modern Arabic name is *berdi*. The plant is nearly extinct in Lower Egypt, but is found in Nubia (whence it was probably introduced into Egypt) and Abyssinia. It still grows in the Jordan Valley, in the neighbourhood of Jaffa, and also of Sidon, in parts of the Sinai Desert, and in Sicily. It is often a conspicuous feature in African vegetation. It is represented on the oldest Egyptian monuments, and as reaching the height of about ten feet. It was grown in pools of still water, growing ten feet above the water, and two beneath it, and restricted to the districts of Sais and Sebennytus. The papyrus (not merely *C. Papyrus*, but also *C. alopecuroides*, which is still found in Egypt) was used for many purposes, ornamental and useful, such as wreaths for the head, sandals, boxes, boats, and cordage, but the *C. Papyrus* was valued principally for a kind of paper called by its name. Its pith was boiled and eaten, and its root dried for fuel. The papyrus or Paper (q.v.) of the Egyptians, made of strips of its pith in layers, was of the greatest reputation in antiquity, and it appears on the earliest monuments in the shape of long rectangular sheets, which were rolled up at one end, and on which the scribe wrote with a reed called *kash*, with red or black ink made of an animal carbon. When newly prepared it was white or brownish white and lissom; but in the process

of time those papyri which have reached the present day have become of a light or dark brown colour, and exceedingly brittle, breaking at the touch. Papyrus was commonly used in Egypt for the purposes of writing, and was, in fact, the paper of the period; but, although mentioned by early Greek authors, it does not appear to have come into general use among the Greeks till after the time of Alexander the Great, when it was extensively exported from the Egyptian ports under the Ptolemies. It was, however, always an expensive article to the Greeks. Among the Romans it does not appear to have been in use at an early period, although the Sibylline books are said to have been written on it. It was cultivated in Calabria, Apulia, and the marshes of the Tiber, but the staple was no doubt imported from Alexandria. So extensive was the Alexandrian manufactory that Hadrian, in his visit to that city, was struck by its extent. It continued to be employed in the eastern and western empire till the 12th century, and was used amongst the Arabs in the 8th; but after that period it was quite superseded by parchment or by paper made of rags. During the later periods it was no longer employed in the shape of rolls, but cut up into square pages, and bound like modern books.

The discovery in Egypt of classical Greek authors written on papyrus began about the middle of the 19th century, and the results have been on the whole beyond expectation. The great orator Hyperides (q.v.), then only known by name, is now represented by four or five pretty complete orations; fragments of Euripides and Aeschylus have been added to what we possess of these authors, and early MSS. have been obtained of parts of Homer, Plato, Thucydides, Demosthenes, and Isocrates. In 1888-89 Mr Flinders Petrie found near Medinet el Fayûm papyri which were identified as fragments of Plato's *Phædo*, transcribed about 250 B.C., and a part of the lost *Antiope* of Euripides, besides quantities of letters and documents of the Ptolemaic period. In January 1891 more than 160 ancient mummies (dating from the 20th and 21st Dynasties) were found in a subterranean passage at Deir el Bahari, near Thebes; with these were many papyri, containing, as usual, many ritual passages and extracts from the Book of the Dead (q.v.); there were also 'boxes crammed with papyri.' And at the beginning of the same year the world was surprised by the announcement that papyrus rolls obtained from Egypt by the British Museum authorities had been found to contain almost the whole of a lost but famous work of Aristotle on the constitution of Athens. These rolls, written by four different copyists, are mainly in a small semi-cursive hand, and date from about the end of the 1st century A.D. Other finds at Oxyrhynchus (q.v.) and elsewhere have been the *Mimes* of Herodas (q.v.), the *Odes* of Bacchylides, fragments of Pindar's *Pæans*, an important continuation of Thucydides by an unknown author, the *Logia* or *Sayings* of Jesus, and scraps of unknown gospels.

See Paoli, *Del Papiro* (1878), Baikie, *Egyptian Papyri* (1925), works by Grenfell and Hunt, and by Kenyon; also the articles BOOK (and works there quoted), EGYPT, PALÆOGRAPHY, PAPER.

Par. See SALMON.

Pará, the name which the river Tocantins (q.v.) receives in its lower course, from Cametá downwards (138 miles). It is 20 miles broad opposite the city of Pará, and 40 miles broad at its mouth. The Paranan, an arm of the Amazon, which cuts off Marajó Island from the mainland, pours into it part of the waters of the great river.

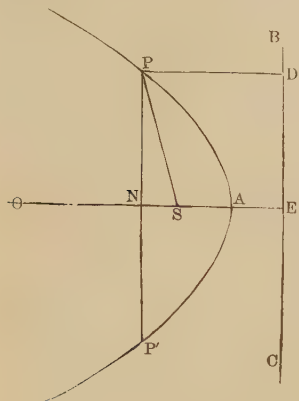
Pará, the third in size of the Brazilian states, bordering on Guiana and the Atlantic. It is a prolific rubber region, and presents a luring field for scientific exploitation. Lumbering and stock-raising are important industries, while products of the soil are nuts, cacao, cotton, rice, and tobacco. The state is divided by the Amazon, which along with its arms and tributaries affords much of the internal communication. There is a railway (108 miles) from Pará to Bragança and another in the valley of the Tocantins. The state has an area of 444,000 sq. m. and a population of 1,000,000. The capital PARÁ (official name *Belém*) is a thriving city and seaport, standing on the east bank of the river Pará, 70 miles from its mouth, on a point of land formed by the entrance of the Guamá. The harbour, nearly landlocked by wooded islands, is well constructed on modern lines, and admits vessels of large size. Pará, as a whole, is a plain-looking commercial town, compactly built, and without straggling suburbs, the dense tropical forest coming close up to the outskirts. The streets are narrow, but regular, well shaded with mangoes and palms, and the houses, with their blue and white tiled roofs and whitewashed walls, are very pretty. The city contains a cathedral (1720), naval arsenal, museum, zoological gardens, and a unique public park called the Bosque. The place is not unhealthy, though the wet season extends over nearly two-thirds of the year. Pará, accessible to ocean-going steamers, is the headquarters of several steamboat companies, and the emporium of the Amazon river-trade, supplying the towns of the interior with foreign goods, and exporting india-rubber, cacao, Brazil nuts, timber, tonka-beans, isinglass, hides, guarana, copaiba, tobacco, &c. Pop. 236,000. See Cooper, *The Brazilians and their Country* (1920), Tomlinson, *The Sea and the Jungle* (1912, new ed. 1920), and BRAZIL, and books there noted.—'Para Grass' is a name given to piassava; see FIBROUS SUBSTANCES.

Para, a Turkish coin, generally of copper, the 40th part of a Piastre (q.v.). Five, ten, and twenty para pieces are nickel coins.

Parable (Gr. *parabolē*, 'a comparison') was originally the name given by the Greek rhetoricians to an illustration avowedly introduced as such. In Hellenistic and New Testament Greek it came to signify an independent fictitious narrative, employed for the illustration of a moral rule or principle. This kind of illustration is of eastern origin, and the greatest examples are to be found in the Old and New Testaments, particularly in the discourses of Christ. The parable differs from the fable in the probability or verisimilitude of the story itself, and agrees with it in the essential requisites of simplicity and brevity. In the course of time the word parable came to lose its significance of figurative speech, and to mean speech generally. See ALLEGORY, APOLOGUE, and FABLE.

Parabola, the section of a cone by a plane which is parallel to a generating line. As a particular case, when the plane passes through the vertex of the cone, the parabola closes up into a straight line. A property of the parabola is that the distance of any point on the curve from a certain fixed point is equal to its distance from a certain fixed straight line. The fixed point is called the *focus* of the parabola, and the fixed line is called its *directrix*. In the figure, PAP' represents a parabola of which S is the focus and BC is the directrix. The point A is called the *vertex* of the parabola. The line ASO is the *principal diameter* of the curve; and any line drawn through a point such as P parallel to AO is called a *diameter*.

From the above property it is easy to prove that $PN^2 = 4AS \cdot AN$, where N is the foot of the perpendicular from P upon OA. It is obvious that the parabola is not a closed curve. The centre (corresponding to the centre of the ellipse) is situated



at infinity. The tangent to the curve at P bisects the angle SPD. Hence a reflecting surface formed by the revolution of PAP' about OA as axis is such that parallel rays falling upon it in the direction of OS are reflected to S. Conversely, rays diverging from S will be reflected parallel to SO. Hence the intensity of the reflected beam of light remains constant at

all distances from the source, except in so far as it is affected by absorption, and the parabolic is therefore the most perfect form of reflector (see LIGHTHOUSE, REFLECTION). If the resistance of the air were negligible, the path of a projectile would approximately be a parabola with its axis, or principal diameter, vertical, and its vertex at the highest point of the path. Let $PN = y$, $AN = x$, $AS = a$. The equation of the parabola referred to its vertex as origin is $y^2 = 4ax$. All curves the equations of which are of the form $y^n = px^m$ are classed as parabolas. Thus, the curve represented by the equation $y^3 = px$ is called the *cubical parabola*; and that one whose equation is $y^3 = px^2$ is called the *semi-cubical parabola*.

Paraboloid is a solid figure traced out by a Parabola (q.v.) revolving round its principal axis.

Paracelsus, a name coined for himself by Theophrastus Bombastus von Hohenheim, was apparently meant to imply that he was greater than Celsus; there is no good authority for further adding the names Philippus Aureolus. Paracelsus was the son of Wilhelm Bombast von Hohenheim, a physician at Einsiedeln, in the Swiss canton of Schwyz, and was born in December 1493. He owed his early education mainly to his father; went to Basel University at sixteen, but soon left to study alchemy and chemistry with Trithemius, Bishop of Würzburg; and next at the mines in Tyrol belonging to the Fugger family learned the physical properties of metals and minerals, and the disposition of rock strata, and began to realise that the observation of nature is of surpassingly greater value to the student than academic prelections or the lucubrations of the study. Here and in subsequent wanderings over great part of Europe he amassed a vast store of facts, learned the actual practice of medicine amongst various peoples, but lost all faith in scholastic disquisitions and disputations. He acquired no little fame as a medical practitioner, and on his return to Basel in 1526 received the appointment of town physician. He also lectured on medicine at the university, but defied academic tradition not merely by lecturing in German (not Latin), but by flouting at Galen and Avicenna—burning their books in public, it was affirmed—and denying all that was most firmly believed by the faculty.

Bitterness, backbiting, enmities soon rose and pursued him throughout the rest of his life, aggravated and justified in some measure by his

own vanity, arrogance, and aggressiveness, as also by his intemperate habits. A dispute with the magistrates in 1528 led to his leaving Basel in haste; he wandered for more than a dozen years, visiting Colmar, Nürnberg, Zürich, Augsburg, and many other towns, but seldom sojourning more than a few months, and at last settled in 1541 under the protection of the archbishop at Salzburg. But he died on the 24th September of the same year—murdered by his enemies, said his friends; in consequence of a drunken debauch, said his enemies. Both statements are probably extreme.

He is said to have written some 364 works, of which only some 230 were printed; and of these the critics only admit from ten (Marx) to twenty-four (Häser) as genuine, the others being by his followers the 'Paracelsists.' They were mainly written in Swiss-German, the Latin versions being by other hands. The earliest printed work was *Practica D. Theophrasti Paracelsi* (Augsburg, 1529). His *Paragranum* was published after his death. Collected German editions appeared at Basel in 1589-91 (11 vols. 4to) and again in 1603-5 (4 vols. folio; re-issued 1618), Latin editions in 1603-5 (11 vols. 4to) and 1658 (Geneva, 3 vols. folio).

His system was based on a cosmogonic view of the universe, the disturbances in the economy of the human microcosm corresponding to and being determined by the movements of the all-embracing macrocosm. Repudiating the current pseudo-Aristotelianism, Paracelsus turned sympathetically to Neoplatonism and the Cabbala; but it seems difficult not to admit in him an element of pure charlatanism, as well as of mysticism. Unquestionably, however, his method and his influence tended in the direction of the immediate observation of nature, the discarding of antiquated theories, the encouragement of independent research, experiment, and innovation. Paracelsus is often regarded as a chemist; he certainly made some new chemical compounds; but he is more famous because he applied chemical knowledge to improve pharmacy and therapeutics, and, in an empirical fashion, to revolutionise hide-bound medical methods.

See monographs by M. B. Lessing (1839), Marx (1842), Mook (Würzburg, 1876); the article MEDICINE, and the histories of medicine; the Lives (in English) by Hartmann (1886), Miss Stoddart (1911; new ed. 1915), and Prof. Stillman (1920), Waite's edition of some of his writings (1894); and Browning's famous poem on Paracelsus.

Parachute. See BALLOONS AND AEROPLANES.

Paraclete. See SPIRIT (HOLY), MONTANISM, ABELARD.

Paradise (Gr. *paradeisos*, 'a park,' 'a pleasure-ground;' originally an oriental, apparently Persian, word; cf. the Heb. *pardes*, and modern Persian, *firdaus*).—See ATLANTIS, AVALON, EDEN, HEAVEN; and BIRD OF PARADISE for the bird so named.

Paradise-fish (*Macropodus viridi-auratus*), a Chinese species of Macropod often kept in aquaria for its beauty of form and colouring. In the male the colours increase in brilliancy at the pairing-season, and he swims around his wished-for mate, fluttering the long, delicate filaments of the ventral fins, or erecting those of the tail fin like a peacock's train in miniature.

Paradox (Gr. *para*, 'beside' or 'beyond,' and *doxa*, 'an opinion'), a term applied to whatever is contrary to the received belief; not necessarily an opinion contrary to truth. There have been bold and happy paradoxes whose fortune it has been to overthrow accredited errors, and in the course of time to become universally accepted as truths. For paradoxists who square the circle, and invent per-

petual motion, see QUADRATURE OF THE CIRCLE, PERPETUAL MOTION; and De Morgan's *Budget of Paradoxes* (1872; new ed. 1915).

Paradoxides Series, the second lowest of the four main subdivisions of the Cambrian System, including the Menevian and Solva Beds of Wales, characterised by the presence of trilobites belonging to the genus *Paradoxides*. See CAMBRIAN SYSTEM.

Paraffin (so called as being *parum affinis*—i.e. having little affinity for other bodies) was a name given by Baron Reichenbach (q.v.) to a white transparent crystalline substance first obtained by him in 1830 from wood-tar. The honour of this discovery must be shared with Christison of Edinburgh, who independently and almost simultaneously obtained the same body (which he named petroleine) in making a chemical examination of Rangoon petroleum. Dumas, a French chemist, obtained it also from coal-tar in 1835. But for twenty years after its discovery paraffin-wax remained a chemical curiosity only. It was not till 1850 that it began to be produced, by James Young (q.v.), in quantity sufficient to occupy the attention of manufacturers. Since then it has become of great importance commercially, and has for years been the principal material employed in the manufacture of candles in Great Britain and Germany, having for that purpose, to a large extent, superseded the use of beeswax, spermaceti, stearic acid, and tallow, besides being used in many other branches of the arts and manufactures, and in surgery.

The word paraffin, at first applied by Reichenbach to the solid body, is now used by chemists as a generic term for the series of saturated Hydrocarbons (q.v.), the higher members of which are paraffin-wax, lower members are liquid, and the lowest are gases; marsh-gas or firedamp being lowest of all. Paraffin-oil was Young's term for his mineral burning oils, and in Britain this name still applies to all the oils associated with the manufacture of paraffin, in which the olefine series of non-saturated hydrocarbons is largely represented along with liquid paraffins. On the Continent and in America paraffin is used only for the oils heavier than lamp-oil, or the oils pressed directly from the solid paraffin; petroleum for the natural oils, which are mostly mixtures of the same two series of hydrocarbons. In 1872 Watts used the name paraffin for all the saturated hydrocarbons of that series of which the first four—ethane, methane, propane, quartane—are at ordinary temperatures gaseous, those higher in the series oily liquids, and those higher still solids; all remarkable for their chemical indifference. Scotland is the main seat of the paraffin-oil industry; but Germany, France, Italy, and Australia also use coal and shale or schist for the production of hydrocarbon oils. Large deposits of shale are known to exist in America, but petroleum can be worked more cheaply.

In December 1847 James Young was informed that a dark oily liquid had been found in a coal-mine at Alfreton in Derbyshire. Young, recognising the commercial importance of the products that could be obtained from it, erected a refinery, and produced a light oil for burning, a heavy oil for lubricating, and paraffin-wax. This petroleum spring soon exhausted itself, but meanwhile Young, reflecting on the probable origin of the oil, succeeded in distilling an analogous oil from coal. This process he patented in 1850. Works were erected at Bathgate, in West Lothian, in which neighbourhood was found a highly bituminous cannel coal, known as Torbanehill Mineral or Boghead Coal (q.v.). This mineral, employed by Young, yielded under distillation about 120 gallons of crude oil per ton, but in 1862 the supply ceased.

Young's patent, which covered the distillation of oil from coal at a low red heat, expired in 1864. In 1859, however, Robert Bell erected oil-works at Broxburn (q.v.), and was the first in Scotland to distil oil from shale, although Du Buisson had obtained a patent in France before 1850 for a similar process. Bell also recognised the importance of the sulphate of ammonia (for sale as a fertiliser), which had hitherto been wasted. Since 1862 shale has been employed to a very large extent in Scotland for oil-making. Young allowed his patent to be used in the United States of America, where oil for several years was distilled from cannel-coal; but, public attention being thereby directed to the natural petroleum which have since been found in such abundance, the use of cannel-coal was discontinued.

The shale-oil industry in Scotland has been more than once threatened with extinction. It was only saved from collapse about 1872 by the energy and inventive resource of some of the persons engaged in it. The history of the industry naturally falls into various periods; during these periods can be observed the rise of by-products to a position of prime importance. The first period was a brief one (1848–50), when Young utilised the petroleum-spring at Alfreton for the production mainly of lubricating oil, used in mills as a substitute for sperm-oil. The second period extended over the duration of Young's patent (1850–64), when the burning oil had become of the greatest importance to the manufacturer. The third period (1864–72) witnessed the great development of the petroleum trade in America, during which the price of burning oil fell so low that about half of the works in Scotland were closed. The fourth period (1872–78) was a period of severe struggle for existence. The smaller and weaker works disappeared. The production became concentrated in fewer hands with greater outputs. Burning oil being now less remunerative, the utmost attention was paid to the recovery of all waste-products and to the development of the by-products; paraffin-wax and sulphate of ammonia then becoming of chief importance to the manufacturer. The inventive genius of those concerned in the industry, principally of Henderson, of William Young, and Beilby, applied itself to the introduction of new and economical processes whereby methods of retorting the shale were improved, manufacturing costs reduced, and the yield of the products that had now become of most value much increased. The fifth period (1878–87) was in consequence a time of much prosperity, ending, however, in a partial collapse by reason of over-production in Scotland combined with ever-increasing imports of wax from America. In 1894 further improvements in retorting were introduced by Bryson, Jones, and Fraser. The Scottish shale industry, however, is finding it more and more difficult to compete with the immense output of natural petroleum from other countries, and all but the strongest companies have by this time succumbed.

Geologically, the position of the shale in the east of Scotland is in the Lower Carboniferous series, but in the west of Scotland it is found in the Coal Measures. There are some seven or eight different seams of shale, all varying in position and quality from each other; but the same shale may be thick and rich in one place, and thin and poor in another. The Broxburn seam of shale at its best is probably the richest and most profitable quality to work; but the Pumpherston seams, though poor in oil, became of value because they are rich in ammonia. The shale is procured in the same manner as in coal-mining. In Germany considerable quantities of paraffin are made

by distilling certain varieties of brown coal or Lignite (q.v.).

The shale when taken from the pits is broken into small pieces and put into the retorts, where destructive distillation takes place. The shale yields from 18 to 33 gallons of crude oil per ton, and from 25 to 70 lb. of sulphate of ammonia.

Crude oil is composed of a very wide range of hydrocarbons, each varying in specific gravity and boiling-point and in the percentage of carbon present; but in the practical operations of the refiner the fractionation of the oil is confined within certain definite limits which have been found of most convenience commercially—viz. *Naphtha*, specific gravity, 680 to 750 (water = 1000); volatile at ordinary temperatures; the lighter portions are used for carburetting air-gas and for petrol or motor spirit; the heavier portions are principally used as solvents. *Burning oils*—(a) for domestic use; specific gravity, 800 to 805; flash-point, Abel test, over 100° F. (b) Lighthouse oil, specific gravity, 810 to 815; flash-point, Abel test, about 150° F. (c) High Test oils, specific gravity, 830 to 840; flash-point, Abel test, about 240° F.; used in special lamps for lighting railway-carriages and in ships, and for internal combustion engines. *Intermediate oils*, of specific gravity 840 to 870, are used as fuel in the navy, for gas-making, and for gas-enriching. *Lubricating oils* of standard specific gravities—865, 875, 885, 890–5—are used principally for mixing with animal and vegetable oils in lubricants. *Paraffin-waxes*, with melting-points varying from 80° to 130° F. The soft wax from 80° to 100° is employed in the preparation of ordinary and safety matches, and for burning in miners' lamps; while the harder qualities are manufactured into candles.

The operations of the oil-refinery are: (1) distillation, (2) treatment with chemicals, (3) cooling and pressing the heavy oil containing paraffin so as to separate the solid hydrocarbons from the liquid. The oils are distilled several times, and are fractionated into the various qualities required; and after each distillation the oil is treated with oil of vitriol and with caustic soda. The soda compounds retained in solution by the oil have to be carefully removed by washing with water. In lubricating oils the essential features are high viscosity, high flash-point, and low setting-point. The first two depend on proper fractionation; and the third is secured by careful refrigeration. The crude paraffin scale or wax is refined either by chemicals, by sweating, or by treatment with naphtha. The sweating process, which is simple and effective, is the one most commonly adopted, although the best qualities of refined paraffin require a treatment or two with shale naphtha. The distillations are carried out in a series of connected boiler-stills, which work continuously, and are connected with residue-stills working intermittently. See Scheithauer, *Shale Oils and Tars* (rev. ed. 1923); also articles CANDLE, HYDROCARBONS, NAPHTHA, PETROLEUM, WAX.

Paraguay, a river of South America, an affluent of the Paraná (q.v.), rises in the high plateau of the Brazilian state of Matto Grosso, in several deep lakes, believed also to send some of their waters to one of the headstreams of the Amazon. It flows SW. and S., forming from 20° to 22° S. the boundary line between Brazil and Bolivia, thence SSW. through Paraguay, forming the boundary with Argentina, to its junction with the Paraná, a few miles above Corrientes. Affluents are the Cuyabá, Tacuary, Apá, Jejui, and Tebicuary on the left, and the Jauru, Pilcomayo, and Vermejo on the right. Except in the extensive marshy areas on the upper course, the country on both banks of

the Paraguay is rich and fertile, and abounds in excellent timber. The river, which is 1500 miles long, is navigable for steamers to the mouth of the Cuyabá. Steamers drawing nine feet can at all seasons reach Corumba; and the river is almost the only commercial outlet for Matto Grosso and Paraguay. The Paraguay was discovered by Sebastian Cabot, who in 1526 ascended as far as the confluence of the Pilcomayo. See Hills and Dunbar, *The Golden River* (1922).

Paraguay, an inland republic of South America, divided into two distinct portions by the river so named. The area of Paraguay is estimated at 160,000 sq. m.—a territory nearly three times as large as England. The population of Paraguay is composed of whites of Spanish descent, Indians (see GUARANÍ), a few negroes, and a mixture of these several races, and is estimated at 700,000, exclusive of the Indians in the Gran Chaco (q.v.). A mountain-chain called Sierra Amambay, running in the general direction of from north to south, and bifurcating to the east and west towards the southern extremity, under the name of Sierra Mbaracayú, divides the tributaries of the Paraná from those of the Paraguay, none of which are very considerable, although they are liable to frequent and destructive overflows. The northern portion of Paraguay is in general undulating, covered by low, gently-swelling ridges, separated by large grass plains, dotted with palms. There are mountains in the north-east and north-west corners. The southern portion is one of the most fertile districts of South America, consisting of hills and gentle slopes richly wooded, of wide savannahs, which afford excellent pasture-ground, and of rich alluvial plains. Some of these, indeed, are marshy, or covered with shallow pools of water, but a large proportion are of extraordinary fertility and highly cultivated. Two lakes only, Ypoá and Ipacará, are worthy of note. The climate, for the latitude, is temperate, the temperature occasionally rising to 100° in summer, but in winter being usually about 45°. In geological structure the southern part belongs generally to the Tertiary formation; but the north and east present greywacke rocks in some districts. Much valuable timber is found in the forests, and the wooded districts situated upon the rivers possess a ready means of transport. Among the trees are the tannin-bearing *Quebracho* (q.v.), rubber, and the *Maté* (q.v.), which forms one of the chief articles of commerce, being in general use throughout great part of South America. The shrub or tree grows wild in the north-eastern districts, and the gathering of its leaves gives employment in the season to a large number of the native population. Orange trees were introduced by the Jesuits and now abound. Many trees also yield valuable gums. Wax and honey are collected in abundance, as is also cochineal, and the medicinal plants are very numerous. The chief cultivated crops are maté, sugar-cane, tobacco, fruits, cotton, maize, rice, and mandioca.

Game, both large and small, is very abundant. Tapirs, jaguars, pumas, ant-eaters, wild-boars, peccaries, and deer of many descriptions are inhabitants of the forests and plains; birds are innumerable, and for beauty and variety of plumage are perhaps unsurpassed by any in the world; the rivers teem with fish, and their banks are the resort of alligators and coypús. Snakes are numerous, but very few of them are venomous. Some of the boas are exceedingly large, and there is a remarkable water-serpent which is said to attain a length sometimes of eight yards.

The stock-raising industry is rapidly increasing in importance, and with it go the tanning and tinned meat industries. There is considerable mineral

wealth, especially iron, manganese, and copper, while petroleum has also been discovered. These resources await exploitation under proper organisation, a remark that might be extended to agriculture. The chief exports are hides, yerbamaté, oranges, tobacco, timber, tinned and preserved meats, cattle, petit-grain oil, and quebracho extract; the imports, cotton goods, hardware, wine, grain, linen, silk, petroleum, &c. Trade in the towns is almost wholly in the hands of Italians, French, and Germans. The principal native industries are tanning and the manufacture of pottery and bricks, laces, ponchos, soap, food-pastes, brandy, &c.

The regular army consists of about two thousand men. The established religion is the Roman Catholic, the ecclesiastical head of which is the Bishop of Asunción. Marriage, to be legal, must be by civil ceremony. Education is free and said to be compulsory; but of the adult Paraguayans only two in five can read and write. At the same time, schools are numerous, and there is a university at Asunción. Communication by river is good, by road bad, by rail improving (511 m. in 1923). Asunción, the capital (pop. 100,000), has railway connection with Buenos Aires. Other towns are Villarrica, Concepción, Carapeguá, Laque, Encarnación.

The history of Paraguay is highly interesting. It was discovered by Juan Díaz de Solís in 1515, and further explored by Diego García in 1525, and by Sebastian Cabot in 1526; but the first colony was settled in 1535 by Pedro de Mendoza, who founded the city of Asunción, and established Paraguay as a province of the viceroyalty of Peru. The warlike native tribe of the Guaranis, however, a people who possessed a certain degree of civilisation, and professed a dualistic religion, long successfully resisted the Spanish arms, and refused to receive either the religion or the social usages of the invaders. In the latter half of the 16th century the Jesuit missionaries were sent to the aid of the first preachers of Christianity in Paraguay; but for a long time they were almost entirely unsuccessful, the effect of their preaching being in a great degree marred by the profligate and cruel conduct of the Spanish adventurers, who formed the staple of the early colonial population. In the 17th century the home government consented to place in the Jesuits' hands the entire administration, civil as well as religious, of the province, which, from its not possessing any of the precious metals, was of little value as a source of revenue; and, in order to guard the natives against the evil influences of the bad example of European Christians, it gave to the Jesuits the right to exclude all other Europeans from the colony. From this time forward the progress of civilisation as well as of Christianity was rapid. On the other hand, by their 'sterile extravagant theocratic despotism' the Jesuits are held to have made the people a '*servum pecus* knowing no rule but that of their superiors.' On the expulsion of the Jesuits from Paraguay in 1768, the history of which is involved in much controversy, the province was again made subject to the Spanish viceroys. For a time the fruits of the older civilisation maintained themselves; but as the ancient organisation fell to the ground great part of the work of so many years was undone, and by degrees much of the old barbarism returned. In 1776 Paraguay was transferred to the newly-formed viceroyalty of Río de La Plata. It was the first state to establish its independence (1811). In 1814 Dr Francia (q.v.), originally a lawyer, and the secretary of the first revolutionary junta, was proclaimed dictator for three years; and in 1817 his term of the office was made perpetual. He continued

to hold it till his death in 1840, when anarchy ensued for two years; but in 1842 a national congress elected Don Mariano R. Alonzo and Don Carlos Antonio López, a nephew of the dictator, joint consuls of the republic. In 1844 a new constitution was proclaimed, and Don Carlos was elected sole president, with dictatorial power, which he exercised till his death in 1862, when he was succeeded by his son, Don Francisco Solano López, whose name has become notorious in connection with the tragic struggle of 1865-70, in which the Paraguayans made a heroic but unavailing fight against the combined forces of Brazil, the Argentine Confederation, and Uruguay. The war was brought to a close by the defeat and death of López at the battle of Cerro Corá, 1st March 1870. The results of the war may be read in the population returns—(1857) 1,337,439, (1873) 221,079, including only 28,746 men and 106,254 women over fifteen years of age. Paraguay has had its share of general emigration to South America. The constitution of 1870 was modelled on that of Argentina; but revolutions still take place with disturbing frequency. A settlement of 500 Australian Socialist workmen in 1893 at New Australia and a secession from it at Cosme, 100 miles away, struggled with difficulties for some years and then collapsed, save in so far as they returned to ordinary capitalist lines. A later co-operative association of lumbermen from California and Canada perished in less than a year.

See Histories of Paraguay by Demersay (Paris, 1865) and Washburn (Boston, 1870); Daire, *Letters from Paraguay* (1805); Robertson, *Francia's Reign of Terror* (1840); Du Graty, *La République du Paraguay* (Brussels, 1861); Burton, *Battlefields of Paraguay* (1869); Martínez, *El Paraguay* (Asunción, 1885); Knight, *Cruise of the Falcon* (1887); Criado, *Paraguay* (1889); La Dardye, *Le Paraguay* (1889); W. B. Grubb, *An Unknown People* (1911); Range, *Fibras de la Flora Paraguaya* (Asun. 1922); for the Jesuit mission, R. B. Cunningham Graham, *A Vanished Arcadia* (1901), and W. H. Koebel, *In Jesuit Land* (1912) and *Paraguay* (1917); and for New Australia, S. Grahame, *Where Socialism Failed* (1912).

Paraguay Tea. See MATÉ.

Parahyba, capital of the Brazilian state of Parahyba, on the river of the same name, 10 miles from the sea. Its chief buildings are the cathedral and the government palace (formerly the Jesuit college). A large sugar-mill was erected in 1889. At the mouth of the river is a bar; but a railway (12 miles) was built in 1889 to the port of Cabedello, there terminating in a pier in deep water. The exports are sugar, cotton, and cotton-seed. Pop. 53,000.—The state, the easternmost in the republic, has an area of 28,846 sq. m. and a population of 960,000. The staple products are cotton, sugar, skins, hides, and cotton-seed.—There is a more important Parahyba River farther south, which enters the Atlantic, in the state of Rio de Janeiro, after a course of nearly 500 miles. It is navigable for 50 miles from its mouth.

Parallax is the apparent displacement of an object caused by a change of place in the observer. When an object at M is looked at from P it



Fig. 1.

appears in line with some object, S; but after the observer has moved to E, M has apparently moved to a position in line with S'; the amount of apparent motion is called *parallax*. The angle PME

is called the 'angle of parallax,' or the 'parallactic angle,' and is the measure of the amount of parallax. To astronomers the determination of the parallax of the heavenly bodies is of the utmost importance, for two reasons—first, from the necessity of referring all observations to the earth's centre—i.e. so modifying them as to make it appear as if they had been actually made at the earth's centre; and secondly, because parallax is our only means of determining the magnitude and distance of the heavenly bodies. The *geocentric* or *daily* parallax—as the apparent displacement of a heavenly body, due to its being observed from a point on the surface of the earth instead of from its centre, is called—is determined as follows: Let

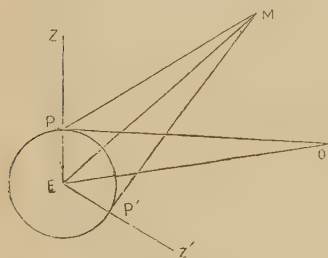


Fig. 2.

Let the *zenith distances*, ZPM and $Z'P'M$, be observed simultaneously, and, since the latitudes of P and P' , and consequently their difference of latitude, or the angle PEP' , are known, from these three the angle PMP' (the sum of the parallaxes at P and P') is at once found; and then, by a trigonometrical process, the separate angles or parallaxes PME and $P'ME$. When the parallax of M , as observed from P , is known, its distance from E , the centre of the earth, can be at once found. When the heavenly body is on the horizon, as at O , its parallax is at a maximum, and is known as the *horizontal parallax*. The geocentric parallax is of use only in determining the distances of those heavenly bodies at which the earth's radius subtends a considerable angle.

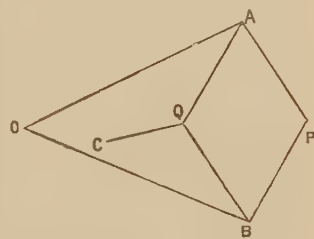
In the case of the fixed stars, at which the earth's radius subtends an infinitesimal angle, it becomes necessary to make use of a much larger base-line than the earth's radius, and, as the largest we can employ is the radius of the earth's orbit, it accordingly is made use of, and the displacement of a star, when observed from a point in the earth's orbit instead of from its centre, the sun, is called the *annual* or *heliocentric* parallax. Here the base-line, instead of being, as in the former case, 4000 miles, is about 92,000,000 miles, and the two observations necessary to determine the parallactic angle are made from two points on opposite sides of the earth's orbit, at an interval as nearly as possible of half a year. Yet, notwithstanding the enormous length of the base-line, it bears so small a proportion to the distances of the stars that the parallax is very small and never exceeds $1.0''$. The geocentric horizontal parallax of the moon is about $57' 4.2''$; that of the sun, about $8.8''$. The annual parallax of a Centauri, the nearest of the stars, is $0.76''$. See the articles STARS and SUN.

Parallelepiped (Gr. *parallēlepipedon*), a solid figure having six faces, the faces being invariably parallelograms, and any two opposite faces equal, similar, and parallel. If the faces are all squares, and consequently equal, the parallelepiped becomes a cube.

Parallel Forces are forces which act in parallel lines, such for example as the weights of

the portions that make up any framework or structure on the earth's surface. With the exception of a particular case (see COUPLE), parallel forces have always a single resultant, which is readily found by the method of moments. See MOMENT; also FORCE.

Parallel Motion, a name given to any linkage by which circular motion may be changed into straight line motion. The most familiar instance is Watt's parallel motion (see STEAM-ENGINE), which is essentially a three-bar linkage, and, although not theoretically perfect, is sufficiently good for all practical purposes. It is impossible, indeed, to obtain a straight line motion without the use of at least five bars in the linkage; and till 1874, when Hart discovered the method, even this simplest mode of obtaining a true parallel motion was not deemed possible. The Peaucellier cell, a linkage of seven bars, was, however, the earliest linkage discovered for solving the problem of how to draw a straight line. It dates from 1864, and is, perhaps, the most convenient form that has yet been devised. It is shown in the figure. The equal links AP , AQ , BP , BQ , form a rhombus; the long links OA , OB , are also equal, and have the common point O fixed. The seventh link, QC , has its end C fixed, so that Q describes a circle passing through O —i.e. QC equals the fixed distance CO . In these circumstances, when Q moves in its circle P moves in a straight line. See A. B. Kempe's *How to draw a Straight Line* ('Nature' series, 1877).



Parallelogram of Velocities. See COMPOSITION.

Parallels, in military language, are trenches cut in the ground before a fortress, roughly parallel to its defences, for the purpose of giving cover to the besiegers from the guns of the place. See SIEGE.

Paralysis. The term paralysis, while ordinarily used to express loss of power of movement, is used medically in the wider sense of loss of function, so that there may be paralysis of motion, of sensation, of secretion, &c. The term *Paresis* is used to indicate a diminished activity of function. Thus, paresis of a limb means diminished power of moving the limb.

From what is said under the articles BRAIN, NERVOUS SYSTEM, and SPINAL CORD it will be seen that paralysis may arise (1) from destruction of the nerve-cells in the motor area of the surface of the brain; (2) from interruption of the nerve-fibres in their path through the brain to the spinal cord; (3) from interruption of the nerve-fibres in their path through the spinal cord; (4) from disease of the nerve-cells in the spinal cord; (5) from disease or injury to the nerves passing from the spinal cord to the muscles; or (6) from affections of the muscles themselves. Thus we speak of *Cerebral*, *Spinal*, and *Peripheral Paralysis*. As this pathway from the cerebral cortex to the muscle fibre consists of two principal nerve-fibres, it is customary to divide motor paralysis into an upper and a lower neurone type. The upper neurone type is associated with spasticity, increased reflexes in the paralysed limbs, no muscular atrophy except from disuse, and normal electrical reactions. The lower neurone type is characterised by flaccidity, diminished or absent

reflexes, muscular atrophy, and reaction of degeneration.

Cerebral Paralysis.—The most common causes of paralysis are hæmorrhage, thrombosis, and embolism. Two conditions are necessary for the production of cerebral hæmorrhage, (a) a structural weakening of the blood-vessel, and (b) a blood-pressure sufficiently high to rupture the weakened vessel. Continued high blood-pressure leads to arterial vascular degeneration. Rupture of a normal artery is well-nigh impossible. The vessels which give way are those which are least well supported, and thus although hæmorrhage may occur in any part of the brain, it is most common in the region of the internal capsule. Thrombosis, or the clotting of blood in the vessels, is generally the result of disease in the vessel walls or syphilis, but may also occur in cases with enfeebled circulation. In embolism the obstruction of the blood-stream is produced by a clot or foreign body carried from a distant part, usually detached from the valves of the heart. The most usual form of paralysis resulting from the above lesions is paralysis of the opposite side of the body, or 'hemiplegia.' If the paralysis is on the right side it is usually accompanied by loss of speech, or 'Aphasia' (q.v.). Loss of sensation on the same side as the paralysis occurs if the optic thalamus is involved. The face is usually found to recover before the leg, the leg before the arm, and the coarser movements of the hand before the finer. (See APOPLEXY.)

Spinal Paralysis is usually the result either (1) of pressure upon the spinal cord from the results of curvature or injury of the spine, or of growths such as tumours or abscesses; (2) of disease of the spinal cord itself, especially from tumours or acute or chronic inflammations, which may lead to interruption of the nerve-fibres which pass downwards from the brain to the nerve-cells in the gray matter of the spinal cord; or (3) of direct injury to the spinal cord. If the conducting paths from and to the brain are interrupted in any way there is complete paralysis of voluntary motion and of sensation below the level of the affected part of the spinal cord, because the motor impulses cannot pass down nor the sensory impulses upwards. At the same time, below the injury reflex movements may be preserved and certain forms even increased. Such spinal paralysis is termed paraplegia. If the injury to the spinal cord is unilateral, there will be paralysis of the muscles of the same side below the injury and some dissociated anæsthesia of the opposite side below the injury, a condition known as 'Brown-Séquard paralysis.' (See SPINAL CORD.)

In certain cases the nerve-cells in the anterior horns of the gray matter of the cord (and the same may be said of the corresponding cells of origin of the motor nerves of the brain) may be diseased without implication of any other part of the spinal cord. The result of this is paralysis of the muscles supplied by those nerve-cells, and consequent gradual wasting of the muscles. Under this head comes 'infantile paralysis,' now known to be caused by an infective virus which has a specially intense action on the central nervous system. A large number of muscles are usually first paralysed, but in a week or two most of the paralysis clears up, leaving only a few muscles paralysed, and these undergo rapid wasting. A similar disease occurs in adults known as 'progressive muscular atrophy' or 'chronic anterior poliomyelitis.' This has a gradual onset, usually shows itself first in the small intrinsic muscles of the hand, and runs a very slow course. If the pyramidal tracts be also involved the disease is termed 'amyotrophic lateral sclerosis.' If the bulbar nuclei are affected the condition is termed 'bulbar paralysis,' and is

associated with weakness of the muscles of articulation and swallowing. In consequence it is more rapidly fatal.

Peripheral Paralysis.—(a) *From Affections of Nerves.*—These are of extremely frequent occurrence, and may be due to pressure upon, injury to, or disease of the nerves. The most common of these diseases are the inflammations arising from cold, from the excessive use of alcohol, or from exposure to the poison of lead. If the nerve affected be a purely motor nerve the resulting paralysis is purely motor. The typical example is the so-called 'Bell's' or 'facial paralysis,' from affection of the seventh cranial nerve. This arises most commonly either from exposure to draught or from disease of the ear, in the neighbourhood of which the nerve passes through the bones of the skull (see EAR). There results a complete paralysis of the muscles of expression on the corresponding side of the face; the mouth is twisted to the opposite side, the lips cannot be pursed or retracted, the eye cannot be shut, and the forehead can be neither raised nor depressed, while the usual furrows on the forehead and cheek are either obliterated or diminished. The disease is in many cases amenable to treatment, but when associated with disease of the ear it should always be regarded as of grave import. If proper treatment be neglected, the paralysed muscles may waste, and recovery become impossible. 'Lead palsy' is usually indicated by a loss of the power of extending the wrists (wrist-drop) without impairment of sensation (see LEAD-POISONING). An example of paralysis resulting from pressure on a nerve is seen in the not uncommon result of sleeping with the arms over the back of a chair (sleeping or crutch palsy). As the musculo-spinal nerve is compressed, and the muscles which it supplies—namely, those which extend the wrist and fingers, and which turn the forearm outwards (supination)—are paralysed, there is a wrist-drop like that of lead palsy, but in addition there is loss of sensibility (anæsthesia) on the skin of the back of the thumb and first two fingers.

(b) *From Disease of Muscles.*—The group of diseases in which the muscle-fibres themselves are primarily affected, with healthy motor nerves and nerve-cells, is termed the 'muscular dystrophies' or 'myopathies.' Two varieties are known, one in which the affected muscles waste from the onset, the other in which they undergo a false enlargement before they ultimately become smaller, due to replacement by fat—so-called 'pseudo-hypertrophic paralysis.' The disease is congenital, although the onset may be delayed. The pseudo-hypertrophic variety tends to run in families, and usually selects patients of the same sex in each family.

Hysterical Paralysis.—Paralysis, following emotional shock, in which no organic injury is to be discovered, is termed 'hysterical' or 'functional.' The nerves and muscles affected are normal, the cause lying in the brain, and is of a psychic nature, the repressed emotional experience finding an escape by conversion into a physical symptom. It may be either flaccid or spastic in type, and was very common during the Great War. It can usually be cured by persuasion or analysis.

Paramaribo, the capital of Dutch Guiana, is situated on the Surinam, about 13 miles from its mouth. It has broad, tree-shaded streets, with clean wooden houses, painted light gray, and numerous canals and churches. There are also a governor's palace, two forts, a park, &c. The Herrnhuters (Moravian Brethren) are a strong body in the town. Except for the small harbour of Nickerie, all the trade of the colony is concentrated at Paramaribo. Sugar, cocoa, and gold are largely exported. Pop. 42,000.

Paramatta. See **PARRAMATTA**.

Paramecium, or **SLIPPER ANIMALCULE**, an Infusorian very common in pond water or in vegetable infusions. In shape it is an asymmetrical oval, in length about $\frac{1}{16}$ of an inch. If dry grass be steeped in a glass of water for some days, the animalcules dormant about the stems revive and multiply very rapidly. Each paramecium is covered with rows of cilia which lash it through the water and drive food-particles into an aperture which serves as mouth. As the food-particles enter they take bubbles of water with them, and are moved round and round in the living substance until they are digested or got rid of. There are two (excretory) contractile vacuoles; the large nucleus has a small one (micronucleus) lying beside it; within the firm rind there are remarkable eversible threads used in attachment. A paramecium often divides transversely into two; these two repeat the process, and rapid multiplication may thus proceed for a while. It has its limits, however, and then two individual Infusorians conjugate, exchange some micronuclear elements, and separate. This process seems to promote vigour and variability.

Paraná. (1) An important river of South America, rises as the Rio Grande in the Brazilian state of Minas Geraes, about 100 miles NW. of Rio de Janeiro. It flows north-west and west through and along the southern frontier of Minas Geraes, till it unites with the Paranahyba. It then receives the name Paraná, and turns to the south-west and afterwards to the south, separating Paraná state from Matto Grosso and from Paraguay, round the southern border of which republic it sweeps westward to its confluence with the Paraguay River. It then rolls southward through the Argentine provinces, past Santa Fé, below which its channel frequently divides and encloses numerous islands, and finally south-eastward, till it unites with the Uruguay, above Buenos Aires, to form the Río de la Plata. The entire length of the river is a little over 2000 miles; it drains an area of more than 1,100,000 sq. m. Its chief tributaries, besides those already mentioned, are the Mogy Guassu, Tieté, Paranapanema, Ivahy, Iguassu, and Salado; at San Pedro (33° 40' S. lat.) a delta begins. The principal towns on its banks are Corrientes, Paraná, Santa Fé, and Rosario—all Argentine. The river is navigable at all times to the influx of the Paraguay (705 miles), and except at low water to the mouth of the Iguassu (460 miles). Immediately above this point occurs one of the most remarkable rapids in the world. It extends for 100 miles in a straight line up the river, between ranges of frowning cliffs which confine the stream to a narrow, rocky bed, little more than 100 yards wide. Through this gorge the water pours in tumultuous fury; for above the rapid the river, then $2\frac{1}{2}$ miles broad, rushes down over the Salto de Guayra, an inclined plane 55 feet high, and then forces its waters, tossing and churning, into the narrow channel below. —(2) A southern state of Brazil, on the coast, with an area of 93,269 sq. m., and a population of 686,000, including several colonies of Germans and Italians. The capital is Curitiba (pop. 79,000), 69 miles by rail from Paranaguá, the port of the state (pop. 5000). —(3) Capital of the Argentine province of Entre Ríos, stands on a high bluff overlooking the Paraná, opposite Santa Fé, 364 miles by rail from Buenos Aires. The town was the capital of the Confederation from 1853 to 1861; afterwards it sank rapidly, but has now again a pop. of 36,000.

Paranoia. See **INSANITY**.

Parapet (Ital. *para-petto*, from *parare*, 'to protect,' and *petto*, 'the breast'), a wall raised

higher than the gutter of a roof for protection; in military works, for defence against missiles from without (see **FORTIFICATION**); in domestic buildings, churches, &c., to prevent accident by falling from the roof. In classic archi-



Ornamental Gothic Parapet.

ture balustrades were used as parapets. In early work parapets are generally plain, but later they are pierced and ornamented with tracery.

Paraphrase (Gr. *para*, 'beside,' and *phrazein*, 'to speak') is the name given to a verbal expansion of the meaning either of a whole book, or of a separate passage in it. A paraphrase consequently differs from Metaphrase, or strictly literal translation, in this, that it aims to make the sense of the text clearer by a lucid circumlocution, without actually passing into commentary. The verified passages of Scripture forming part of the Psalms of the Scottish Church are known as 'the Paraphrases.' See **HYMN**.

Paraplegia. See **PARALYSIS**.

Parasite (Gr. from *para*, 'beside,' *sitos*, 'food'; 'one who eats with another; hence one who eats at the expense of another), a common character in the Greek comedies; a low fellow, who is ready to submit to any indignity that he may be permitted to partake of a banquet, and who lives as much as possible at the expense of others.

Parasitic Animals, those that depend on other living creatures for food and for shelter, but are of no compensating benefit to their hosts. Tapeworms in the food-canal, lice on the skin, eelworms in wheat-plants, green fly on rose-bushes, may all be reckoned as parasitic animals, yet it is evident that these four instances are very different from one another. The fact is that parasitism is a mode of life that occurs in many different degrees. An animal may be parasitic on a plant, as the mite of 'Big Bud' on currant bushes; or it may be parasitic on another animal, as the liver-fluke is parasitic first in the water-snail (*Limnæa*) and then in the sheep. Or a parasite may be parasitic on another parasite, as when the young stages of various gall-flies (*Cynipidæ*) live inside Green-flies (hyper-parasitism).

Diverse Degrees of Parasitism.—The parasites may be external (ectoparasitic) or internal (endoparasitic); they may be temporarily parasitic like the gall-flies that emerge from galls, and the horse-hair worms that come out of insects, or they may be quite incapable of living except as parasites, as in the case of tapeworms. Sometimes almost the whole life is spent on or in one host, as in the small fluke, *Polystomum integerrimum*, found in frogs, where only the larvæ are free-swimming for a short period. But in many cases two hosts are required, as in the case of the liver-fluke of the sheep, which spends its young stages in the water-snail. In this case there is a short free-swimming larval stage after the eggs dropped from the sheep are hatched, and a free stage when the final larvæ leave the water-snail; yet there are many life-histories in which the parasite is never really free, but passes from host to host because one devours the other. Thus the *Trichina* passes from rat to pig, and from pig to man.

Another diversity is seen when only one sex is parasitic, in most cases the female. Thus in some of the scale-insects and Copepod crustaceans the females are stationary parasites, whereas the males move about freely. Very extraordinary is the

state of affairs in the green worm *Bonellia*, where the male is microscopic and lives, after a free larval life, in the reproductive duct of the female, which is about the size of a plum. In this case the pigmy male is in a state of arrested development except as regards the reproductive organs. It appears that the male larva is in some measure poisoned by sojourning for a time as an absorbing parasite on the proboscis of a female. Not less strange are the pigmy males of three kinds of deep-water Angler-fish (Ceratioids), which live attached by their mouth to the body of the female. It is obvious, then, that the term parasitism covers a notable diversity of forms and degrees.

But it is necessary to go further. No one would apply the term parasite to active insects like mosquitoes, which suck blood when they get a chance, but how difficult it is to draw the line between these and habitual blood-sucking flies, and between the latter and fleas. It seems that typical parasitism implies not only habitual dependence, but some associated adaptation of structure and some degree of degeneration. Thus fleas, though wingless and adapted for blood-sucking, do not show the degradation of parasitism to the same degree as lice. Or, again, a tapeworm fixed to the wall of the intestine by its head, and absorbing food by its whole surface, is a more characteristic parasite than a threadworm living freely in the food-canal and sometimes moving about within the body. The fact is that the idea of parasitism must be elastic: it implies a relation of dependence in very varied degrees. Some confusion may be avoided if the word is qualified as often as possible. Thus there may be distinguished ectoparasites and endoparasites, temporary parasites and permanent parasites, monogenic (with one host) and digenic (with two hosts). There are obligatory parasites which cannot live a free life, and facultative parasites which are sometimes free, but take to parasitism when an opportunity offers. It is also useful to distinguish parasites according to the part of their host which they infest. Thus intestinal parasites are usually very different from cutaneous parasites, and blood-parasites are often very different from pulmonary parasites.

It makes for clearness to distinguish parasites which feed on the food-material and debris of their host, such as threadworms and Infusorians in the large intestine of many Vertebrates, from those like tapeworms which absorb the digested food around them. On a different grade, however, are parasitic worms, such as the hook-worm (*Anchylostomum*), which draw blood from the wall of the intestine, with results necessarily more serious than those which follow an appropriation of part of the nutriment. Most serious of all are those parasites whose entire *modus vivendi* consists in destroying cells and tissues. Thus the micro-organisms of malaria and sleeping sickness destroy red blood corpuscles; the *Amœbæ* of dysentery destroy the cells lining the intestine, and, it may be, the tissue of the liver. The grubs that hatch out from the eggs which Ichneumon-flies have laid in caterpillars proceed to eat up the tissues of their host.

The question rises whether there is not need for an entirely separate category for those animals that are parasites in the wide sense, and yet show little or no trace of degeneracy. Thus the Trypanosomes of sleeping sickness and allied diseases are exceedingly active Infusorians. During part of their life in the blood of their final host they move about very rapidly and show great aggressiveness in reference to the blood corpuscles. Some term like 'endophagous' seems to be needed to express the fact that these Trypanosomes are microscopic beasts of prey devouring from within,

just as others of larger size might devour from without. Similarly, the larvæ of Ichneumon-flies are not always in any marked degree degenerate; they actively eat the caterpillar; they are sometimes almost as much predatory as parasitic. In any case, it must be allowed that parasitism occurs in many different modes and degrees.

Kinds of Animal Parasites.—There are some kinds of animals that could not readily become parasitic, such as lung-breathing animals and those that require fresh currents of water. Thus there is an exclusion of amphibians, reptiles, birds, and mammals, pulmonate snails, spiders with their lung-books, and so on. Yet there are some surprises. No one would expect such an animal as a fish to be capable of parasitic life, but three cases are known of Ceratioid Angler-fishes with the males intimately parasitic on the females. The Cyclostome Myxine, or hag-fish, is temporarily parasitic inside a fish—e.g. cod caught on the deep-sea lines of the fisherman. No one would expect such an intensely active air-breathing animal as an insect to be capable of parasitic life, yet the name of parasitic insects is legion. Most of them are of small size, sometimes with relatives that live in crevices. It seems impossible to think of a highly specialised, energetic, air-breathing animal like a scorpion becoming a parasite, and yet some of its not very distant relatives, among the book-scorpions, show ectoparasitism. On the other hand, there are entire classes of animals given over to parasitism, like the Sporozoa, the flukes or Trematodes, and the tapeworms or Cestodes. Of the Nematodes or threadworms, some are free-living and some live in rotten substances, but most are parasitic.

The Hosts of Parasites.—Most animals, except some of the simplest, are subject to parasites; but it is a very important fact that in most cases the infestation is not very prejudicial. In a multitude of cases a give-and-take *modus vivendi* has been established between the accustomed host and the parasite, so that little harm is done. Antelopes and some other wild animals in tropical Africa are abundantly infected with Trypanosome microbes (Infusorians in this case), which are regarded by many as identical with those that cause sleeping-sickness in man, and allied diseases in horses and cattle. In the antelope they are, so to speak, at home, and do little appreciable harm, perhaps because these 'natural reservoirs' produce counter-active anti-bodies in the blood; but, when the Tse-tse flies transfer these Trypanosomes from a wild host to man or cattle, there is very serious disease. In most cases where parasites are deadly it is because they have been transferred to an unwonted host that has no counteractives to check the over-multiplication of the intruder. To take another instance, the red grouse usually contains in its food-canal a great multitude of delicate transparent threadworms, but as long as the birds are vigorous there seems to be little injurious effect. Should the grouse become weakly, through lack of food or very bad weather or some other cause, then the parasites may begin to multiply greatly, and bring about a kind of disease. It looks as if vigorous health served as a check to parasites, keeping them within bounds. It is very unusual to find an earth-worm that does not contain numerous Sporozoa (*Monocystis*) in its reproductive organs, but it is difficult to say that they do much harm, unless some change in the host's condition induces their unusually prolific multiplication. Even ectoparasitic insects sometimes become extraordinarily numerous when the host is for some reason or other weakened and non-resistant.

Another important fact in regard to the hosts that tenant parasitic animals is that each host has

often its own particular parasites which do not occur elsewhere. In many cases there is a remarkable specificity even in regard to ectoparasites, such as fleas and lice. There are instances, no doubt, of the reverse, as with the liver-fluke, which occurs in cattle, horses, deer, camel, antelopes, goat, pig, beaver, squirrel, kangaroo, and even, very rarely, man. But this is altogether unusual; specificity is the rule. The discovery of a new bird or mammal is usually followed by the discovery of new parasitic worms in the food-canal. Some of these particular parasites of particular hosts are well-defined species; but there are others much less distinctive, and the question rises whether the peculiarities may not be modifications imprinted by slight peculiarities in the host. More experiments should be in the way of transplanting parasites from one host to another to see whether the change of environment modifies the structural characters.

While parasites are widespread, some hosts are more susceptible than others, partly because they are more accessible—e.g. more sluggish, and partly because they eat a greater variety of food. Thus the slow-going sun-fish is often copiously infested, and the omnivorous pig is the home of a multitude of parasites, and even man has far over half-a-hundred. It is a small point, yet often obscured, that a parasite that finds its habitat in the food-canal of the pig or the like is merely discovering safe and comfortable quarters with an abundant food-supply. The unwary are apt to read into the parasite an awareness of where it is and what it is doing!

Origin of the Parasitic Habit.—It is probable that most cases of parasitism began gradually. Animals found temporary shelter on or in others, and the habit grew upon them. In some cases it might begin fortuitously—e.g. as the embryos or adults wandered or were swallowed; or it might be that the change of habit saved those which adopted it from extreme keenness in the struggle for existence; or it might simply express a sluggish constitution. In many cases, however, we can hardly doubt that the habit began with the naturally more sluggish females, prompted not by hunger, but by the impulse to seek some conveniently sheltered place for the birth of the young. In fact, there are not a few parasitic female Crustaceans whose mates live freely. Of the evolution of parasites from free-living ancestors the free stages still included in the life-history of most, the close relationships between some free and some parasitic members of the same class—e.g. Crustaceans and Nematodes—and the frequent occurrence of temporary parasitism afford sufficient evidence. It is also instructive to consider the three classes of Plathelminthes—Turbellarians (Planarians, &c.), Trematodes (Flukes, &c.), and Cestodes (Tapeworms, &c.)—of whose genetic relationship there seems little doubt; the Turbellarians are almost all free-living; the Trematodes are mostly external, but sometimes internal parasites; the Cestodes are all endoparasitic.

Life-history of Endoparasites.—Most endoparasitic animals have an eventful life-history. They are not always parasites, or they are not always parasites within the same kind of host. Many of them are at some time free; many of them have some sort of metamorphosis. But, as their life-histories are very various, they do not readily admit of being summed up in general statements.

Let us begin, however, with the adult sexual animals. In this state they are always almost parasitic, partly because rich copious diet, warmth, and relative quiescence favour reproductive maturity; partly because many probably began their parasitic career at the reproductive period, when shelter and

readily attained food were specially advantageous; partly because it is not likely that animals which had become parasitic would relinquish this habit in adult and mature life. In fact, with the exception of some thread-worms (*Gordius*, *Mermis*, &c.) and some few insects (ichneumon-flies, gad-flies, &c.) which are parasitic in their youth and free as adults, it is generally true of parasitic animals that the eggs are produced, fertilised, and deposited in the parasitic stage. In regard to the reproduction it should be noted (1) that the fertility is often enormous, for a tapeworm may produce 42,000,000 eggs, and a female thread-worm 64,000,000 in a year; (2) that in those cases where the female alone is parasitic fertilisation may take place before parasitism has begun; that otherwise it occurs within the body of the host; that all Cestodes and most Trematodes are hermaphrodite, and that some of them show self-fertilisation or autogamy; (3) that in tapeworms the fixed 'head' buds off a long chain of joints, each of which is sexually complete, becomes eventually distended with eggs and embryos, and is liberated singly or along with others from the intestine of the host.

In connection with the prolific multiplication of many endoparasites, there are two ways of looking at the facts. In the first place, the stimulating nature of the food and the easy-going conditions of life will tend to promote reproductivity. In the second place, the chances of death are so great, when the life-history is intricate and involves two hosts, that the surviving types have been those that varied in the direction of prolific multiplication, or of working, so to speak, with a large margin. But the two aspects are not inconsistent: the constitutional nature may be favoured by the environmental nurture.

The eggs or embryos of the parent endoparasite usually pass from the host along with the excreta, and 'there are no intestinal worms, at least among the typical and constant parasites, whose embryos come to maturity near the parent; or, in other words, there are none which pass their whole life-cycle in one locality.' Some of the embryos are locomotor—e.g. those of the liver-fluke and of *Bothriocephalus latrus*; others are passively carried along with the food and drink into new hosts. There the embryos rarely become or remain quiescent, but wander from the food-canal through the tissues and organs of the host until a fit resting-place is found. But, to state another of Leuckart's general conclusions, 'the quiescent stage following upon the wandering embryonic stage does not conclude the life-history of the parasite, which requires, in order to complete its development, a radical change in its environment—in other words, a second migration.'

But before leaving the so-called intermediate host—which is different from that of the parent or that of the adult—we should notice that within it asexual multiplication may occur. Thus, several asexual generations characterise that part of a liver-fluke's life during which it sojourns in a water-snail (*Limnaea*) prior to reaching its final or 'definitive' host in the sheep. In other cases the asexual multiplication within the intermediate host is of a simpler kind, being restricted to budding, as when the bladder-worm or proscotex of *Tænia echinococcus* within ox or man develops many 'heads' or scolices, each of which on being transferred to dog or wolf will grow into a tapeworm. Or there may be no true multiplication—e.g. in the numerous bladder-worms which form only one head, and remain quiescent until the host happens to be devoured by another, within which the 'head' of the bladder-worm may bud off an adult tapeworm chain.

Connected with this change of host there are two main problems: (1) How is the change effected?

PROTOZOA. Rhizopoda. Gregarinida. Infusoria.	A few parasitic. All parasitic. Many parasitic—e.g. Ichthyophthirus Opalina Trypanosome	Amœbæ of dysentery, &c. in man. In all sorts of animals; e.g. the Malaria parasite (Plasmodium) in man and mosquito. Outside fishes. In gut of frog. Causing sleeping sickness in man.	Usually intracellular parasites during part of life. Many occur within the blood-cells of birds, reptiles, &c. Transmitted by Tse-tse fly.
SPONGES. Coelenterata.	Probably none in strict sense. Very rare instances: Medusoid <i>Cunina</i> (<i>Cunocanthina</i>) parasitica. <i>Cunina</i> (<i>Cunocanthina</i>) <i>octoraria</i> . The Hydroid <i>Polypodium hydri-</i> <i>forme</i> is in one stage parasitic. All parasitic.	In another Medusoid, <i>Geryonia</i> <i>proboscidioides</i> . In the bell of the Medusoid Turritopsis. On the ova of the sterlet (<i>Acipen-</i> <i>ser ruthenus</i>). Orthonectida (Rhopalura), in a brittle-star (<i>Amphipura squa-</i> <i>mata</i>), in a Nemertean worm (<i>Lineus lacteus</i>), Dicyemidæ (<i>Dicyema</i>) in cuttle-fish.	Clione bores in oyster-shells, &c., and cases of commensalism are recorded. A Medusa (<i>Mnestra</i>) on the neck of the pelagic Gasteropod Phyllirhoe, and the frequent occurrence of a sea-anemone on a hermit-crab illustrate com- mensalism. These forms are perhaps very primitive, perhaps very degen- erate, worm-types.
'MESOZOA.' 'WORMS.' { Turbellaria (Plan- arians, &c.). Trematoda (Flukes, &c.). Cestoda (Tape- worms, &c.).	Mostly free-living; a few genera are parasitic: All parasitic, many externally, and usually on one host. Many internally, and then re- quiring two hosts. All parasitic; the mature sexual forms in vertebrates, except in the case of Archigetes, which becomes mature in the fresh- water worm Tubifex.	Graffilla in marine molluscs. Anopodium in or on Holothu- rians. Especially on fishes. The first usually a mollusc, the second some vertebrate. All sorts of vertebrates contain both stages, the adults in the gut, the immature forms usu- ally in the flesh. But the im- mature stages have also been found in some molluscs, Ar- thropods, and worms. Two occur on crabs. In bivalves. The majority in the digestive tract of vertebrates; but they may be transferred from a lower host to a higher—e.g. from insect to mammal. <i>Ech. proteus</i> lives as adult in pike, &c., in youth in the amphi- pod <i>Gammarus pulex</i> ; <i>Ech.</i> <i>angustatus</i> of perch in the isopod <i>Asellus</i> . <i>Ech. gigas</i> occurs in the pig. The minute males of Bonellia and Hamingia live within the females. On Crinoids.	'Monogenetic.' 'Digenetic.' Two hosts are requisite to com- plete the life-history of the parasite. The final host usu- ally devours the intermediate one.
Nemerteans (Rib- bon-worms). Nematoda (Thread-worms). Acanthocephala.	Almost all free-living. Malacobdella. Many parasitic; many free. In man occur <i>Ascaris lumbricoides</i> , <i>Oxyuris vermicularis</i> , <i>Filaria</i> <i>sanguinis hominis</i> , <i>Filaria med-</i> <i>inensis</i> , <i>Trichinella spiralis</i> , &c. The class includes several genera, all parasitic, notably Echino- rhynchus.	Two occur on crabs. In bivalves. The majority in the digestive tract of vertebrates; but they may be transferred from a lower host to a higher—e.g. from insect to mammal. <i>Ech. proteus</i> lives as adult in pike, &c., in youth in the amphi- pod <i>Gammarus pulex</i> ; <i>Ech.</i> <i>angustatus</i> of perch in the isopod <i>Asellus</i> . <i>Ech. gigas</i> occurs in the pig. The minute males of Bonellia and Hamingia live within the females. On Crinoids.	The life-histories are often very complex, and may include al- ternation of generations. Many infest plants.
Chaetopoda (bristle-bearing worms). Hirudinea (Leeches). Rotifera.	Almost all free-living. Three or four marine forms are parasitic. Myzostomidæ are ectoparasitic and form galls. Most are ectoparasitic (the rest wandering carnivores). Mostly free-living, a few parasitic —e.g. Seison. Albertia.	On molluscs, fishes, amphibians, &c. On crustacean Nebalia. In earthworm and slug.	Branchiobdella, which some rank among Chaetopods, is parasitic on fresh-water crayfish. This family probably represents Chaetopods degenerated by parasitism. In many, however, the ecto- parasitism is very temporary.
ECHINODERMATA.	None parasitic.		
ARTHROPODA. Crustaceans.	There are many parasites among Copepoda—e.g. Chondracanthus. Caligus. Lernæa. Among Cirripedia—e.g. Sacculina. Among Isopods—e.g. Bopyrus and Entoniscus.	Usually on skin, gills, &c. of fishes. Beneath the tail of crabs. On fishes.	These illustrate (a) many grades of parasitism—temporary, peri- odic, thoroughly established, and (b) corresponding grades of degeneration.
INSECTS.	The vast majority are free-living, but ectoparasitism is illus- trated by Bird-lice (Mallophaga). Lice (Pediculidæ). Strepsiptera. (Many are parasitic on plants.) Endoparasitism by the larvæ of Ichneumon-flies. Gad-flies.	} Mostly on birds and mammals. In bees and wasps. In other insects. In mammals, cattle, horses, &c.	The females only are parasitic, the males free.
Arachnida.	The majority are free-living, but parasitism is illustrated by Linguatulina (Pentastomum). By some Acarina (mites).	Embryo in rabbit; adult in frontal sinuses of dog and wolf. <i>Demodex folliculorum</i> , Sarcop- tes (itch-mite), in skin of man, &c.	With little trace in adult of Arachnid appearance.
MOLLUSCA.	All free-living, except a few Gasteropods. <i>Entoconcha mirabilis</i> . Eulima and Stylifer.	Within Holothurian Synapta. On or in various Echinoderms.	
VERTEBRATA.	The hagfishes (Myxinoidei) bore in cod and the like. The males of three or more kinds of Deep-sea Angler-fishes are external parasites on the females.		

(2) how did this extension of the life-history to two distinct hosts arise? In regard to the modes of transference it will be enough to give two illustrations. The young liver-fluke actively migrates from a water-snail and from the water, encysts on stems of grass, and is then eaten by a sheep. Here, and in some other cases, the migration is in part active. On the other hand, the bladder-worm of the pig lies quite passive in the muscles or connective tissue of that animal, and cannot reach its final host unless 'measly' pork be eaten by man. Here, and in most other cases, the migration is passive. The second problem is very difficult. Is the host in which the adult is found the primitive host, and has that of the immature stages been intercalated? or is the intermediate host really the primitive one in which the animals used to become mature, while the final host represents a secondary prolongation of the life-history? Leuckart expresses himself unconditionally in favour of the second theory that 'the intermediate hosts were originally the true definitive carriers, which formerly brought their intestinal worms to sexual maturity, but have since become merely intermediate, because the development of the parasites has extended itself over a greater number of stages in the course of further differentiation.' It should be kept in mind that many of the Trematodes require only one host, while others require two; the first state of affairs is probably the more primitive. In Archigetes we have an example of a primitive tapeworm which completes its life-history in the river-worm, Tubifex. This, again, is probably primitive.

Environment of Parasites.—Parasites vary in different parts of the body and in different hosts, and it is admitted by all that parasites exhibit 'adaptations' to their life and surroundings. It is therefore important to take account of the precise relations between host and parasite. Ectoparasites will experience mechanical influences due to the movements of their bearers, they will often be carried from one locality to another, they will sometimes share in the warmth of their hosts, they usually find abundant food, and they are often not only sheltered but sedentary. Endoparasites will experience pressure from the tissues in which they lie, or from the peristaltic movements of the food-canal in which they are lodged; their immediate environment usually involves confined space, scant oxygen, considerable warmth, and total darkness; they will be affected by abundant and rich nutrition, by surrounding gases and juices, and by their frequently sedentary life. The frequent absence of sense-organs may be associated with the unstimulating conditions of life; the absence of a food canal in Cestodes and the absorptive character of the skin may be associated with the fact that these parasites float in the digested food of their host; the prolific multiplication may be associated with the abundant and rich nutrition; and so on. There are many obvious adaptations, e.g. the possession of attaching organs, and many subtle adaptations, e.g. the occurrence in the parasite of a substance counteractive to the digestive juice of the host. It is unlikely that these adaptations have arisen by the hereditary accumulation of direct modifications or adjustments; it is likely that they represent the result of the action of natural selection on germinal variations. But it is important to bear in mind (1) that the peculiar environment of parasites may have served as a stimulus, prompting germinal variations some of which were in an effective direction, and (2) that the peculiar environment supplies in each individual development the appropriate and essential stimuli for the expression of the hereditary characters.

Very instructive is the parasitism of the microscopic male Bonellia. The female of *Bonellia viridis* is a green marine worm with a body about the size of a plum and a slender, bifid proboscis, that may be two feet long. Out of the liberated eggs there emerge microscopic free-swimming larvae. Some of these eventually settle down in the mud or between stones, and these develop into females. Others settle down on the proboscis of an adult female and become mouthless males, with arrested development. The arrest appears to be due to the absorption of some substance from the skin of the proboscis, and experiment has shown that a very short sojourn on the proboscis is followed by the development of inter-sex forms between male and female. In the ordinary course of events, the pigmy males leave the proboscis and undergo a final change within the mouth-cavity of the female. Eventually they leave this and pass into the reproductive duct, where they spend the rest of their life. In that strategic position they are obviously able to fertilise the eggs produced by the female.

Effects of Parasites on their Hosts.—In the 17th and 18th centuries the injurious effects of parasites were much exaggerated. All sorts of diseases, including many which we now know to be associated with Bacteria, were said to be due to 'worms,' and physicians gravely discussed '*An mors naturalis sit substantia verminosa?*' As accurate diagnosis began to be less unusual, a strange reaction in favour of parasites found many supporters. Intestinal worms were called 'the good angels and unfailing helpers of children,' and were said to aid digestion and even development. But since the middle of the 19th century, when the experimental study of parasites began in earnest, a knowledge of the various injuries which parasites may do, to man and to domesticated animals at least, has become more and more precise and complete. Only a few illustrations need be given. Numerous large parasites will diminish the nutritive supplies of their host; large bladder-worms and the like press upon adjacent organs, cause obstructions, and give rise to many troubles; the movements and migrations of parasites within the body of their host produce inflammation, and may even result in the perforation of important organs. Some parasitic worms produce injurious toxins. Even external parasites may do internal damage; e.g. those crustaceans which occur beneath the tails of crabs, and sometimes effect the castration of their hosts. While there are many parasites whose effects are very slightly injurious, some of these act as disseminators of other parasites, e.g. Bacteria, or prepare the way for them. The three most important measures to be taken against parasites are to secure (1) cleanliness of body and surroundings; (2) wholesome, and, in the case of man, sufficiently cooked food; and (3) pure water.

Historical.—Most of the ancient and mediæval naturalists and physicians who expressed any opinion on such matters believed that parasites were spontaneously generated within the bodies of their hosts. It was not till the 17th century, when Swammerdam and Redi showed how maggots, lice, &c. developed from eggs, that the belief in *generatio æquivoca* began to be seriously disputed. It was gradually replaced by the theory that parasites came from without, that, ceasing to be free-living, they entered the bodies of other animals and were there modified. But this conclusion was too hastily leaped at, and no care was taken to prove that the free-living forms in question did really develop into parasites. In many cases, indeed, it was soon shown that they did not, and this disappointing result helped Pallas and others in the latter part of the 18th century to recognise rightly that parasites were propagated like other

animals by means of eggs. They concluded, however, that these eggs were more or less directly carried from one host to another, there to develop into the original form, while we know that the life-history of parasites is rarely so simple; nor was there more than a slight warrant for another favourite idea that young animals inherited parasites from their mothers. At the beginning of the 19th century the helminthologists, such as Rudolphi and Bremser, were very active and greatly extended the list of known parasites, but the life-histories remained a puzzle, and many naturalists relapsed into a belief in spontaneous generation. The increasing use of the microscope led to most important results: in 1831 Mehlis discovered the Infusorian-like embryo of certain flukes; Von Siebold (1832) detected the six-hooked embryo within the still unliberated ova of the tapeworm; Eschricht (1841) compared the life-history of internal parasites to that of ichneumon-flies and bot-flies; Steenstrup (1842) published his famous essay on alternation of generations; Von Siebold (1843-50) and Van Beneden (1849-50) worked out the metamorphoses of several parasitic worms; Küchenmeister (1853), Leuckart (1856), and others showed experimentally how infection with larval stages resulted in the development of adult parasites. The foundations of modern helminthology were thus laid, and we have now a vastly increased knowledge of the number of parasites, a precise acquaintance with the life-history and migrations of some of the most important, a scientific system of medical diagnosis and treatment, and some realisation of the general biology of parasitism.

The importance of animal parasites in human history deserves consideration. The world-shaking diseases of malaria and sleeping-sickness are due to parasitic Protozoa. It is likely that the Guinea Worm was the fiery serpent that troubled the Israelites on their desert journeys, and it troubles man still. The formidable Bilharzia is the cause of serious disease—e.g. among British soldiers in Egypt. The heaviest mundane cloud of disease and despair that has ever rested on the human race is caused by hookworms in warm countries. When we think of stock and crops as well as of man himself, we become still more convinced of the economic and historical importance of animal parasites. But they are being gradually conquered or circumvented.

See ACARINA, ASCARIS, BOT, BOTHRIOCEPHALUS, COMMENSALISM, CORN INSECTS, DEGENERATION, ENVIRONMENT, FISH-LOUSE, FLUKE, GALLS, GREGARINIDA, GUINEA-WORM, HAG, LEECH, LICE, TAPEWORMS, THREAD-WORMS, TRICHINA; also Leuckart, *Parasites of Man* (trans. by Hoyle, 1896); Küchenmeister, *Animal and Vegetable Parasites of the Human Body* (trans. Sydenham Society 1857); Cobbold, *Parasites* (1879); Van Beneden, *Animal Parasites and Messmates* (trans. 1876); Massart and Vandervelde, *Parasitism Organic and Social* (1897); Braun, *Animal Parasites of Man* (trans. 1905); Brumpt, *Précis de Parasitologie* (1910); Hegner and Cort, *Diagnosis of Protozoa and Worms Parasitic in Man* (Baltimore, 1921).

Parasitic Diseases constitute an important sub-group in the accepted classification of Disease (q.v.). In these diseases certain morbid conditions are induced by the presence of animals or vegetables which have found a place of subsistence within some tissue or organ, or upon some surface of the body of man or other animals. Plants are not exempt from disorders of this nature (see PARASITIC PLANTS). The forms of animal life giving rise to parasitic diseases are described in articles on Ascaris, Cestoid Worms, Flea, Guinea-worm, Itch, Lice, Nematelmia, Tape-worms, Thread-worms, Tick, Trichina, &c.

The vegetable organisms which are associated with special diseases are almost all of microscopic

size, and their effects are of much greater importance than those of animal parasites, while they are much more difficult to study and control. Certain minute fungi have long been recognised as the causes of diseases in the skin and mucous membranes: Favus, Pityriasis versicolor, Ringworm, Thrush (q.v.). It was shown in 1861 by Carter that a serious disease of the foot which occurs in India (Madura-foot, fungus-foot, &c.) is due to the presence of a fungus; and in 1877 what is now called Actinomycosis (q.v.) was put in the same category.

But the most important and interesting of the vegetable parasites are those belonging to the Schizomycetes or Bacteria (q.v.), whose study has assumed such prominence that it has now become an independent science (Bacteriology). The relations of these organisms to their host are much more intimate than in the case of the larger parasites, and the problems presented by the diseases associated with them are consequently much more difficult of solution; but in many cases the bacterial cause of these diseases has been completely established. In other cases minute animals, e.g. trypanosomes in sleeping-sickness, amœbæ in dysentery, cause the infection. See GERM.

Parasitic Plants are those which, unable to nourish themselves, prey upon other plants or animals; becoming attached, they gain access to the tissues of their host and feed upon its juices. They are more or less degenerate, according to the extent of their parasitism. Many parasites have probably developed from climbing plants. The mistletoe, on the other hand, has no roots in the ground; its seed is left by a bird upon a tree, to which, when it begins to grow, it becomes attached by means of special organs called haustoria, which act as roots and enable it to draw crude sap, water, and salts from its host; and having green leaves it can absorb carbonic acid gas from the air, and elaborate food for its tissues. In the case of the dodder, again, which begins life as an independent plant, the seed germinates underground; when the young plant reaches the surface it fastens upon some host, twining round it, sending its haustoria deep into the tissues, and drawing almost all its nourishment from them. It has, indeed, some chlorophyll, but not enough to do its own assimilation. The part in the ground soon dies. In the Rafflesiaceæ, a foreign family, remarkable for the size of the flowers of some of its genera, the degradation has gone still further, and the whole plant consists of haustoria, a knob-like mass of tissue half formed by the host, and the flowers. There are some parasites which are attached to the roots instead of the stems of their hosts—e.g. Yellow Rattle, Cow-wheat, Eye-bright. The attachment by the haustoria is always remarkably intimate; the tissues are always joined to the corresponding ones of the host, often in such a way that it is difficult to say which plant they belong to. The ovules of many parasites are rudimentary, the embryo is small and without chlorophyll; in cases of advanced parasitism it may even produce no leaves. There are parasitic genera in many families—e.g. Corallorrhiza in the Orchideæ, Cuscuta in Convolvulaceæ, Orobanchæ in Orobanchaceæ, Monotropa in Pyrolaceæ. The Loranthaceæ, of which is Viscum the mistletoe, the Balanophoraceæ, and the Santalaceæ are families of doubtful affinity. Nearly all these parasites have a marked preference for a particular species of host, and they are all flowering plants. But there are many others; the Fungi are either parasitic or, what is much the same thing, saprophytic—i.e. dependent upon decaying organic matter for food. Many of them are a trouble in agriculture, causing corn, hop, and vine mildew, potato disease (see PLANTS, DISEASES OF); others, like the mushroom, are saprophytes. The bacteria may have animals as their hosts, and

cause in them many diseases, the species being often recognised by the disease. When they are saprophytic they cause fermentation and putrefaction. Allied to parasitism is Symbiosis (q.v.), a sort of mutually arranged and beneficial parasitism; as in the case of the Lichens, which consist of Algae and Fungi in partnership.

Parathyroid. See GLANDS.

Paratoluidin. See TOLUIDIN.

Paravane, a torpedo-shaped contrivance towed from both sides of a ship, and so constructed as to remain at a certain depth and at a certain distance from the vessel. The device, a British invention of the Great War, was used (1) for the destruction of submerged submarines; (2) for the protecting of ships against mines, and more generally for the breaking up of hostile minefields. In the first case, in encountering a submarine a heavy explosive charge borne by the paravane was exploded by means of an electric current passing along the towing line; in the second, the mooring wires of anchored mines were deflected along the paravane's towing line to a shear-like arrangement at its head, and there being severed, the attached mines floated and were exploded by rifle-fire. Destructive paravanes were inferior in destructive power to depth-charges. The protective paravanes of merchant ships were known as 'otters.'

Paray-le-Monial, a town of Saône-et-Loire, 48 miles by rail W. by N. of Mâcon, celebrated for its chapel, in which Mary Alacoque (d. 1690) believed herself to have had a vision of the Saviour; the chapel is the object of pilgrimages by the confraternities of the Sacred Heart (q.v.).

Parcæ. See FATE.

Parchim, a town of Mecklenburg-Schwerin, 23 miles SE. of Schwerin; pop. 11,000.

Parchment (Fr. *parchemin*, Lat. *pergamena*, through Gr. from *Pergamos*), a writing material made from the skins of animals. The material was used from very early times, but its manufacture is said to have been brought to perfection by Eumenes II. of Pergamos (197-158 B.C.), the exportation of papyrus having been forbidden from Egypt. The Romans appear to have written chiefly on papyrus, and this practice was continued in Italy till about the 10th century, but parchment was also used; and from that time till ordinary paper became available in the 14th century parchment was almost the only material employed (see PALÆOGRAPHY, PAPER). Some of the earliest printed books, however, were done on vellum (by which was meant originally a parchment made of calf-skin), and on a specially fine vellum, made from the skins of calves prematurely born, some of the best of the early miniature portraits were painted. Ordinary parchment is chiefly made of sheep-skins, but those of calves and goats are also used. Fine parchment and vellum are prepared from the skins of kids, lambs, and young calves. A coarser parchment for drumheads, tambourines, &c. is manufactured from the skins of male goats, wolves, and calves. A peculiar kind is made from asses' skin, and for bookbinders' use a parchment is sometimes prepared from pig-skin. The early stages in the manufacture of parchment are the same as for Leather (q.v.). After being unhaired and cleaned, the skins are stretched evenly upon a stout wooden frame called a *horse*. The flesh side of the skin is first gone over with a double-edged semicircular knife (fleshing-tool) to remove adhering particles of flesh. With the fleshing-tool inverted, to prevent any cutting of the epidermis, the other side of the skin is then scraped to remove dirt and to squeeze out some of the absorbed water. For some purposes for which

stout parchment is required the skin is now merely allowed to dry on the frame, no further treatment being required. But fine parchment for writing or drawing upon, some of which is made from split skins, is sprinkled over with sifted chalk on the flesh side and rubbed smooth with a flat surface of pumice-stone. The grain side of the skin also is rubbed over with pumice, but no chalk is used. Great care requires to be taken not to fray the surface, and certain precautions are necessary during the drying of the parchment. Any considerable roughness or unequal thickness is removed by the skin being again scraped and pumiced.

VEGETABLE PARCHMENT.—This substance was first patented by W. E. Gaine in 1853. It is made by dipping ordinary unsized paper for a few seconds in concentrated sulphuric acid mixed with one-half its volume of water, and then quickly removing all trace of the acid by passing through water, then through a weak solution of ammonia, and once more through water. This simple treatment produces a remarkable change in the paper. It acquires a parchment-like texture; turns translucent, especially when thin; and becomes about five times stronger than ordinary paper. Vegetable parchment is also impervious to water, but is rendered soft and limp when dipped into it. A solution of chloride of zinc acts on paper in a similar way. Stout qualities of vegetable parchment have been used for book-covers and for writing deeds upon. Thin sheets of it serve as a convenient material for tracing designs, plans, &c. But it is now chiefly employed for covering jars of preserves and for like purposes.

Pardo Bazán, EMILIA, CONDESA DE (1851-1921), Spanish novelist, was born at Coruña. Her early works were romantic in type, but, passing under the influence of Zola, she became a realist and apologist for the French naturalistic school; her *Un Viaje de Novios* (1881) first revealed these tendencies. Her greatest works are *La Cuestión palpitante* (1883), *Los Pazos de Ulloa* (1886), *La Madre naturaleza* (1887), *La Piedra angular* (1891), and *Dulce dueño* (1911). Of her dramas, *Verdad* and *Cuesta abajo* were most successful. Pardo Bazán has been claimed as the greatest Spanish novelist of her time. She was an ardent feminist.

Pardoe, JULIA (1806-62), born at Beverley, published poems and a novel in her fifteenth year. Thereafter travels in Portugal, Turkey, and Hungary provided material for various vivid descriptive works. These were followed by several studies, not always historically accurate, in French history, and by numerous novels.

Pardon, in Law, is the remission of the penalty imposed on a person who has been tried and convicted. A pardon is outwith the range of judicial discretion. The power to grant a pardon is the prerogative of the crown. The crown, in exercise of the prerogative of mercy, may grant either an absolute pardon, by which the execution of the sentence is altogether remitted and the offender is restored to the status which he held before conviction, or what is known as a conditional pardon, by which the sentence is modified or commuted. The crown's power of pardon is not entirely universal. Thus, under the Habeas Corpus Act, 1679, the king cannot pardon the offence of sending a prisoner out of England to evade the writ of *habeas corpus*. Again, he cannot pardon a person convicted of a common nuisance until after the nuisance has been abated; for this offence, during its continuance, partakes more of the character of an injury to persons in the neighbourhood than of a public wrong and a pardon, while the nuisance continues, might prejudice the rights of the private persons injured by the nuisance.

Moreover, by the Act of Settlement (12 and 13 Will. iii. cap. 2), a pardon by the crown cannot be pleaded as a defence to an impeachment by the Commons in Parliament so as to prevent the trial; but, after conviction on impeachment, the crown may pardon the offender. The duty of advising the crown in the exercise of the prerogative of mercy rests, in England, with the Home Secretary, and, in Scotland, with the Secretary for Scotland. At common law, pardons must be under the Great Seal; but, by the Criminal Law Act, 1827, it is enacted that a pardon by a warrant under the royal sign manual (countersigned by a principal secretary of state) shall have the effect of a pardon under the Great Seal as to the felony for which the pardon is granted. The Criminal Appeal Act of 1907, which provides, subject to safeguards, an appeal from the verdict of a jury or the sentence of a judge, has, in England, had the effect of diminishing the number of cases falling to be dealt with in the exercise of the royal prerogative of mercy. Under the act, the execution of a judgment is suspended from the time of giving notice of appeal and, where an appeal is brought by leave or of right, until the appeal is determined. The act, too, in sect. 19, contains provisions which empower the Secretary of State, if he thinks fit, on the consideration of any petition for the exercise of His Majesty's mercy, having reference to the conviction of a person on indictment, or to the sentence (other than sentence of death) passed upon a person so convicted, either (a) to refer the whole case to the Court of Criminal Appeal for its decision, in which case the court may set aside the conviction; or (b), if he desires the assistance of the Court of Appeal on any point arising out of the petition, to refer that point to the court for its opinion thereon, in which case the court furnishes the Secretary of State with its opinion upon the point so referred. The Children Act, 1908, enacts (sect. 84) that, where a youthful offender has been sentenced to imprisonment or penal servitude, and has been pardoned by His Majesty on condition of his placing himself under the care of some charitable institution for the reception and reformation of youthful offenders, the Secretary of State—in Scotland, the Secretary for Scotland—may direct him, if under the age of sixteen years, to be sent to a certified reformatory school for a period of not less than three and not more than five years, but not in any case extending beyond the time when he will attain the age of nineteen years. The endurance of the punishment awarded an offender by the court, or of that substituted by the crown, has (in the case of a non-capital felony) the effect of a pardon under the Great Seal, as to the felony whereof the offender was convicted. Accomplices, when admitted to give evidence for the crown, are so admitted under an implied promise of pardon, on condition of their making a full and fair confession of the truth. On performance of this condition, they, though not of right entitled to pardon, have an equitable title to a recommendation for the king's mercy. The crown's right of pardon is usually delegated to the colonial governor, in the case of persons convicted in the courts of a colony. A pardon may also be granted by Act of Parliament. By an act of indemnity any person may be relieved from disabilities and penalties which he has incurred by having contravened the law. Thus by the Indemnity Act, 1920, legal proceedings are forbidden against persons in the service of the crown for anything done in good faith in the public interest during the war within or without the British dominions.

Pardubitz, a town of Bohemia, on the left bank of the Elbe, 55 miles by rail E. of Prague, has a fine 16th-century castle. Pop. 20,000.

Paré, AMBROISE, the father of modern surgery, was born about the beginning of the 16th century, at Laval, in the French department of Mayenne, was trained at the Hôtel Dieu of Paris, and in 1537 as surgeon joined the army starting for Italy. In a later campaign he improved the mode of treatment of gunshot wounds, a treatment which had up to then been of the most barbarous kind—cauterisation with boiling oil. It was during this campaign that he substituted ligature of the arteries for cauterisation with a red-hot iron after amputation. Many other important improvements in surgery were introduced by him at this time. In September 1552 he was appointed surgeon to King Henry II., and afterwards to Charles IX. and Henry III. He died at Paris in December 1590. His writings, of which the principal was *Cinq Livres de Chirurgie* (1562), have exercised a great influence on the practice of surgery in all countries. See Stephen Paget, *Ambroise Paré and his Times* (1897); and F. R. Packard, *Life and Times of Ambroise Paré* (1922).

Paregoric, or PAREGORIC ELIXIR (from the Gr. *parégorikos*, 'soothing'), the *Compound Tincture of Camphor* of the British Pharmacopœia, consists of an alcoholic solution of opium, benzoic acid, camphor, and oil of anise, every fluid ounce containing 2 grains each of opium and benzoic acid, and $1\frac{1}{2}$ grains of camphor. This preparation is much used both by the profession and the public. In doses of from 30 to 60 drops it is an excellent remedy for the chronic winter-cough of old people, the opium diminishing the bronchial secretion and the sensibility of the pulmonary mucous membrane, while the benzoic acid and oil of anise act as stimulating expectorants. It has also been found useful in chronic rheumatism, and, especially in the case of children, to relieve slight pains in the stomach and bowels.

Pareira-Brava, a lofty climbing shrub inhabiting the forests of Peru and Brazil, and bearing bunches of oval berries resembling grapes. The botanical source was for some time obscure, but it is now known that the plant yielding the root of commerce is the *Chondodendron tomentosum* (Menispermaceæ). The plant has a long branching woody root, of a yellowish to greenish brown colour internally, and this has attained considerable reputation in medicine. The root contains a bitter principle, and is used in chronic catarrhal affections of the bladder and in calculus. The decoction and fluid extract are most usually employed, but it is sometimes given in the simple form of powder.—This medicinal root has been referred also, but erroneously, to the allied *Cissampelos Pareira*, a climbing shrub of the West Indies and Mexico, whose roots have similar properties.

Parella, a name given to some of those crustaceous lichens which are used to produce Archil, Cudbear, and Litmus, but more strictly belonging to one species, *Lecanora parella*, and the red or crimson dye prepared from it.

Parenchyma, a technical name for that kind of vegetable tissue in which the component cells are roundish or polyhedral, touching each other by their broad faces, fitting more or less closely, as in the green 'palisade-parenchyma' of the upper part of a leaf, or leaving wide intercellular spaces, as in the 'spongy parenchyma' of the lower part. See CELL, LEAF.

Parent and Child.—The legal relation between parent and child arises out of marriage, and is one of the incidents or consequences of the relation of husband and wife. The legal is to be distinguished from the natural relation, for two persons may be in the natural relationship of parent and child while they are not legally or

legitimately so. In law—although cognisance is taken for certain purposes of the natural relationship between a bastard and his parents—the distinction between legitimate children and natural or illegitimate children is fundamental. For a statement of the law relating to illegitimate children and the rights and liabilities of the mother, the putative father, and other persons towards such children, see the articles **BASTARD**, **AFFILIATION**, **LEGITIMATION**, **INFANT**.

A lawful or legitimate child, in English law, is a child born in lawful wedlock or within a competent time after the dissolution of the marriage. A child between whose parents the relation of marriage subsists at the time of his birth is legitimate, although they were unmarried when he was begotten; and a child begotten of parents married at that time, or married afterwards but before he was born, is legitimate, although the marriage may have been dissolved by death or divorce before he was born. In some systems of law—e.g. in Roman law and in Scots law—marriage has, or may have, a retroactive effect in legitimating previously born children; but in English law the intermarriage of the parents of a child after the birth of the child does not make the child legitimate. There is a strong presumption in law that a child born during marriage, or born not more than nine months after the dissolution of the marriage, is legitimate. The fact that the wife had immoral relations with other men is not in itself sufficient to displace the presumption of legitimacy. This presumption can be rebutted only by clear proof that the husband is not in fact the father of the child—e.g. by proof that the husband was impotent or that the husband and wife had no sexual intercourse within the period during which the child must have been begotten. The non-access of the husband to the wife must be proved otherwise than by the evidence of the spouses. It is, indeed, now settled in England that neither a husband nor a wife is permitted to give evidence of non-intercourse after marriage, with the object, or possible result, of bastardising a child born in wedlock—*Russell v. Russell*, 1924, A.C. 687.

The moral duty of parents to provide for the maintenance of their children is recognised by the courts; but in England, except under the operation of the poor-law and certain modern statutes, there is no enforceable legal obligation on a father or mother to maintain a child. Hence a father is not liable to pay a debt incurred by a child, or money expended on the child's behalf, even in respect of necessities supplied for the use of the child, unless he has expressly or impliedly contracted to do so or has authorised the incurring of the debt or the expenditure of the money. The Poor Law Acts, however, render it compulsory upon the father and mother, and also the grandfather and grandmother, if able to do so, to provide a maintenance for a child who cannot support himself. Under these acts, too, a man is liable to maintain the children of his wife by a former marriage as part of his own family, and is chargeable with all poor-law relief granted to them until they attain the age of sixteen or until the death of their mother. Under the Married Women's Property Acts a married woman who has separate property is under the same legal liability as her husband for the maintenance of her children and grandchildren; but she is not liable to maintain the children of her husband by a former marriage. Under the Vagrancy Act, 1824, a father who, although able to do so, neglects or refuses to maintain his children, or who runs away and leaves them chargeable to the parish, is criminally liable. Under the Children Act, 1908, sect. 12, a parent

who fails to provide food, clothing, medical aid, or lodging for his child, or who, being unable to do so, fails to take steps to procure these by having recourse to the poor-law authorities, is deemed to have neglected him in a manner likely to cause injury to his health, and may be punished. This enactment has the effect of making it clear that the wilful omission of a parent to provide medical aid for his child is such neglect as may come within the purview of the criminal law. By sect. 75 of the same act, where a child is ordered to be sent to and detained in a reformatory or industrial school, the parent, if able to do so, is made liable to contribute to his maintenance therein. Again, by sects. 82 to 85 of the Education Act, 1921, a local authority has power to take measures for the provision of meals for children in attendance at any public elementary school within its area, and is directed to require and recover payment from parents in respect of meals so supplied. As to the statutory obligations on parents in respect of the education of their children, see **EDUCATION**.

On the same principle, relying on the sense of filial duty, English law, apart from the statutes relating to the poor, does not compel children to maintain their parents. By the Poor Law Acts, however, the children of any old, blind, lame, impotent, or other poor person not able to work are required, being of sufficient ability, at their own charges to relieve and maintain him or her, in the manner and according to the rate which the justices at petty sessions shall order. Under the Married Women's Property Act, 1908, a married woman, if she has separate estate, can be made liable to support her parents.

A father has a right to restrain and control the actions of his children until they arrive at years of discretion, and to chastise them in a reasonable manner for disobedience. This parental power of control and correction may be delegated, for instance, to a schoolmaster, who is then to that extent *in loco parentis*. A father has, as a general rule, a right to the custody of his child. The right to custody may be enforced by writ of *habeas corpus* or by an application to the High Court of Justice; but, under the Custody of Children Act, 1891, where the parent of a child applies to the High Court for a writ or order for the production of the child, the court may in its discretion refuse to issue the writ or make the order, if the parent has abandoned or deserted the child, or has otherwise so conducted himself that the court is of opinion that his right to the custody of the child should not be enforced. At common law the mother had, during the lifetime of the father, no legal rights as against him with respect to the custody and control of the child. But, under the Guardianship of Infants Acts, 1886 and 1925, the court has wide powers to determine a question as to the custody of a child independently of the rights possessed by the father at common law. Thus the act of 1886 provides that, upon the application of the mother, the High Court or a county court may make such order as it thinks fit with regard to the custody of her infant child and the right of access thereto of either parent, having regard to the welfare of the child and to the conduct of the parents and to the wishes as well of the mother as of the father. The court, if it makes an order giving the custody of the child to the mother, may, under sect. 3 of the act of 1925, further order that the father shall pay to the mother a weekly or other periodical sum towards the maintenance of the child. Moreover, the Guardianship of Infants Act, 1925—which came into operation on 30th September 1925—provides (sect. 1) that where in any proceeding before any court the custody or upbringing of an infant or the

administration of any property belonging to, or held in trust for, an infant is in question, the court, in deciding that question, shall regard the welfare of the infant as the first and paramount consideration, and shall not take into consideration whether, from any other point of view, the claim of the father, or any right at common law possessed by the father, in respect of such custody, upbringing, or administration is superior to that of the mother or the claim of the mother is superior to that of the father. Where a decree of judicial separation is pronounced the court has an absolute discretion to give the custody of the infant children of the marriage to either parent and to regulate the access of the other parent to them. Again, if the father, mother, or any person having the custody of a child under the age of sixteen years is convicted of certain offences by any court, that court may order the child to be taken out of the custody of that person. The rights of a parent or other person having the lawful custody are in some measure also protected by provisions of the criminal law. Thus it is a criminal offence for any one unlawfully, either by force or fraud, and without any *bona fide* claim of right to take or entice away, or to detain any child under the age of fourteen years, with intent to deprive the parent, guardian, or other person having the lawful care or charge of such child, of its possession; or, with such intent, to receive or harbour the child, knowing it to have been so taken or decoyed away. Recent statutes, and, in particular, the Children Act, 1908, contain numerous provisions designed to prevent cruelty to, or maltreatment of, children by parents or other custodians (see CHILDREN).

The father, and after his death the mother, has, at common law, the guardianship of a child up to the age of twenty-one years. The right to guardianship on the death of the father or of the mother is now regulated by sects. 4 and 5 of the Guardianship of Infants Act, 1925. Under that act the mother, if she survive the father, is guardian of the child, either alone or jointly with any guardian appointed by the father; and the father, if he survive the mother, is guardian of the child either alone or jointly with any guardian appointed by the mother. When no guardian has been appointed by the predeceasing parent, or if the guardian appointed by the predeceasing parent is dead or refuses to act, the court, if it thinks fit, may appoint a guardian to act jointly with the surviving parent. Either the father or the mother of an infant may by deed or will appoint any person to be guardian after his or her death. Any guardian so appointed acts jointly with the mother or father, as the case may be, so long as the mother or father is alive, unless the mother or father objects to his so acting. If the mother or father objects, or if the guardian so appointed considers that the mother or father is unfit to have the custody of the child, the court, on the application of the guardian, determines whether the surviving parent shall be sole guardian, or whether the guardian appointed by the predeceasing parent shall act jointly with the surviving parent or shall be sole guardian.

A father has the right to determine in what religious faith his children shall be brought up. On the death of the father, if he has left no directions on the subject and has done nothing to forfeit or abandon his right to have his children educated in his own religion, the court will direct that the children be brought up in the father's religion, unless it be plain that the welfare of the children renders that course undesirable.

The consent of parents or guardians required by English law to the marriage of a child who is under age is now regulated by sect. 9 of the Guardianship of Infants Act, 1925, and the schedule appended to

that act. In the case of a legitimate child, if both parents are alive and living together the consent of both parents is requisite. If one parent is dead the consent of the surviving parent is sufficient where there is no other guardian. When one parent is dead and a guardian has been appointed by the deceased parent, the consent required is that of the surviving parent and the guardian if acting jointly, or the surviving parent or the guardian if the parent or guardian is the sole guardian. Where both parents are dead the consent of the guardians or guardian appointed by the deceased parents or by the court is required.

In many systems of law—e.g. in Scots law—the testamentary power of a parent is subject to restraints in favour of his or her children; but in English law a parent has power, if he pleases, to disinherit children by will. As to the distribution of the estates of parents or of children on intestacy, see *INTESTACY*, *KIN* (NEXT OF), *HEIR*.

The parental power comes to an end when the child attains full age. On the marriage of a daughter under full age the parental rights of custody and control are terminated. In some systems of law the parental power over a child is alienable and may be transferred to another person who adopts the child. But adoption, in the sense of the transfer of the rights and duties of a parent in respect of a child to another person and the assumption by that other person of these rights and duties, is not recognised by the law of England. A contract under which a parent is to be divested of his or her rights in favour of another person who is to have the rights which the law gives the parent in relation to the child, and is to undertake the duties which the law imposes on the parent, is invalid.

Scotland.—The Scots law of parent and child differs in important respects from the law of England. Thus in Scotland a child who is illegitimate at birth may become legitimate by the subsequent marriage of his father and mother. Legitimation *per subsequens matrimonium* was recognised by the Canon Law, and has been adopted in all the legal systems of Western Europe except England. An exception is made where a legal impediment existed to the marriage of the parents at the date of the conception of the previously born child. Thus a child conceived in adultery cannot be legitimated even though at its birth the parents are free to marry. Again, a father's legal right of control may terminate by express or tacit consent before the child attains full age, in which case the child is, in the language of law, 'forisfiliated'—i.e. is out-with the power of the father as head of the family. A parent is under a legal obligation to support the child and a child to support the parent, and either may sue the other for aliment. The obligation of aliment, however, is enforceable only where there is indigence on the one side and surplus means of livelihood on the other. As circumstances may change, and either the indigence of the one party or the ability of the other may cease, decree in an action for aliment is granted *in hoc statu*, and may at any time be restricted or recalled by the court on cause shewn. On the bankruptcy of the parent or child liable in aliment, the claim for aliment is not good in competition with his creditors; for his bankruptcy is conclusive evidence that he has no superfluity. The amount of aliment claimable in law is not limited to what is necessary for bare subsistence, but depends in some degree on the claimant's station in life. On the death of the person liable the claim cannot be enforced like an ordinary debt against his executors. But where a person who is liable *ex debito naturali* to aliment another dies leaving property, heritable or move-

able, the persons who succeed to his property are bound *ex jure representationis* to implement the deceased's obligation out of the property to which they have succeeded. This principle applies whether the property of the deceased passes under a will or *ab intestato*. Scots law restricts in favour of children the power of a father or mother to dispose of his or her moveable property by will, and so prevents the parent from disinheriting the children. Where the parent leaves children, one or more, and is not survived by a wife (or husband) the children get one-half of his or her moveable estate as their legitim. Where the parent leaves children and is survived by a wife (or husband) the children get one-third of his or her moveable estate as their legitim. The right of representation does not extend to legitim, so that grandchildren have no claim for legitim upon the death of their grandparent (*vide* LEGITIM). A parent's right to the custody of children is subject to the jurisdiction of the Court of Session, which may make such regulations as it deems fit with regard to the custody. The court, in any action for separation or for divorce, may from time to time make such interim orders, and may in the final decree make such provision as to it seems proper with respect to the custody, maintenance, and education of any pupil children of the marriage. The recent statutes mentioned above relating to the custody, protection, and guardianship of children apply, generally speaking, to Scotland as well as to England. In Scots law the consent of parents or guardians is not necessary to the validity of the marriage of a person in minority; and accordingly sect. 9 of the Guardianship of Infants Act, 1925 (*supra*), dealing with the consent of parents or guardians to the marriage of a child who is under age, has no application to Scotland.

Parhelion. See HALOS.

Pariahs is the Tamil name given to the lowest class of the Hindu population of Southern India—the 'out-castes' who do not belong to any of the four castes of the Brahminical system (the Telugu name is *Mala*, the Kanarese *Holia*, the Malayalam *Paliyar*). They are now commonly described as the depressed classes. In the Madras Presidency they numbered, in 1921, 6,372,086, or 15 per cent. of the total population, or four times as numerous as the Brahmans. Presumably they represent the aboriginal race conquered by the Sudras, themselves a stock vanquished by the Vedic peoples. In the 18th century Pariahs were slaves to the higher castes; they must still dwell in huts outside village bounds, but are frugal, pleasure-loving, and laborious. The government has taken measures in recent years to improve their conditions, and the community has come into prominence by its assertion of equal rights of citizenship with the superior castes. See CASTE.—For the Pariah Dog, see DOG.

Parietaria. See PELITORY.

Paris, the capital of France, is situated in 48° 50' N. lat. and 2° 20' E. long., on the river Seine, about 110 miles from its mouth. It lies in the midst of the fertile plain of the Ile-de-France, at a point to which converge the chief tributaries of the river, the Yonne, the Marne, and the Oise. These streams, navigable for the small vessels formerly used in commerce, gave it until recent times the advantages of a seaport, while the great trade-routes passing along their valleys connected it with all parts of France. It has thus become the centre of a great network of canals, roads, and railways. Paris has occupied since Roman times a constantly increasing series of concentric circles. Down to the year 1922 the city was bounded by fortifications, begun in 1840 and completed twenty years after-

wards. The extension of the city boundary to this line explains the increase of population from 1,174,346 in 1856 to 1,696,741 in 1881; subsequent pop. (1886) 1,825,274; (1881) 2,269,023; (1901) 2,714,068; and (1921) 2,906,472; this last figure represents a density of 150 persons per acre as against 60 per acre in the county of London, but outside the demolished fortifications population is comparatively sparse. Paris has within the old fortifications a mean elevation of about 120 feet, but it rises in low hills north of the Seine, Montmartre (400 feet) and Belleville (320 feet), and south of the Seine, the Montagne Sainte Geneviève (190 feet). These elevations are encircled at a distance of from two to five miles by an outer range of heights, including Villejuif, Meudon, St Cloud, and Mont-Valérien (650 feet), the highest point in the immediate vicinity of the city. The Seine, which enters Paris in the south-east at Bercy, and leaves it at Auteuil in the west, divides the city into two parts, and forms the two islands of La Cité and St Louis, which are both covered with buildings.

France has long been the most highly centralised country in Europe, and Paris as its heart contains a great population of government officials. As a city of pleasure it attracts the wealthy from all parts of the world. It can boast of possessing the best dressmakers in the world; and through some of them (Paquin, Beer) sets the pace of fashion every season at the race-courses that adjoin Paris. But it is also, as the capital of the thriftiest nation there is, a city of capitalists and a great financial centre. Further, in the realm of learning, the provincial universities of France have been largely deprived of their attraction by the schools of Paris, to which flock the pick of the country's youth. The publishing trade has followed the same course. Paris, with the notable exceptions of the motor and aeroplane trade, cannot be described as a manufacturing town. Its chief and peculiar industries produce articles which derive their value not from the cost of the material but from the skill and taste bestowed on them by individual workmen. They include jewellery, bronzes, artistic furniture, and decorative articles known as 'articles de Paris.'

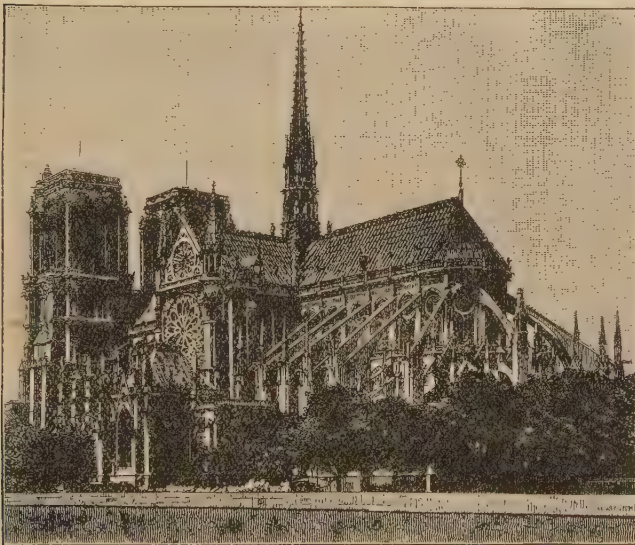
Before speaking in detail of the streets, boulevards, and *places* or squares of Paris, it is proper to mention that the private houses as well as the public buildings are built of a light-coloured limestone, quarried in the neighbourhood of the city, easily cut with the saw and carved ornamentally with the chisel. With this material they are reared in huge blocks to a height of six or seven stories, each floor comprising generally two distinct flats; access to all the floors in a tenement being gained by a common stair and common gate (the *porte cochère*), which are placed under the charge of a porter or *concierge* at the entrance; he, by pulling a *cordon* or rope, gives admission to the tenants at night. In the great new streets this general plan has been adhered to, but with this difference, that instead of being narrow and crooked they are wide and straight. Among the finest are the Rue de Rivoli, the Rue de la Paix, the Rue Royale, Avenue de l'Opéra, the Avenue de Champs-Élysées, the Avenue du Bois de Boulogne (the two latter forming the finest avenue of any city in Europe), and the avenues that radiate from the Arc de Triomphe generally. The Boulevards, which extend in a semicircular line on the right bank of the Seine, between the nucleus of the city and its surrounding quarters, present the most striking feature of Paris life. In all the better parts of the city they are lined with trees, seats, stalls, kiosques, and little towers covered with advertisements. Restaurants, cafés, shops, and

an impatience of everything not in the latest fashion, long neglected their old buildings in the style they had originated. Their Gothic churches were disfigured by incongruous additions and tawdry ornaments, which make them uninteresting if not repulsive to visitors. This remark does not apply, however, to the first two churches we shall mention. They have been admirably restored, and it is now difficult to say whether their incomparable beauty is to be more attributed to mediæval builders or to the modern architects by whom they have been renovated.

Among the district churches of Paris (upwards of sixty in number) the grandest and most interesting, from a historical point of view, is the cathedral of Notre Dame, which stands on a site successively occupied by a pagan temple and a Christian basilica of the time of the Merovingian kings. The main building, begun in the 12th century, is 400 feet long, 150 feet wide, and 110 high. The height of two towers is 218 feet, that of the *flèche* 300 feet. The interior consists of a principal and two flanking

of oak and lead; and under the care of some of the ablest architects of France the church was converted into what is now described in Paris as the noblest of Gothic buildings. The *Salute Chapelle*, built by St Louis in 1245-48, for the reception of the various relics which he had brought from the Holy Land, is perhaps the greatest existing masterpiece of Gothic art. Restored by Napoleon III. at a cost of £50,000, it was threatened by the Commune, but saved. One of the most interesting churches in Paris is St Séverin, buried in narrow streets of the Quartier Latin. A large part of it is in the English Gothic of the 15th century, showing that it was erected during the English occupation of Paris. St-Germain-des-Prés, which is probably the most ancient church in Paris, was completed in 1163; St Étienne du Mont and St Germain l'Auxerrois, both ancient, are interesting—the former for its picturesque and quaint decorations, and for containing the tomb of Ste Geneviève (q.v.), the patron saint of Paris; and the latter for its

rich decorations and the frescoed portal, restored at the wish of Margaret of Valois. Among modern churches is the Madeleine (1806-42), built in the style of a Corinthian temple, and originally intended by Napoleon I. to be a monument to the Grande Armée. It forms an oblong building, 328 feet long by 138 wide, independently of the flights of steps. The height of the columns is 62 feet, that of the entablature 14 feet, and the entire height from the ground 116 feet. There are in all fifty-two columns. The roof is of iron and copper. The interior is elaborately decorated with gold, white marble, paintings, and sculptures; but in spite of their religious subjects the building still produces on northern eyes the impression of a pagan temple rather than of a Christian church. The Panthéon (1764) was begun as a church, but converted by the Constituent Assembly of republican France into a temple dedicated to the great men of the nation, next restored to the church by Napoleon III. and rededicated to Ste Geneviève, but



Notre Dame: from the River.

naves, which are continued round the choir. It has been said that if the pillars of Notre Dame could speak they might tell the whole history of France. The kings, however, were crowned at Reims, and the only royal coronation celebrated at Notre Dame was that of Henry VI. of England in 1431. There, too, was sung in 1486 a memorable *Te Deum* when Paris was retaken by the troops of Charles VII. During the French Revolution the church was mutilated in order to destroy what were supposed erroneously to be emblems of royalty. In 1793, after childish and repulsive mockeries of the ceremonies of the Roman Catholic Church, it was converted into a 'temple of reason.' In 1804 Napoleon I., at the height of his power, resolved to impress Europe by an imposing ceremony—that of his coronation—in Notre Dame; and there it was that he, in presence of the pope, who never before had crossed the Alps at the bidding of king or emperor, placed the crown upon his own head. In 1831 the novel of Victor Hugo, *Notre Dame*, made the church interesting to all Europe. In France there was a general desire for its restoration, and in 1845 this great work was undertaken by the state. Viollet-le-Duc added to the building the great *flèche*, a structure

once more, on the occasion of the funeral of Victor Hugo (1885), reconverted into a monument, with the old inscription 'Aux grands hommes la patrie reconnaissante.' The Panthéon has been spoken of as rivalling St Peter's at Rome and St Paul's in London. The frescoes of the interior are very fine. In the crypt are the tombs of Voltaire, Rousseau, Victor Hugo, and Zola. The *Chapelle des Invalides* is particularly beautiful; there lie the remains of Napoleon I. The sarcophagus, hewn from a huge block of Russian granite, is of a grandeur and solemnity of design well worthy of that great warrior. Notre Dame de Lorette, erected in 1823, is a flagrant specimen of the meretricious taste of the day; St Vincent de Paul, completed in 1844, is somewhat less gaudy and more imposing in style. Among the few Protestant churches, l'Oratoire is the largest and the best known. For the great church of Sacré Cœur at Montmartre, see SACRED HEART.

Paris abounds in places of amusement suited to the tastes and means of every class. It has upwards of forty theatres, mostly cheaper than London theatres. The leading houses are the Opéra, the Théâtre Français—chiefly devoted to classical French drama—the Opéra Comique, and the Odéon,

which receive a subvention from government. The opera-house, completed in 1875, is one of the most magnificent buildings of its century, having cost, exclusive of the site, £1,120,000. The lighter side of amusement is provided by music-halls and café-concerts and cabarets artistiques. Among the latter should be mentioned the Chat Noir, La Pie qui chante, La Lune Rousse; some of the best French wit is to be heard there; the Moulin Rouge and Bal Tabarin are dancing places in Montmartre that recruit little of their coarse and jaded clientèle from the French Parisians. In addition to the noble gardens of the various once imperial palaces, the most densely-crowded parts of the city have public gardens, shaded by trees and adorned with fountains and statues, which afford the means of health and recreation to the poor. At the west of Paris, beyond the old fortifications, is the Bois de Boulogne, converted by Napoleon III. from a wood covered with stunted trees into one of the most beautiful gardens in Europe. It takes the place of the London parks for the fashionable world of Paris. East of Paris is the Bois de Vincennes, an admirable recreation ground for the working-classes. While, however, the parks of London are centrally situated, those of Paris are on the outskirts of the town.

Paris has three large and twelve lesser cemeteries, of which the principal one is Père-la-Chaise (see LACHAISE), extending over 200 acres, and filled in every part with monuments erected to the memory of celebrated persons buried there. The famous mortuary, the Morgue, was pulled down in 1924, and a mortuary with the new name Institut Médico-Légal built on the riverside at the Quai de la Rapée; its former site behind Notre Dame is now a public garden. The southern parts of Paris are built over beds of limestone, which have been so extensively quarried as to have become a network of vast caverns. These quarries were first converted in 1784 into catacombs so-called, in which are deposited the bones of the dead, collected from the ancient cemeteries of Paris.

It has been frequently remarked that Paris contains few important civil buildings of the middle ages, which is to some extent due, apart from actual destruction, to the reckless way in which improvements have been carried out. A government commission now watches over the historic monuments of Paris, so that further destruction is checked. Two most interesting civil buildings of the 15th century still exist. One is the Hôtel de Cluny (see CLUNY), one of the finest existing monuments of the Gothic Flamboyant style. The other is the Hôtel de Sens, the old palace of the archbishops of Sens, formerly metropolitans of Paris. It is unfortunately buried among narrow streets north of the Seine and opposite the Cité. For many years it has been put to business purposes, both private and public, and it presents an essentially derelict appearance.

The Louvre, the greatest of the modern palaces of Paris, forming a square of 576 feet by 538 feet, was erected on the site of an old castle of the 13th century (see below). The first part, the south-west wing, was erected in 1541 on the plan of Pierre Lescault. It remains a masterpiece of architectural design and monumental sculpture. The principal portion of the great square was completed under Louis XIV. in the latter part of the 17th century, the physician Claude Perrault being the architect. The colonnade of the eastern façade is more admired than any other part of the building.

The Palace of the Tuileries was begun in 1566 by Catherine de Médicis, and enlarged by successive monarchs, while used as a royal residence,

until it formed a structure nearly a quarter of a mile in length, running at right angles to the Seine. It was connected with the Louvre, which lay to the west, by a great picture-gallery overlooking the Seine, and 1456 feet in length. North of the picture-gallery, and between the two palaces, lay the Place du Carrousel, in the midst of the most magnificent palatial structure in the world. The Tuileries continued to be occupied as the residence of the imperial family; but the Louvre proper formed a series of great galleries filled with pictures, sculptures, and collections of Egyptian, Greek, and Roman antiquities. The Commune attempted to burn the whole pile, but only succeeded in destroying the Tuileries and a corner of the Louvre. The Place du Carrousel enclosed between them and the Louvre is now thrown into the great line of gardens stretching west to the Arc de l'Étoile. In the midst of the old palaces a statue of Gambetta, surrounded by allegorical figures, has been erected. North of the Louvre is the Palais Royal. It forms a mass of buildings, including the old palace of the Orleans family, the Théâtre Français, and a quadrangle of shops, restaurants, and cafés, enclosing a large garden open to the public, 700 feet long by 300 feet wide. Its galleries were long one of the liveliest and most frequented spots in Paris. Its cafés had a world-wide reputation, which has faded, however, since the great improvements of Napoleon III. sent the current of life into other quarters. The most valuable part of the palace, fronting the Rue St Honoré, was set on fire by order of the Commune in 1871. The Palace of the Luxembourg, on the south side of the Seine, was built by Marie de Médicis in the Florentine style. It contains many magnificent rooms, and in 1879 became the meeting-place of the French senate. Close to it a gallery has been constructed for the reception of the works of living artists acquired by the state. On the north bank of the Seine, opposite the Island of the Cité, stands the Hôtel de Ville. It was burned by the Commune, but has been rebuilt and restored in the style of its predecessor, and is now one of the finest buildings in Paris. On the Island of the Cité stands the Palais de Justice, a vast pile, also set fire to by the Commune; some parts of it date from the 14th century, and others are modern. It is the seat of some of the courts of law, as the Courts of Cassation, of Appeal, and of Police. Within the precincts of this palace are the Sainte Chapelle, and the noted old prison of the Conciergerie, in which Marie Antoinette, Danton, and Robespierre were successively confined. The Conciergerie is still one of the several prisons of Paris. Others are La Santé, St Lazare (for females), La Petite Roquette (for juveniles), and, some little distance outside Paris, Fresnes les Rungis, a modern institution on novel, and it is even said on palatial, lines.

The number of benevolent institutions is enormous. The largest of the numerous hospices or almshouses is La Salpêtrière, probably the largest asylum in the world, extending over 78 acres of land, and appropriated solely to old women; Bicêtre receives only men. The Hospice des Enfants Trouvés, or Foundling Hospital (q.v.), provides for the infants brought to it till they reach the age of maturity, and only demands payment in the event of a child being reclaimed. The Crèches (q.v.) receive the infants of poor women for the day. Besides institutions for the blind, deaf and dumb, convalescents, sick children, &c., Paris has many general and special hospitals. Of these the oldest and most noted are the Hôtel Dieu, La Charité, and La Pitié.

The chief institutions connected with the University of Paris, and with education generally, are still situated in the Quartier Latin. The Sorbonne

(q.v.), the seat of the Paris faculties of letters, science, and Protestant theology, has been rebuilt and increased in size (1899). The Sorbonne contains lecture-halls and class-rooms, and an extensive library open to the public. Near the Sorbonne is the Collège de France, where gratuitous lectures are also delivered by eminent scholars and men of letters, as well as a large number of colleges and lycées, the great public schools of France for secondary instruction, filling the Quartier Latin with huge barrack-like buildings. The Scots College stands as it did in the 17th century, five stories high, with eleven windows in a row, a good specimen of the old Paris colleges. The École Polytechnique, the School of Medicine and the School of Law, the Observatory, and the Jardin des Plantes, with its great museums of natural history, lecture-rooms, and botanical and zoological gardens, are situated in the same quarter of Paris. The principal of the public libraries is that of the Rue Richelieu, called the Bibliothèque Nationale (see LIBRARY), which originated in a small collection of books placed by Louis XI. in the Louvre. It is surpassed only by the British Museum in the number of its books and manuscripts.

No city on this side of the Alps is richer than Paris in fine-art collections, and among these the museums at the Louvre stand pre-eminent. Among its chief treasures may be mentioned, in the museum of antique sculptures, the famous Venus of Milo, and in the Salon Carré the great works of the Italian, Flemish, and Spanish masters, one of which, Leonardo da Vinci's masterpiece, *La Joconde* (*Mona Lisa*), was stolen in 1911, but was subsequently found in Italy and returned to France by the Italian government. It is impossible to do more than refer to the long succession of galleries in which are exhibited Egyptian, Assyrian, Elamitic, Greek, Roman, mediæval, and Renaissance relics and works of art. The Musée Carnavalet or historical museum of the city of Paris has been specially devoted to the collection of everything interesting connected with the municipality. On the demolition of the old houses many objects were found which formed the nucleus of the collection, which is constantly receiving large additions which make it one of the most interesting of the Paris museums. The Hôtel de Cluny contains curious relics of the arts and usages of the French people, from the earliest ages of their history to the Renaissance period. The potteries, sculptures, paintings, arms, furniture, and tapestries of the middle ages and of the 16th and 17th centuries are of the highest historical interest and value. The Museum of Artillery at the Hôtel des Invalides is devoted to arms and armour, flags and war dresses. The Musée Guimet, or 'National Museum of Religions,' includes objects used in religious ceremonies, savage, Indian, Chinese, &c. The Mint deserves notice for the perfection of its machinery; and the Gobelins (q.v.), or tapestry manufactory, may be included under the fine arts, as the productions of its looms are all manual, and demand great artistic skill. The Conservatoire des Arts et Métiers, in the Rue St Martin, contains a great collection of models of machinery, and class-rooms for the instruction of workmen in all departments of applied science. The great Paris exhibitions have all left behind them important buildings. The spacious building in which the exhibition of 1878 took place was named Palace of the Trocadéro, and is now used for musical entertainments and as an architectural and ethnological museum. For the exhibition of 1889 was erected one of the most striking monuments of modern Paris, the Eiffel (q.v.) Tower, while the exhibition of 1900 left as bequests the

Grand and the Petit Palais which the republic can justly boast of.

The fortifications, demolished in 1919-22, formed a rampart of over 22 miles. They were begun under Louis-Philippe, cost £5,500,000, and when completed entirely encircled the city except for the necessary openings for roads, for railways, for canals, and for the Seine. Long before the time of their destruction their strategic uselessness had been recognised. At the various gates was collected the octroi or town dues, an important but troublesome source of revenue to the city; the expectation that these dues would disappear with the fortifications was disappointed. On the left bank of the Seine is the École Militaire, founded in 1752, and used as barracks for infantry and cavalry; it can accommodate 10,000 men and 800 horses. Near it is the Hôtel des Invalides, founded in 1670 for disabled soldiers.

Paris is divided into twenty arrondissements. The prefect of the Seine is the chief of the municipal government, and is appointed by the government. There is a large municipal council, chosen by popular election. Each arrondissement has a maire and two assistant-councillors. The prefect of police is at the head of the civic guard or gendarmes, the fire-brigade, and the sergents de ville or city police, who are armed with swords and revolvers, since the spread of hooliganism (*apaches*) in many quarters of Paris. The cleaning, sewerage, and water-supplies of Paris are under the charge of the prefect. In some districts of the city, and in most suburban localities, there is no main sewerage system, but street improvement makes for extension. The water-supply is plentiful, though not invariably readily accessible. The street lighting is usually good, but the streets themselves, for the most part cobbled, are rough, and traffic is dangerous owing to lack of proper control. In 1818 public slaughter-houses, or abattoirs, were established at different suburbs; only there are animals allowed to be slaughtered. Large cattle-markets are held near the licensed abattoirs. There are in the heart of the city numerous *halles*, or wholesale, and *marchés*, or retail markets. The principal of these is the Halles Centrales, near the church of St Eustache, covering nearly 20 acres. A striking feature of modern Paris is its anglicisation. Tea-rooms are now to be found in nearly all quarters of Paris: so are English shops with English goods. English fashion for men is considered the height of *chic*, and to this craze probably must be attributed the increase in music-halls, bars, and saloons in fashionable parts of the town, and the eagerness of modern Parisian youth for sports, tennis, and so forth, at various clubs in and outside the city.

History.—The earliest notice of Paris occurs in Cæsar's *Commentaries*, in which it is described, under the name of Lutetia, as a collection of mud huts, composing the chief settlement of the Parisii, a Gallic tribe, conquered by the Romans. Lutetia soon acquired great strategic importance, due to its lines of defence—the windings and marshes of the Seine and Marne to the east and west, and the forest-clad hills on the north and south. It lay midway between the chief enemies of Rome in Gaul, the Germans on the east and the unsubdued Celts of Armorica on the west. In 53 B.C., accordingly, Cæsar assembled there the delegates of the Gallic tribes, and it became an important Roman town. Two ruins of this period remain south of the Seine. One formed part of the Palais des Thermes, the abode of the Roman governors of Lutetia and afterwards of the Merovingian kings of France. The other ruin is that of the *arènes* or amphitheatre of the Roman city. The foundations and parts of the old wall were discovered in 1870, and since then excavations have

laid them bare. In 1891 they were enclosed in a small park and thrown open to the public. The amphitheatre was 180 feet long by 153 feet wide. It is estimated that it could contain 10,000 spectators of the gladiatorial shows. Lutetia began in the 4th century to be known as Parisia, or Paris. In the 6th century Paris was chosen by Clovis as the seat of government; and after having fallen into decay under the Carolingian kings, who made Aix-la-Chapelle their capital, and in whose time it suffered severely from frequent invasions of the Northmen, it finally became in the 10th century the residence of Hugh Capet, and the capital of the French monarchy. From this period Paris continued rapidly to increase, and in two centuries it had doubled in size and population. The reign of Philippe-Auguste (1180-1223) is the great epoch in the mediæval history of Paris. It was then that were erected masterpieces of Gothic art, including the nave, the choir, and the chief façade of Notre Dame and the Sainte Chapelle. Then was founded the University of Paris, the great theological school of the middle ages, wielding a power over the church second only to that of Rome, and attracting from all parts of western Europe vast crowds of students, who, on returning to their homes, spread abroad a knowledge of the art and culture of Paris. Philippe-Auguste built a crenelated wall and flanking towers, one of which, the Tour de Nesle (q.v.), stood on the site of the Palace of the Institute. Outside the wall he erected the castle of the Louvre on the site of the present palace. It became the centre and stronghold of feudalism and the citadel of Paris, which was now, after Constantinople, the greatest city of Europe. In the 16th century the castle was still used as a royal residence, but after the reception of Charles V. there by Francis I. it was pulled down to make way for the new palace. Luckily the walls were not levelled to their foundations. In 1885 they were discovered to exist. Galleries have been excavated, and extensive ruins have been laid bare, which now form the most interesting sight of underground Paris.

In the middle ages Paris was divided into three distinct parts—the Cité, on the islands; the Ville, on the right bank; and the Quartier Latin, or University, on the left bank of the river, and on the Montagne Ste Geneviève. In 1358 broke out the first of the long series of Paris revolutions. It was headed by Étienne Marcel, the famous provost of the Paris merchants, who for a time ably ruled the town. Louis XI. did much to enlarge Paris and to efface the disastrous results of its hostile occupation by the English during the wars under Henry V. and Henry VI. of England; but its progress was again checked during the wars of the last of the Valois, when the city had to sustain several sieges. On the accession of Henri IV. of Navarre, in 1589, a new era was opened for Paris. The improvements commenced in his reign were continued under the minority of his son, Louis XIII. Louis XIV. converted the old ramparts into public walks or *boulevards*, organised a regular system of police, established drainage and sewerage works, founded hospitals, almshouses, public schools, scientific societies, and a library, and thus renewed the claim of Paris to be regarded as the focus of European civilisation.

The terrible days of the Revolution caused a temporary reaction; but the improvement of Paris was recommenced on a new and grander scale under the first Napoleon, when new quays, bridges, markets, streets, squares, and public gardens were created. All the treasures of art and science which conquest placed in his power were applied to the embellishment of Paris, in the restoration of which he spent more than £4,000,000 sterling

in twelve years. His downfall again arrested progress, and in many respects Paris fell behind other European cities. Renovation was recommenced under Louis-Philippe; but as lately as 1834 much of the old style of things remained; the gutters ran down the middle of the streets, there was little underground drainage from the houses, oil-lamps were suspended on cords over the middle of the thoroughfares, and, except in one or two streets, there were no side-pavements. It was reserved for Napoleon III. to reconstruct Paris. When he commenced his improvements Paris still consisted, in the main, of a labyrinth of narrow, dark, and ill-ventilated streets. He resolved to pierce broad and straight thoroughfares through the midst of these—thus putting an end to the possibility of forming barricades—to preserve and connect all the finest existing squares and boulevards, especially those surrounding the monuments of the Bonaparte family, and, in lieu of the old houses pulled down in the heart of the town, to construct, in a ring outside of it, a new city in the most approved style of modern architecture. With the assistance of Baron Haussmann (q.v.), the Prefect of the Seine, his schemes were carried out with rare energy and good taste. With a fresh supply of water, trees, parterres, and fountains were introduced everywhere, and Paris ceased to produce on visitors the impression that it stood in the midst of a chalky desert. It was converted into one of the greenest and shadiest of modern cities. Two straight and wide thoroughfares, parallel to and near each other, crossed the whole width of Paris from north to south through the Cité; a still greater thoroughfare was made to run the whole length of the town, north of the Seine, from east to west. The old boulevards were completed so as to form outer and inner circles of spacious streets—the former chiefly lying along the outskirts of the old city, the latter passing through and connecting a long line of distant suburbs. In the year 1867, when the international exhibition was opened, Paris had become in all respects the most splendid city in Europe. Many further improvements were then contemplated. Financial and political difficulties were, however, at hand (see FRANCE), and these schemes had to be postponed. The siege of Paris by the Germans, which lasted from 19th September 1870 to 28th January 1871, caused much less injury to the city than might have been expected—it was reserved for a section of the Parisian population to commit an act of vandalism without a parallel in modern times. On the 18th of March the Red Republicans, who had risen against the government, took possession of Paris. On the 27th March the Commune was declared the only lawful government. Acts of pillage and wanton destruction followed. On the 15th of May the column erected to the memory of Napoleon and the Great Army, in the Place Vendôme, was solemnly pulled down as 'a monument of tyranny.' The government troops under Marshal MacMahon attacked the insurgents, and kept them from doing further mischief. The former succeeded in entering Paris on the 20th of May, and next day the Communists began systematically to set fire with petroleum to a great number of the chief buildings of Paris, public and private. The fire for a time threatened to destroy the whole city. It raged with the greatest fury on the 24th, and was not checked until property had been lost to the value of many millions sterling, and historical monuments were destroyed which never can be replaced. The horror inspired by the Commune for a time drove the wealthy classes from Paris, and it was feared that it would lose its prestige as a European capital. This, however, has not proved to be the case. By the autumn of 1873 all the private houses burned had been rebuilt,

the monuments only partially injured had been restored, and the streets and public places were as splendid and gay as in the best days of the empire.

Since the establishment of the republic improvements have been executed little if at all inferior in importance to those of the second empire. New streets have been opened near the Paris Bourse de Commerce and the Post-office; the Champ de Mars, a waste of sand in which the Eiffel Tower was erected, has now become a beautifully built area, and the Grand and Petit Palais have already been mentioned; the museums of the Jardin des Plantes have been rebuilt; the Quartier Latin has been covered with educational buildings. Notable also has been the construction of the *Métros* and the *Nord Sud*, two systems of electrified underground railways, which hold within their network almost every part of the city. In 1910 and 1911 disastrous floodings of the Seine occurred. During the Great War in August and September 1914, and in June 1918, the German armies approached to within thirty miles of Paris; on the first occasion reinforcements despatched in the commandeered taxi-cabs of the city contributed memorably to the enemy's repulse. In 1918, too, Paris was bombarded from a distance of about fifty miles by a freak long-range gun, but little damage was done, and it, and such damage as resulted from sporadic air-raids, was quickly repaired on the conclusion of the war.

Somewhat conflicting opinions are expressed on the part Paris has played in the history of the world. After Athens and Rome, says one writer, it is the city that has made the deepest impression on men's minds. Paris, says another, has carried the torch of life and civilisation from century to century, and done most to spread culture and enlightenment throughout the globe. At this moment, says a third, the inhabitants are the best fed and best clad, the best educated of city populations. These views are generally accepted in France. There is, however, a reverse to the picture. The Parisians are declared to be a feeble people, dying out, and constantly recruited by immigration from Belgium, Alsace, Switzerland, and Italy. Paris is a modern Babylon; its domestic life, described in French novels, is a centre of corruption for Europe. There has been, no doubt, truth in all these views at different periods of the history of Paris. Certain it is, however, that in England it is too often forgotten that in Paris drunkenness is still rare, that among a large section of the population there has always been a pure domestic life, and that the profligacy of the second empire has now ceased to exist.

See the guidebooks of Murray, Baedeker, Joanne, and Muirhead and Monmarché; topographical works by Du Camp (7th ed. 6 vols. 1884), Colin (1885), Pontich (1884); the official *Annuaire Statistique* (since 1883); G. A. Sala, *Paris Herself Again* (1879); P. G. Hamerton, *Paris in Old and Present Times* (1884; new ed. 1892); Piton, *Comment Paris s'est Transformé; Histoire, Topographie, &c.* (1891); *Paris Guide par les principaux Écrivains et Artistes de la France* (introd. by Victor Hugo, and parts by Michelet, Louis Blanc, Renan, Sainte-Beuve, Taine, Quinet, Viollet-le-Duc, &c. (2 vols. 1867-68); Hoffbauer, *Paris à travers les Âges* (1890 et seq.); Lebeuf, *Histoire de la Ville et de tout le Diocèse de Paris* (15 vols. 1754; new ed. by Cocheris, 4 vols. 1863); Dulaure, *Histoire Civile, Physique, et Morale de Paris* (7 vols. 1821; new ed. by Leynadier, 1874); histories by De Gaulle (1840), Gabourd (1863-65), Arago (*Paris Moderne*, 2d ed. 1867); and the copious *Histoire Générale de la Ville de Paris*, issued, since 1866, by the municipal authorities; also histories of the university, in the middle ages by Budinssky (Berlin, 1876), and in the 17th and 18th centuries by Jourdain (Paris, 1862-66). Some account of the siege of Paris in 1870-71 is given at FRANCE (HISTORY). See also Du Camp, *Les Convolutions de Paris* (1875-79); Morin, *Histoire Critique*

de la Commune (1871); Vinoy, *Siège de Paris* (1872); Viollet-le-Duc, *La Défense de Paris* (1872); books by Grant Allen (1897), Belloc (1900), Macdonald (1900), Whiteing (1900); Lacombe, *Bibliographie de Paris* (1886); Vandam, *Men and Manners under the Third Republic* (1904); Barrett Wendell, *France of To-day* (1907); and Braque, *France under the Republic* (1910).

DECLARATION OF PARIS.—In 1856 the representatives of the Powers agreed to four points in International Law (q.v.)—viz. (1) Privateering is abolished; (2) the neutral flag covers enemies' goods, excepting Contraband of War (q.v.); (3) neutral goods, with the same exception, are not liable to be seized even under an enemy's flag; (4) blockades, in order to be binding, must be effective. The United States refused to accept the first point, because the European powers declined to affirm that thereafter all private property should be exempted from capture by ships of war. See NEUTRALITY.

TREATIES OF PARIS.—The Peace of Paris of 1763 terminated the Seven Years' War (q.v.); fixed the territorial relations of Germany, France, and Spain; gave to England the French colonies in America; and rearranged the possessions of France and England in the West Indies, India, and Africa. The Treaty of 1814, concluded by the Allies soon after the abdication of Napoleon, reduced France substantially to its old limits. That of 1815, after Waterloo, did so more completely, levied a heavy contribution towards the war expenses, and reconstituted the map of Europe on the old lines. The Treaty of 1856 concluded the Crimean War (q.v.). A Treaty of 1857 arranged relations between Britain and Persia.

Paris. (1) Capital of Bourbon county, Kentucky, on Stoner Creek, 19 miles by rail N.E. of Lexington. It contains a military institute, and manufactures tobacco, flour, cordage, &c. Pop. 6000.—(2) Capital of Lamar county, Texas, 98 miles by rail N.E. of Dallas. It has manufactories of brooms, furniture, sashes, wagons, ploughs, &c. Pop. 15,000.

Paris, a genus of monocotyledonous plants of the family Liliaceæ, of which one species, *P. quadrifolia*, called Herb Paris, is not uncommon in moist, shady woods in some parts of Britain. It is rarely more than a foot high, with one whorl of generally four leaves, and a solitary flower on the top of the stem, followed by a berry. The berry is reputed narcotic and poisonous, but its juice has been employed to cure inflammation of the eyes. The root has been used as an emetic.

Paris, also called ALEXANDER, was, according to Homer, the second son of Priam and Hecuba, sovereigns of Troy. His mother dreamed during her pregnancy that she gave birth to a firebrand, which set the whole city on fire, a dream interpreted by Æsacus or Cassandra to signify that Paris should originate a war which should end in the destruction of his native city. To prevent its realisation Priam caused the infant to be exposed upon Mount Ida, by a shepherd named Agelaus, who found him five days after alive and well, a she-bear having given him suck. Agelaus brought him up as his own son, and he became a shepherd on Mount Ida. An accident having revealed his parentage, old Priam became reconciled to his son, who married Enone, daughter of a river-god. But his mother's dream was to come true for all that. He was appealed to, as umpire, in a strife which had arisen among the three goddesses, Hera (Juno), Athene (Minerva), and Aphrodite (Venus), as to which of them was the most beautiful, the goddess Eris (Strife) having revengefully flung among them, at a feast to which she had not been invited, a golden apple (of discord) inscribed 'To the Most Beautiful.'

Each of the three endeavoured to bribe him. Hera promised him dominion and wealth; Athene, military renown and wisdom; Aphrodite, the fairest of women for his wife—to wit, Helen, the wife of King Menelaus. Paris decided in favour of Aphrodite—hence the animosity which the other two goddesses displayed against the Trojans in the war that followed. Paris now carried Helen away from Lacedæmon in her husband's absence. 'The rape of Helen' is the legendary cause of the Trojan war (see HELEN, TROY). Paris deceitfully slew Achilles in the temple of Apollo. He was himself wounded by a poisoned arrow, and went to Mount Ida to be cured by CEnone; but she avenged herself for his unfaithfulness to her by refusing to assist him, and he returned to Troy to die.

Paris, COMTE DE. See BOURBON, ORLEANS.

Paris, GASTON, born 9th August 1839, succeeded his father, Paulin Paris (1800–81), in 1872 as professor of old French at the Collège de France, became a member of the Academy of Inscriptions in 1872, and of the Académie Française in 1896. He wrote a long series of most valuable works on old French literature (*La Poésie du Moyen-Âge*, 1885–95; *La Littérature Française au Moyen-Âge*, 4th ed. 1909), and edited many texts (as *Le Roman de Renard*, 1895). He died in March 1903.

Paris, MATTHEW, chronicler, who probably inherited his family-name (then not uncommon in England), was born about 1200. In January 1217 he entered the Benedictine monastery of St Albans, grew up under the eye of Roger de Wendover, and in 1248 was sent by the pope's recommendation on a mission to repair the financial disorders in the Benedictine monastery on Monk's Island (Holm) near Trondhjem in Norway. In July 1251 he was in attendance at the court at Winchester, six months later he witnessed the marriage at York of Henry's daughter to Alexander II. of Scotland, and in March 1257 he had much conversation with the king during his week's visit to the monastery. His death occurred about the middle of 1259. Matthew Paris's principal work is his *Historia Major*, or *Chronica Majora*, a history from the creation down to the year 1259. The original edition is that published in 1571 under the authority of Archbishop Parker; but the authoritative edition of the work is that edited by Dr Luard in the Rolls series (7 vols. 1872–83). His conclusion as to its authorship is that down to the year 1189 it was the work of John de Cella, abbot of St Albans from 1195 to 1214; that from that point it was continued by Roger de Wendover down to the year 1235—the whole work to this point being often ascribed to him alone, and known as the *Flores Historiarum*; that Matthew of Paris next transcribed, corrected, and extended (by *interpretation* rather than *interpolation*) the work, which, moreover, from 1235 down to 1259 is entirely his own. As a historian he is vigorous, vivid, and accurate, and his pages are aglow with patriotic fervour. His *Historia Anglorum* is abridged from the greater work by the omission of what relates to foreign affairs. It was edited by Sir F. Madden in the Rolls series (3 vols. 1866–69). Other works are the *Abbreviatio Chronicorum* (1100–1255); *Liber Additamentorum* or *Supplementorum*; the dubious *Duorum Offarum Merciorum Regum Vitæ*; and the valuable *Viginti trium Abbatum S. Albani Vitæ*.

See the translations by Giles (1847), and the *Cambrian History of English Literature*, vol. i. (1907).

Paris, PLASTER OF. See GYPSUM, STUCCO.

Paris Basin, in Geology, the area in which the Cainozoic systems of France are best developed. See Eocene SYSTEM.

Paris Bordone. See BORDONE.

Parish (Lat. *parochia*; Gr. *paroikia*, 'neighbourhood') is a term originally used for the district assigned to a bishop or priest. In early times the bishop arranged all the church work of his diocese, and the minor churches were served by clergy sent from the bishop's church. Where the church was established and endowed parishes were assigned to resident priests, and tithes were, by special gift or by general rules of law, made payable to the parson of the parish. In England provisions relating to this matter were included among the laws of Edgar about 970. Parishes were formed on the basis of previously existing manors and townships; the lord of the manor often held the Advowson (q.v.) or patronage of the parish church; and the inhabitants held their meetings in the vestry of the church; the parson presided, and he was usually permitted to nominate one of the Churchwardens (q.v.). The parish was originally the unit of administration for poor-law and highway purposes, but modern legislation has transferred many of the functions of parish authorities to Boards of Guardians (see POOR-LAWS), County Councils (see COUNTY), and other authorities. There are about 15,000 civil parishes in England and Wales, and 1500 in Scotland; they vary widely both in extent and in population. The boundaries of an ancient parish are fixed by custom, the memory whereof was formerly, and in some cases is still, kept alive by an annual perambulation (see BOUNDS). Ancient parishes have been divided and altered in many cases in the exercise of statutory powers; in the case of civil parishes in England and Wales the Ministry of Health possesses large powers of alteration. For ecclesiastical purposes populous parishes may be divided and new vicarages constituted by the Ecclesiastical Commissioners; by the exercise of these powers the number of ecclesiastical parishes has been raised to over 14,000. The parson or incumbent is a corporation sole; he has a freehold in his office, and in the church and churchyard (see TITHE). The church is only used for the services of the Church of England; the Churchyard (q.v.) may be used by Nonconformists. The local government of a parish is now determined by the Local Government Act of 1894, which established district councils, parish meetings, and parish councils. The district councils are mainly the old rural and urban sanitary authorities under a new name, and have charge of highways, &c. The parish meeting in every rural parish includes all persons registered as local government electors, and retains, even where there is a parish council, the power of adopting certain Adoptive Acts (Lighting and Watching Act, Baths and Washhouses Acts, Burial Acts, Public Improvements Act, Public Libraries Acts), and of controlling to some extent the expenditure of the parish. When there is no parish council, the parish meeting (which must take place at least once a year) appoints the overseers, and may have some of the powers of the parish council conferred on it by the county council. Every rural parish with a population of 300 (though some parishes are grouped for the purpose) has now a parish council of a chairman and from five to fifteen councillors, elected annually at a parish meeting by show of hands, or by ballot, if demanded. Smaller parishes may have a council, but the consent of the county council is required if the population is less than 100. The parish council, which is a corporate body whose expenses are defrayed out of the poor-rate, appoints overseers and assistant-overseers, has the carrying out of the parochial Adoptive Acts by the provision of public offices and recreation grounds, the duty of looking after wells, streams, footpaths, rights of way, the regulation of minor nuisances, the power of acquiring and holding land

for allotments and other local purposes, and the administration of non-ecclesiastical charities. The offices of parish councillor, guardian, rural or urban district councillor, borough or county councillor are open to men and women subject to certain qualifying provisions. Local government franchise is open to men and women holding or occupying premises during a qualifying period. The wife of a man so qualified, if she is thirty years of age and resides on the same premises, is likewise entitled to registration.

The Vestry of a parish is either a common vestry—a meeting of all the ratepaying inhabitants, presided over by the incumbent—or a select vestry, elected under Hobhouse's Act (1831), or under a local act. In urban parishes it was unaffected by the Local Government Act of 1894 except where the urban district or borough council took over its duties; in rural parishes it continued to exist for ecclesiastical purposes only. The powers of the vestry and churchwardens, however, have been severely curtailed in England by the Parochial Church Council (Powers) measure of 1921. The administration of the Poor-laws (q.v.) in England is unaffected by the Act of 1894, save that now rural district councillors act as guardians. The care of the poor is almost entirely in the hands of the guardians; the overseers assist the guardians, but their duties as to poor relief are nominal. The assistant-overseers, when not appointed by the guardians, are officers of the parish council. A woman may be an overseer. See CHURCH-RATES, CHURCHWARDENS, CHURCHYARD, POOR-LAWS, VESTRY.

In Scotland, the Court of Session, acting as the Commission of Teinds, has power to unite and divide parishes, and to erect a disjointed part into a parish *quoad sacra*—i.e. for ecclesiastical purposes only. The poor-law was formerly administered by the kirk-session in country parishes and by magistrates in burghal parishes; but an Act of 1845 introduced a system of parochial boards, which since the Local Government Act of 1894 have been superseded by the parish councils. The church fabric is supported by the heritors; there are no churchwardens in Scotland; nor is there any meeting corresponding to the vestry. In the matter of parish schools Scotland was formerly far in advance of England. There are no parish meetings in Scotland or Ireland, and no parish councils in Ireland.

In the United States the term parish is not uncommonly used to denote the district assigned to a church or minister, but there are no civil parishes, except in the state of Louisiana.

See Beatrice and Sidney Webb, *Local Government*, Part I. (1906); Redlich and Hirst, *Local Government in England* (1903); Reichel, *Origin and Growth of the English Parish* (1921); Lord Selborne, *Churches and Tithes*; J. J. Clarke, *Local Government of the United Kingdom* (1924).

Parish Clerk. See CLERK.

Park, MUNGO, the African traveller, was born 10th September 1771, at Foulshields on the Yarrow, a farmer's seventh child in a family of thirteen. Educated at Selkirk, he was apprenticed to Dr Thomas Anderson, a surgeon there, and afterwards studied medicine in Edinburgh (1789-91). He was then introduced to Sir Joseph Banks by his brother-in-law, James Dickson, botanist, and obtained the situation of assistant-surgeon in the *Worcester*, bound for Bencoolen in Sumatra. On his return in 1793, the African Association of London had received intelligence of the death of Major Houghton, who had undertaken a journey to Africa at their expense. Park offered his services, was accepted, and sailed from England 22d May 1795. He spent some months at the English factory of Pisania on

the Gambia in making preparations for his travels, and in learning the Mandingo language. Leaving Pisania on the 2d of December he travelled eastward; but when he had nearly reached the place where Houghton lost his life, he fell into the hands of a Moorish king, who imprisoned him, and treated him roughly. Park seized an opportunity of escaping (1st July 1796), and in the third week of his flight reached the Niger, the great object of his search, at Sego, in 13° 5' N. lat. He followed its course downward as far as Silla; but meeting with hindrances that compelled him to retrace his steps, he pursued his way westward along its banks to Bammaku, and then crossed a mountainous country till he came to Kamalia, in the kingdom of Mandingo (14th September), where he was taken ill, and lay for some time. A slave-trader at last conveyed him again to the English factory on the Gambia, where he arrived, 10th June 1797, after an absence of nineteen months. Bryan Edwards drew up an account of his journey for the Association, and Park published an account of his travels after his return, under the title of *Travels in the Interior of Africa* (1799), a work which at once acquired a high popularity. He now married a daughter of Dr Anderson, his old Selkirk friend (2d August 1799), and settled as a surgeon at Peebles, where, however, he did not feel at home. He told Scott that he would rather brave Africa and its horrors than wear his life out in toilsome rides amongst the hills for the scanty remuneration of a country surgeon; and so, in 1805, he undertook another journey to Africa at the expense of government. As he parted from Scott on Williamhope ridge, his horse stumbled: 'I am afraid, Mungo,' said Scott, 'that is a bad omen.' To which Park replied with a smile, 'Freits (omens) follow those who look to them.' When he started from Pisania he had a company of forty-five, of whom thirty-six were European soldiers; but when he reached the Niger in August his attendants were reduced to seven. From Sansanding on the Niger, in the kingdom of Bambarra, he sent back his journals and letters in November 1805 to the Gambia, and embarked in an unwieldy half-rotten canoe with four European companions. Through many perils and difficulties they reached Boussa, where the canoe was caught in a cleft of rock; they were attacked by the natives, and drowned as they attempted to escape. An account of Park's second journey was published at London in 1815. Mrs Park was in receipt of a government pension till her death in 1840. Two of Park's sons joined the Indian army; Thomas, the second son, perished in trying to penetrate the mystery of his father's death. Park's narratives, which are well written, have long held their place amongst the classics of travel, and are of no inconsiderable value, particularly for the light which they throw upon the social and domestic life of the negroes, and on the botany and meteorology of the regions through which he passed; but he was unfortunately cut off before he had achieved the grand aim of his explorations—the discovery of the course of the Niger (q.v.). Park was tall and robust, and possessed of great hardihood and muscular vigour. 'For actual hardships undergone,' writes Joseph Thomson, 'for dangers faced, and difficulties overcome, together with an exhibition of the virtues which make a man great in the rude battle of life, Mungo Park stands without a rival.'

See the Life by Wishaw, prefixed to *Journal* (1815), and those by Joseph Thomson (1890) and T. B. Mac-lachlan (1898).

Parker, SIR GILBERT, born in Ontario in 1862, and educated at Trinity College, Toronto, travelled much in Canada and in the southern

seas, and for a time edited a Sydney paper. *Pierre and his People* (1892) is a fine presentation of Canadian character. Other stories of Canadian life, amongst *habitants*, half-breeds, and the rest, are *When Valmond came to Pontiac*, *The Seats of the Mighty* (a historical novel), and *The Lane that had no Turning* (1900). The scene of later stories is laid in Jersey, England, and Egypt; but none of these appealed so strongly as his Canadian stories. In his historical work on *Old Quebec* (1903) he had the help of a collaborator. Sir Gilbert settled in England, and from 1900 to 1918 sat as Conservative M.P. for Gravesend.

Parker, SIR HYDE (1739-1807) a British admiral, of a Devonshire family distinguished both before and after him in the naval service of the country, served in the American war and in the West Indies, and in 1801 was appointed to the chief command of the fleet which was sent to the Baltic to act against the armed coalition of the three northern states of Russia, Sweden, and Denmark. He had no share in the battle of Copenhagen, in which Nelson engaged under permissive orders; but by his appearance before Carlskrona he compelled the neutrality of Sweden; and he was on the point of sailing for Cronstadt when the news of the Emperor Paul's death put an end to hostilities.

Parker, JOSEPH (1830-1902), a popular preacher and author, the son of a stone-cutter, was born at Hexham, and began to preach in early youth. He studied at Moorfields Tabernacle and University College, London (1852), was ordained pastor of the Congregational Church, Banbury (1853), and became minister of the Cavenish Street Church, Manchester (1858), and of Poultry Chapel, London (1869), afterwards the City Temple (opened 1874). See his *A Preacher's Life* (1899), and *Life* by W. Adamson (1902).

Parker, MATTHEW, the second Protestant Archbishop of Canterbury, was born son of a calenderer at Norwich, August 6, 1504, studied at St Mary's Hostel and Corpus Christi College, Cambridge, took orders, and was elected to a fellowship. He was an arduous student of the Scriptures and of church history, yet, in spite of his strong leaning to the past, from an early period he was infected by the new doctrines. In 1535 he was appointed chaplain to the queen Anne Boleyn, and soon after he obtained the deanery of the college of St John the Baptist at Stoke near Clare in Suffolk. Here he lived mainly till 1545, his retiring temper finding pleasure enough in his studies and the administration of the college. In 1538 he was created D.D., next a royal chaplain and canon of Ely, and in 1544 master of Corpus Christi College, Cambridge, and the year after vice-chancellor of the university. Two years later he married. He was presented by Edward VI. to the deanery of Lincoln and the prebend of Corringham, but on the accession of Mary he resigned his mastership and was deprived of his preferments, finding safety, however, in strict retirement. The accession of Elizabeth called him from his retirement, and he was consecrated Archbishop of Canterbury in the chapel at Lambeth, 17th December 1559. The ridiculous fable about the informality of the ceremony, according to which it was performed at the Nag's Head Tavern, is not now believed.

During his fifteen years' primacy Parker strove to define more clearly the limits of belief and discipline, and to bring about more general conformity. The Thirty-nine Articles were passed by convocation in 1562, and four years later the archbishop issued his 'Advertisements' for the regulation of service, which, with the measures of repression perhaps forced upon him by the imperious queen,

provoked great opposition in the ranks of the growing Puritan party. To Parker belongs the merit of originating the revised translation of the Scriptures known as the Bishops' Bible. His wife died in August 1570. Her on one occasion Elizabeth insulted at Lambeth with the words, 'Madam I may not call you, and mistress I am loath to call you: however, I thank you for your good cheer.' Parker died 17th May 1575.

Parker did much for our native annals, but his methods as an editor have not commended themselves to modern scholars. He edited *Elfric's Anglo-Saxon Homily*, to prove that transubstantiation was not the doctrine of the ancient English church; the *Flores Historiarum*, as the work of an assumed Matthew of Westminster; the *Historia Major* of Matthew Paris, the *Historia Anglicana* of Walsingham, Asser's *Gesta Elfredi*, and the *Itinerarium* of Giraldus Cambrensis. The *De Excidio Britannice* of Gildas was edited under his eye by Joselin. He was an indefatigable collector of books, and the greater part of the treasures he had amassed he bequeathed to Corpus Christi College. This collection Fuller called 'the sun of English antiquity before it was eclipsed by that of Sir Robert Cotton.' Parker established a *scriptorium* at Lambeth, where he maintained printers, transcribers, engravers. His original writings are inconsiderable, the chief being a Latin treatise, *De Antiquitate Britannice Ecclesie et Privilegiis Ecclesie Cantuariensis* (1572). His letters fill a volume (1853) in the publications of the Parker Society, a fitting memorial of the book-loving archbishop. The Society published from 1841 till its dissolution in 1853 as many as fifty-three volumes of the works of Ridley, Bull, Grindal, Hooper, Cranmer, Coverdale, Latimer, Jewel, Tyndale, Bullinger, Whitgift, Rogers, and other fathers of the English Reformation. See *Lives* by Strype (1824) and Kennedy (1908); also Hook's *Lives of the Archbishops of Canterbury*, vol. ix. (1872).

Parker, THEODORE (1810-60), preacher, was born at Lexington, Mass. His grandfather held a command at Lexington, his father was an intelligent Unitarian farmer and wheelwright. He graduated at the Divinity School at Harvard in 1836, and settled the year after as Unitarian minister at West Roxbury, now a part of Boston. The naturalistic or rationalistic views which separated him from the more conservative portion of the Unitarians first attracted wide notice in an ordination sermon on *The Transient and Permanent in Christianity* (1841). The contest which arose on the anti-supernaturalism of this discourse led him further to develop his theological views in five Boston lectures, published under the title of *A Discourse of Matters pertaining to Religion* (1841), which was followed by *Sermons for the Times*. Failing health induced him to make an extended tour in Europe. In 1844 he returned to America, and for the remainder of his life preached to a congregation of three thousand at the Melodeon and Music Hall, besides incessantly writing and lecturing. He plunged with characteristic enthusiasm into the anti-slavery agitation. His writings reveal vast learning, keen spiritual insight, with great force of argument and felicity of illustration. Yet the thought is neither clearly defined, profound, nor always self-consistent, while the form is usually far inferior to the content.

The English edition of his works was edited by Frances P. Cobbe (14 vols. 1863-71). There are *Lives* by Weiss (2 vols. Boston, 1864), Frothingham (New York, 1874), Dean (Lond. 1877), Frances E. Cooke (3d ed. Boston, 1889), and White Chadwick (1900). See also vol. i. of Martineau's *Essays, Reviews, and Addresses* (1890).

Parkersburg, capital of Wood county, West Virginia, on the Ohio River (here crossed by a railway bridge $1\frac{1}{2}$ mile long), at the mouth of the Little Kanawha, 195 miles by rail E. by N. of Cincinnati. The city has a large trade in petroleum, and contains great oil-refineries, besides chemical

works, lumber-mills, and manufactories of furniture, wire, &c. Pop. 20,000.

Parkes, SIR HENRY (1815–96), Australian statesman, was born the son of a yeoman at Stoneleigh, Warwickshire, emigrated to New South Wales in 1839, and at Sydney became eminent as a journalist, editing *The Empire* in 1851–57. A member of the colonial parliament in 1854, he held various government offices and became premier in 1872, was repeatedly head of the ministry, and was identified with free trade and compulsory state education. He was president of the Australian Federation Convention of 1891. See his autobiographical *Fifty Years of the making of Australian History* (1892), and *Life* by Lyne (1897).

Parkesine. See CELLULOID.

Parkhurst, JOHN, born at Catesby in Northamptonshire in 1728, was educated at Rugby and Cambridge and took orders, but soon after retired to his estate at Epsom to give himself to study. Here he died 21st March 1797. In 1762 appeared his principal work, *A Hebrew and English Lexicon, without Points*, a very creditable performance for its time, and long a standard work, although disfigured by its fanciful etymologies. He also wrote a treatise (1787) against Dr Priestley, to prove the divinity and pre-existence of Jesus Christ.

Parkinson, JOHN (1567–1650), was apothecary to James I. and director of the Hampton Court gardens. He wrote *Theatrum botanicum* (1621), one of the best herbals, and *Paradisus terrestris* (1640). His name was chosen for a genus of Leguminosæ, represented by two species, *Parkinsonia aculeata* (inter-tropical) and *P. africana* (in South Africa).

Parkman, FRANCIS, historian, was born in Boston, Massachusetts, 16th September 1823, graduated at Harvard in 1844, next studied law for two years, then travelled in Europe, and returned to explore the Rocky Mountains. The hardships he endured among the Dakota Indians seriously injured his health, yet in spite of this and defective sight Parkman secured recognition as the authoritative historical writer on the rise and fall of the French dominion in America. He died 8th November 1893. His chief works form a connected series, and should be read in the following order: *The Pioneers of France in the New World* (1865), *The Jesuits in North America* (1867), *The Old Régime in Canada* (1874), *La Salle and the Discovery of the Great West* (1869), *Count Frontenac and New France under Louis XIV.* (1877), *A Half-Century of Conflict* (1893), and *Montcalm and Wolfe* (1884). See books by Farnham (1900) and Sedgwick (1904).

Parlement, the name applied in France, down to the Revolution, to certain superior and final courts of judicature, in which also the edicts of the king were registered before they became laws. Of these the chief was that of Paris, but there were no fewer than twelve provincial parlements, at Toulouse, Grenoble, Bordeaux, Dijon, Pau, Metz, Besançon, Douai, Rouen, Aix, Rennes, and Nancy. These, though not actually connected with that of Paris, invariably made common cause with it in its struggles with the royal power. The parlement of Paris dated from the 14th century, and already consisted of three chambers, the Grand Chambre, the Chambre des Enquêtes, and the Chambre des Requêtes. By 1344 it had grown in numbers and power, and consisted of 3 presidents and 78 counsellors, of whom 44 were ecclesiastics and 34 laymen. In 1467 Louis XI. made the counsellors irremovable. Its influence grew during the 16th century, and it now began to find courage to deliberate on the royal edicts as well as merely

register them, which the king could always force them to do by coming in person and holding a 'lit de justice' (see BED OF JUSTICE). Neither Richelieu nor Louis XIV. permitted such discussion of their edicts, and both the Regent Orleans and Louis XV. followed their policy. The latter exiled the members from Paris in 1753 for their interference in the struggle between the Jansenists and the Jesuits, and in 1770, on the advice of Maupeou, abolished the old parlement altogether and established the Parlement Maupeou. Louis XVI., however, recalled the former counsellors. These in the last days of their existence were grouped as follows: The Grand' Chambre, with 10 presidents and 37 counsellors, of whom 12 were clerics; the three Chambres des Enquêtes, each formed by 2 presidents and 23 counsellors; and the Chambre des Requêtes, in which sat 2 presidents and 13 counsellors.

Parley, PETER See GOODRICH.

Parliament (Low Lat. *parliamentum* or *parlamentum*; Fr. *parlement*, from *parler* 'to talk'), a meeting for conference and discussion (see PARLEMENT). In England the name of parliament has been given since the 13th century to the Great Council of the realm—the national assembly which succeeded to the powers exercised by the Witenagemot in Anglo-Saxon times. Under the influence of feudal ideas the Great Council became the high court of parliament. As the manor had its courts in which the lord met with his tenants, so the kingdom had its high court, in which the king met with the different estates or orders of his subjects, and conferred with them as to the enforcement of the good customs of the realm. At first the king claimed to exercise a measure of arbitrary discretion in issuing his writs of summons to parliament; but before the end of the 13th century it was settled and clearly understood that parliament should always consist of duly qualified representatives of the three estates of the realm—the Clergy, the Lords, and the Commons. The notion that the three estates are King or Queen, Lords, and Commons is a modern misconception.

The Three Estates—The Clergy.—The clergy were represented by the Lords Spiritual, the bishops, who sat among the Lords by virtue of their office. At one time proctors representing the lesser clergy sat among the Commons; but the clergy gave up this right in order to manage their own affairs in Convocation (q.v.). When Convocation gave up its right of taxation clergymen were permitted to vote in the election of members of the House of Commons. It would hardly be correct to say that the clergy still form a separate estate; but the Lords Spiritual still sit in the Upper House. The Archbishops of Canterbury and York, and the Bishops of London, Durham, and Winchester are always summoned to parliament; the other bishops are also summoned, but the junior members of the episcopal bench are excluded by the acts for the creation of new bishoprics, in which it is provided that the number of Lords Spiritual is not to be increased beyond the number as it stood in 1846, when the see of Manchester was founded. The Lords Spiritual do not vote as a separate order; in other words, a bill may pass in the House of Lords though all the bishops vote against it.

The Lords Temporal.—The lords or greater barons were originally those who held lands and honours of the king by the more dignified kinds of feudal service. They were barons by tenure, and as such entitled to receive the king's writ; among themselves they were peers or equals. In course of time the writ became the evidence of title to a peerage; but since the 15th century peers have always been created by a patent from the crown,

specifying the title by which the new peer is to be known, and the heirs to whom his dignity is to descend. The titles now in use are duke, marquis, earl, viscount, and baron (on which see separate articles); a peer is named as being of a particular place, but it is no longer necessary that he should have any land or feudal rights in the place named. In other words, our aristocracy is no longer a close feudal aristocracy; it owes its existence to the crown, and the crown may increase the number of peers at pleasure. Historically this has been a rule of first importance, for the right to create new peers has enabled the crown—i.e. the ministers governing in the name of the crown, and enjoying the confidence of the House of Commons—to overcome the resistance of the House of Lords. Thus the mere threat to exercise the right to create new peers in such a way as to outvote an unfavourable majority in the upper house, secured the passing of the Reform Bill of 1832, and obliged the Lords definitely to sanction the limitation of their powers in the Parliament Act of 1911. The dignity of peerage was always a hereditary dignity; the blood of the holder was ennobled. But the sons of a peer, though they bear courtesy titles and are nominally ennobled, are commoners for all legal and political purposes. This again is a most important rule, because it prevents the nobility from becoming a closely organised caste. It seems that the crown could always create a man a peer for his life; but it was resolved in the case of Lord Wensleydale, in 1856, that a life peerage, even if followed up by a writ of summons to parliament, would not entitle the holder to sit in the House of Lords. Since the Wensleydale case the Lords of Appeal in Ordinary have been made life peers by statute. These lords are appointed to take part in the judicial business of the House, and in 1913 their number was increased from four to six. In 1830 there were 401 peers on the roll of the House of Lords; at present there are over 700. Of these peerages more than one-third have been created since the beginning of the 19th century. The right of peeresses in their own right to sit in the House of Lords was, in 1922, first favourably reported on by the committee for privileges, but finally refused, and in 1925 a bill in the Lords to confer the right was rejected.

In ancient times the prerogative right to create peers was used but sparingly; there were only some 50 or 60 Lords Temporal in the parliaments of the 15th and 16th centuries. The number of Lords Spiritual was reduced by the removal of abbots and priors at the Reformation to 26, at which figure by arrangement it has ever since remained. Four sat as representatives of the Irish Church from 1800 down to its disestablishment in 1869, and previous to its disestablishment in 1920, under the Welsh Church Act of 1914, there were representatives of the church in Wales. In conferring peerages the Stuart kings were more generous, or more lax, than their predecessors. At the Revolution of 1688 the number stood at about 150. On the accession of George I. the leaders of the House of Lords proposed to restrain the crown from adding to the then existing number of 178 peerages; but this scheme was vehemently opposed in the House of Commons, and finally rejected. During the reign of George III. peers were created very freely. It was the avowed policy of the younger Pitt to fill the House of Lords with the wealthiest traders and landowners, and so to break down the family and personal factions into which a small aristocratic assembly tends to divide itself. With this object he conferred peerages so lavishly that the number created by George III. was 388.

In 1399 the Commons formally admitted 'that the judgments of parliament belong to the Lords

and not to the Commons.' The House of Lords is a court of final appeal for all parts of Great Britain and Northern Ireland; it exercises original jurisdiction in peerage cases, in trials of peers for treason or felony, and on Impeachments (q.v.) by the Commons. When the House is sitting judicially, convention dictates that only those members who hold or have held high judicial office take part in the proceedings. Lay peers formerly took part and voted on appeals; but this practice was justly regarded as a scandal. In 1844 some lay peers announced their intention to vote in the case of the *Queen v. Daniel O'Connell*, but they were persuaded to retire, and the case was decided by the legal members of the House. In its legislative capacity the House may deal with any matter affecting the public interest, and it claims the right to initiate bills which directly affect its own rights and privileges. By a convention of long standing, the Lords respect the right of the Commons to initiate money bills; their assent to such a bill is rendered unnecessary by the Parliament Act of 1911 (see below). Any member of the House may introduce a bill, and ask that it may be read a first time; the 'reading' is of a formal character—the bill is laid on the table, and the title is read out by the clerk. If the House consents to read the bill a second time it accepts the general principle of the measure; the bill is then referred to a committee of the whole House, or to a select committee, to be amended in detail; it may then be reported to the House and read a third time and passed. If the bill is afterwards passed, or has already been passed by the Commons, it only requires the royal assent to become an act of parliament. This assent is given by the sovereign in person, or by commissioners representing the sovereign; the Lords are present in their places; the Commons, headed by their Speaker, attend at the bar of the Lords; the clerk of parliaments utters the Norman-French formula, 'Le Roy (or La Reine) le veult.' In the case of a money bill the royal assent is coupled with an expression of thanks for the 'benevolence' of parliament. The clerk endorses on the bill the date of the royal assent which turns it into an act. If the sovereign were to refuse assent the form would be 'Le Roy (or La Reine) s'avisera'—the King (or Queen) will think about it. But since the cabinet council became the chief power in the state this form of refusal has never been heard. Ministers take the lead in the business of legislation; they obtain the assent of the sovereign on the one hand, and of parliament on the other; all open conflict of powers is avoided. Queen Anne refused her assent to a Scotch Militia Bill; but since that time the royal assent has been given to every bill which passed the two Houses. Bills which await the royal assent are usually deposited in the House of Lords for that purpose; but a money bill is returned to the Speaker of the Commons, and is handed by him at the bar of the House of Lords to the Clerk of the Parliaments to receive the royal assent.

Precedence and Privileges.—Members of the House of Lords were formerly required to sit according to their precedence, but this rule is no longer observed. The bishops sit to the right of the woolsack; on the same side is the bench usually occupied by ministers. Supporters of the government sit behind their leaders, members of the opposition on the other side of the House, and independent members on the cross benches in front of the table. Whether it is sitting as a legislative or a judicial body, the House of Lords possesses all privileges necessary to the safe and dignified conduct of business. Its members are free from arrest on civil process in coming, going, or returning.

They are free to speak their minds without being liable to action or indictment. They have access to the crown to explain their proceedings, and the crown should put the best construction on what they do. It is a breach of privilege to reflect on the honour of the House, or on the parliamentary conduct of its members. It is technically a breach of privilege to report its proceedings; but regular arrangements are now made for the admission of reporters. It was formerly doubtful how far the printers of the House were protected, but now, under an Act of 1840, the printers of parliamentary papers, if sued or prosecuted, may obtain a stay of proceedings on producing a certificate that such papers were printed by order. The House of Lords declares its own privileges; but in doing so it is bound by the law; it cannot create a new privilege by mere declaration. Persons guilty of breach of privilege may be attached and brought in custody, censured, fined, or imprisoned for a time certain or during pleasure. The privilege of the House may be used to protect the House and its committees, and all persons having lawful business before them, together with their counsel, solicitors, and witnesses.

Officers.—The chief officer of the House of Lords is the Chancellor, or Keeper of the Great Seal, who acts as speaker for formal purposes; he does not keep order; the Lords keep their own order. It is not even necessary that he should be a lord of parliament, and he sits on the woolsack, which is supposed to be outside the House. Deputy-speakers are appointed when necessary; and there is a salaried Chairman of Committees who exercises considerable powers, especially in regard to private bills. The Clerk of the Parliaments is appointed by the crown; and the Gentleman Usher of the Black Rod is one of the King's ushers, whom he permits to act as the messenger and executive officer of the Lords. The judges and law-officers rank as assistants of the House; they are summoned to attend in parliament, and they are present on occasions of state; the judges also come in, their place being on the woolsacks, when the Lords desire to take their opinions on a point of law. Formal messages to the Commons are conveyed by the Usher of the Black Rod. Judges and Masters in Chancery were formerly employed for the same purpose, but the Commons came to treat these ceremonious messages with levity, and messages now pass from one House to another by the hands of their respective clerks, except on certain important occasions, such as the opening of parliament, &c. Formerly, when the two Houses differed, a formal conference was held in the Painted Chamber, the Lords sitting with their hats on, the Commons standing and uncovered; but the modern practice of party government renders these conferences unnecessary.

The Commons.—The Commons, or 'communitas regni,' included originally three classes of persons. First, the proctors of the lesser clergy, who disappeared at an early date. Secondly, the knights of the shire, who were chosen by the lesser barons and the general body of freeholders. These free tenants held their land by honourable tenures, but they could not bear the expense of attendance in parliament. As early as the time of King John they were represented by delegates; and Simon de Montfort gave effect to the same principle when he ordered two knights to be sent to parliament from each shire. Thirdly, there were burgesses and citizens, representing the self-governing towns of the kingdom. The burgesses also found it hard to bear the expense of attending parliament; they usually received an allowance for doing so. From the earliest times, indeed, constituencies were liable for the expense of maintaining their members during their attendance upon parliament, but

by the beginning of the 17th century the practice had practically disappeared. In the 19th century, however, in the interests of more democratic representation, a movement began for the payment of members out of national funds. Not till 1911, however, as an indirect result of the Osborne judgment, whereby the payment of salaries to members out of trade-union funds was declared illegal, was provision first made for the payment of members; then an allowance to each member of £400 a year was made, and has since been annually renewed. The legal liability of constituencies for the payment of members has, however, never been removed. Payment of travelling expenses was first made in 1924.

Happily for the cause of popular government, the knights and burgesses were soon welded together in one body; there has never been any legal difference between county members and borough members. Early in the history of parliament, it would appear in the 13th or 14th century, the Commons refused to consider their own affairs in a separate chamber; one of their number presided, and acted as Speaker in communicating to the Lords the opinions of the third estate; and thus the Commons came to be organised as a separate House. The Lords remained in the old parliament chamber, and there the king continued to meet with the three estates; his throne was set in the House of Lords, and he never went into the House of Commons. Charles I. was therefore acting contrary to usage when he went in person to arrest the seven members. From about 1548 the Commons met in a room which had been known as St Stephen's Chapel, and the House of Commons is still occasionally spoken of as St Stephen's. Within the House all members are equal; but the bench immediately to the right of the chair is reserved for privy-councillors, and is now always occupied by ministers having seats in the House: their supporters sit behind them, and the members of the opposition sit to the left of the chair. Like the members of the other House, the Commons enjoy privilege of parliament; they are free from arrest on civil process in attending the House, and in coming or returning; but no person is privileged against arrest for any indictable offence or for contempt of court. In the days when arrest for debt was common the privilege claimed by members of parliament, and even by their servants, was sometimes used to defeat creditors; but now an action or a bankruptcy petition is in no way impeded by privilege. A member of either House who becomes bankrupt is not permitted to sit or vote. Freedom of speech is enjoyed by the Commons as by the Lords; and they may claim, as a House, free access to the sovereign. The Commons may deal with offenders against their privileges by directing a prosecution; they do not claim the right to impose a fine, or to imprison for a time certain, but they may commit a person to prison during pleasure; persons so imprisoned may not be detained after the end of the session. The House declares its own privileges, but it cannot create a new privilege by mere declaration. In the famous case of *Stockdale v. Hansard* the House assumed authority to protect its printer against an action for libel, but the courts disregarded this resolution, and the controversy was finally settled by the passing of the Act of 1840 which has already been cited. A question of privilege will be taken up without notice at any moment; but it should be observed that a member has no privilege except during the session and forty days before and after it. We have seen that the Commons claim no general judicial authority, but they have claimed to deal judicially with cases of privilege, and with questions relating to the election and conduct of

their members. Election petitions used to be tried by committees of the House, but this practice led to great abuses, and in 1868 these petitions were remitted to the judges for trial. The House may exclude, suspend, or expel a member for misbehaviour; but it was settled in the case of John Wilkes (q.v.) that expulsion creates no disqualification; the person expelled may be re-elected. Burke and other high authorities attach great importance to this rule of the constitution. If the House could disqualify a member for re-election, the majority might be tempted to strengthen itself by expelling the leaders of the minority. In 1711 Sir Robert (then Mr) Walpole was expelled the House, and there is reason to believe that the vote in his case was decided by considerations of party, and not by his guilt or innocence of the charges made against him.

As representing the whole community, and not merely a limited order, the Commons from early times assumed the lead in the financial and legislative business of parliament. Onwards from the Great Charter the crown frequently admitted that taxes were not to be levied without consent of parliament; and in the reign of Richard II., if not earlier, the Commons laid claim to the 'power of the purse.' This power, though generally acknowledged, was from time to time a source of conflict between the Commons and the Lords, memorably on the occasions of the Lords' rejection of the Paper Duty Repeal Bill of 1860 and of the Finance Bill of 1909; it was the rejection of the last which led to the passing of the Parliament Act of 1911, whereby the undivided authority of the Commons over finance was definitely established by law, it being provided that a bill certified by the Speaker of the Commons as a money bill and sent up at least one month before the end of the session might, if not passed by the House of Lords without amendment within one month after being so sent up, be presented for the royal assent and become an act of parliament independent of the concurrence of the Lords. Estimates of public expenditure are laid before the Commons by ministers, and considered in committee of supply. This is a committee of the whole House; the Speaker leaves the chair when the committee begins; the Mace (q.v.) is taken from the table; the Chairman of Committees takes his seat at the table; and the discussion which follows is of an informal character, members being allowed to speak more than once to the same question. When some of the necessary votes have been taken in supply the House resolves itself, in like manner, into a committee of ways and means. The resolutions adopted in committee are embodied in bills, which are sent up for the assent of the Lords or for the royal assent. At the close of the financial year (i.e. about the end of March) the Chancellor of the Exchequer, in committee of the whole House, opens his Budget (q.v.) of expenditure and revenue for the coming year. Legislative business is conducted with the same forms as in the Lords; but a member must ask leave of the House to introduce a bill. If a bill is read a second time it is considered in detail by a committee of the whole House, or by a select committee. A committee always reports its proceedings to the House, the Speaker resuming the chair for that purpose. As the supremacy of the Commons over finance was legally established by the Parliament Act of 1911, so also, by the same act, was its predominance in legislation secured. Thus by the provisions of the act, public bills other than money bills—a bill to extend the duration of parliament is outwith the scope of the act and must have the assent of the Lords—if passed by the House of Commons in three successive sessions, whether of the same parliament

or not, and rejected by the House of Lords each time, may be presented for the royal assent and become acts of parliament on their third rejection without the concurrence of the Lords, provided their passage through the House of Commons has occupied two years from their second reading in the first session. In the preamble to the act is a declared intention to substitute for the existing House of Lords a second chamber constituted on a popular, as distinct from an hereditary, basis, and were such an intention put into effect some readjustment of powers between the houses in the direction of restoring a more effective authority to the Upper House could only follow. Besides performing financial and legislative duties, the House of Commons acts as a 'grand inquest' to inquire into all matters of public concern. It is specially bound to watch the conduct of ministers, and to inform the sovereign whether they possess the confidence of the nation or not. In other words, the support of the Commons is necessary to the existence of a ministry, while a ministry may hold power though its supporters are in a minority in the Lords. Ministers take the lead in all important business; and party discipline tends to reduce the individual private member to comparative insignificance.

Union with Scotland and Ireland.—Down to the Treaty of 1707 Scotland had an independent parliament; the three estates of that kingdom sat together in one house, and the conduct of business was for the most part left to a smaller body called Lords of the Articles. At the Union the Scottish parliament ceased to exist; it was agreed that sixteen Scottish peers (elected by an assembly of peers at Holyrood, at the opening of a new parliament) should sit in the House of Lords, and not less than forty-five Scottish members in the House of Commons. The Irish parliament was an assembly of a more or less provincial character, sitting in two houses. Its legislative independence was conceded, under pressure, in 1782, but it never obtained effective control over the executive (see GRATTAN). By the Act of Union the Irish parliament was taken away; it was agreed that twenty-eight Irish peers (elected for life) should sit in the House of Lords, and 100 Irish members in the House of Commons. Thus the English parliament became the parliament of the United Kingdom. But by the joint effect of the Government of Ireland Act (1920) and the Irish Free State (Agreement) Act (1922), only thirteen Irish members, these representing constituencies in Northern Ireland, now sit in the House of Commons. Twenty-eight peers still sit as formerly in the House of Lords. The Irish Free State and Northern Ireland have each parliaments of their own. That of the Free State is known as Oireachtas, and consists of two houses, a chamber of deputies (Dáil Eireann) of 153 members popularly elected on principles of proportional representation, and a Senate (Seanad Eireann) of 56 members (exclusive of university members), a fourth of whom are popularly elected every three years on principles of proportional representation, from a panel of which two-thirds are nominated by the Dáil and one-third by the Seanad. For the passing of bills the assent of the governor-general as representing the crown is required. Provision is made for the payment of members of both houses. The parliament of Northern Ireland consists also of two houses—a House of Commons of 52 elected members and a Senate of 2 *ex-officio* and 24 elected members. The parliament has power to legislate for its own area except in regard to matters of imperial concern and in certain matters reserved to the imperial parliament. An allowance for expenses is made to members of both houses.

Parliamentary Reform.—Successive Reform acts have widened the democratic basis of the House of Commons: the Act of 1832 gave power into the hands of the middle classes; the Acts of 1867 and 1884, by admitting all householders and £10 lodgers to the franchise, gave a preponderance of voting power to the working-classes; while the Act of 1918 by virtually establishing universal manhood suffrage and by giving the vote to women very greatly enlarged the electorate. Side by side with an extended electorate the House of Commons has increased in size, and with its 615 members may now be considered too large for a deliberative assembly. The colonies and dependencies have no direct representation in either House; but questions of imperial policy occupy no small share of the time of parliament. With the advance of democracy the sphere of legislation has been much extended; large schemes for promoting education, health, insurance, for regulating the control of industry, and for the creation of new executive departments and local authorities are brought forward by all political parties. Each party makes its power felt by pushing its own measures and by dilatory resistance to the measures of its opponents; obstruction has been reduced to an art; the labours of those who lead the House of Commons have become intolerable heavy, and the old rules of debate are found unequal to the strain of political conflict. In 1882 the House adopted new rules of procedure, and these rules were further amended in 1887. A motion for the closure of a debate may now be put at any moment, with the assent of the Speaker or Chairman. But a question for the closure of debate is not decided in the affirmative unless the number voting in the majority be not less than 100. The closure has now been developed so as to give the Cabinet complete control over the business of legislation. A time may be fixed for each stage or part of a bill; when the moment arrives, the 'guillotine' falls and discussion comes to an end. When amendments are put down in embarrassing numbers, the Chairman may be empowered to select those which most require discussion, and the debate leaps, 'kangaroo' fashion, from one selected amendment to another. But though the 'kangaroo' closure, and (to a lesser extent) the guillotine may now be regarded as accepted features of parliamentary procedure, their employment is recognised as being justifiable only on grounds of necessity. Dilatory motions for adjournment have been checked; tedious and irrelevant speakers may now be stopped by the chair; a member 'named' to the House as disregarding the authority of the chair may be suspended for a time from his service.

Officers.—The chief officer of the House of Commons is the Speaker, who is chosen by the members from among their own number, at the opening of a new parliament. The Speaker-elect presents himself at the bar of the Lords for the approval of the crown, which is given in a customary form of words by the Lord Chancellor. The Speaker then lays claim to the ancient privileges of the Commons: on returning to his own House he takes the oath before the other members. Inducted with these forms, the Speaker becomes the president and spokesman of the House, with authority to keep order. Under the Parliament Act he has also important duties of a judicial and interpretative character. He refers all questions of importance to the House; but his own position is one of great influence and dignity; previous to 1919 he was First Commoner in the kingdom ranking next after the peers of the realm, but now he takes precedence after the Lord President of the Council. The Chairman of Committees presides in committee of the whole House; he is also

empowered to act as Deputy-speaker. The Under-clerk of the Parliaments acts as clerk of the House. There are two other clerks; their chief duty is to keep the Journals, which are accepted by all other authorities as evidence of what is done by the House. The Serjeant-at-arms is the executive officer of the Commons.

Summoning Parliament.—When the sovereign is advised to summon a new parliament notice of that intention is given by proclamation. A writ of summons is sent to each lord of parliament; the Scottish peers elect the representative peers. A writ is also sent to the returning officer of each constituency, commanding him to hold an election, and to return the name of the person elected. In counties the sheriff acts as returning-officer; in Scotland he acts also for burghs within his jurisdiction; in English boroughs this duty is commonly performed by the mayor. The lawful charges incurred by the returning-officer, formerly borne by the candidates themselves in such a way as to impede the candidature of the poor, have since 1918, except in the case of university elections, been paid by the state; a candidate has, however, to make a deposit which is not returned to him unless he poll one-eighth of the total votes cast.

Places represented in Parliament.—The places represented in the House of Commons are counties and county divisions, boroughs and wards of boroughs, and universities. By the Representation of the People Act (1918) and by the Redistribution of Seats (Ireland) Act (1918), a new distribution of representation according to population was introduced on the principle of one member for every 70,000 in Great Britain and one for every 43,000 in Ireland; under the Government of Ireland Act (1920), however, the Northern Ireland constituencies are much larger. In both the acts of 1918 the establishment of single-member constituencies was aimed at. By the first act the principle of proportional representation was for the first time introduced into parliamentary elections in Great Britain but only in the case of university constituencies returning two or more members; facilities were indeed provided for a limited extension of the principle to certain other constituencies returning three or more members, provided a scheme to be brought forward by commissioners received the assent of parliament, but this assent, as it proved, was refused. The seats allotted to the universities have long been the cause of controversy. In old times a university was a kind of borough within a borough; Oxford and Cambridge obtained at an early date the privilege of sending burgesses to parliament; and the universities of London and Dublin and the four Scottish universities came also to be represented in parliament. Under the Representation of the People Act (1918) and the Redistribution of Seats (Ireland) Act (1918) the number of university constituencies was increased. Thus the English universities of Durham, Manchester, Liverpool, Leeds, Sheffield, Birmingham, Bristol, the whole forming one constituency, were for the first time enfranchised, as were also the university of Wales, the National University of Ireland, and Queen's University, Belfast. On the establishment of the Irish Free State, Dublin and also the National University ceased to return members to the House of Commons.

Electors.—The voters entitled to take part in the election are those whose names are on the register. Registration was introduced after the Reform Act of 1832; the rules respecting it are now governed by the Representation of the People Act (1918). Lists of voters are prepared by registration officers, and means are provided for proving and testing claims to vote. The lists are prepared twice yearly,

the period necessary for qualification in this way being shortened from one year to six months. The registration list in a university constituency is prepared by the governing body of the university. The persons entitled to be placed on the register are persons of full age (21 years for a man, 30 for a woman) not being peers, though peeresses in their own right may vote, not disqualified by alienage, office, or employment, unsoundness of mind, conviction for crime or corrupt practices, and possessing any of the qualifications required by law (see below). Since 1918 all disqualifications on the ground of receipt of poor relief have been removed. Before 1832 county members were elected in England by the freeholders assembled in the county court; an act of Henry VI. restricted the right of voting to those whose tenements were of the yearly value of forty shillings; in some boroughs the right of election belonged to a limited number of persons having freeholds or burgage tenements within the boroughs; in others the inhabitants paying scot and lot voted; in others, again, the right was restricted to members or officers of the corporation. In Scotland the county qualification was a forty-shilling land of old extent, or land not of old extent rated in valuation books at £400; in Edinburgh the election was by the town council; the member for each group of royal burghs was chosen by delegates appointed by the town-councils. In Galt's novel, *The Provost*, there is a graphic and truthful description of a burgh election under the old system. The Irish borough and county franchises were modelled on the English system; on the passing of the Roman Catholic Emancipation Act in 1829 it was thought prudent to disfranchise freeholders under £10 a year. In England, in the counties, under the Reform Act of 1832 the old forty-shilling freehold qualification was retained, while the franchise was extended to all persons who paid a yearly rent of £50, or were copyholders to the value of £10, and in the boroughs a common franchise was created for all occupiers of premises of the annual value of £10 a year. By the act of 1867 the qualifications required of electors were decidedly lowered, especially of voters in the boroughs; thus in the counties the right to vote was given to all occupiers of property rated at £12 a year, and in the boroughs to all householders who paid rates and to lodgers paying a yearly rental of £10. By the act of 1884 the occupation franchise which had been given to the boroughs in 1867 was extended to the counties, and the qualifications for the suffrage in these two kinds of electoral districts were, with some slight exceptions, made uniform for the first time in parliamentary history. In Scotland and Ireland onwards from 1832, the franchise had, by the passing of corresponding acts, been reformed along similar lines. The position of the franchise law in Great Britain and Northern Ireland is now to be found in the Representation of the People Act (1918), an act in direct succession from the acts of 1832, 1867, and 1884. By this act the county and borough franchises were finally assimilated, and a single statute was substituted for the tangle of legislation in which the franchise law had previously to be sought; the property qualification was altogether abolished, and a common qualification based on local occupation or residence was established; the vote was given to women. Under the act men have the right to vote as parliamentary electors in a constituency provided they have attained the age of 21 years, and provided they have resided in any premises or have occupied any business premises of the yearly value of not less than £10; women have the right to vote provided they have attained the age of 30 years, and provided they are entitled to be registered as local

government electors in respect of the occupation of dwelling-houses (irrespective of value) or of lands or other premises (other than dwelling-houses) of a yearly value of not less than £5, or are the wives of men entitled to be so registered; in Scotland the women's parliamentary franchise is slightly different but substantially the qualifications are the same; in all cases whether of male or female suffrage residence or occupation must be for a qualifying period of six months ending on 15th January or 15th July (in Northern Ireland the latter date alone applies), but residence or occupation during the qualifying period in neighbouring constituencies is as effective as residence or occupation in the constituency itself. As has been indicated above, the Act of 1918 increased the number of the university constituencies; at the same time it also extended generally the university franchise. Formerly women were excluded from that as from other franchises, and the possession of a degree did not in all universities qualify a man for a vote; now the franchise is granted irrespective of sex to all persons who have taken degrees other than honorary degrees. In university, as in ordinary, constituencies, a man to exercise the vote must have attained the age of 21 years, a woman that of 30 years; and in the case of a university which does not admit women to degrees, a woman is none the less eligible to vote if but for the prohibition she would have been entitled to a degree. If qualified, university voters continue as formerly to vote in ordinary constituencies, a double qualification being in this way retained; other double qualifications are also possible under the act, continuance so being given to a method of voting held by many to be inconsistent with democratic principles; while, however, the Act of 1918 did not do away with plural voting, it reduced it to narrow limits, the provisions of the statute making it illegal for anyone to vote at a general election in more than two constituencies. In addition to changes in the franchise already cited, the Act of 1918 also established a new naval and military franchise; under this, soldiers and sailors are entitled to be registered as parliamentary electors provided that but for their service they would have been entitled to be so registered.

Candidates—Conduct of the Election—Election Petitions.—On receiving the writ for an election the returning-officer fixes a day to receive the names of candidates. Any male British subject of full age, not disqualified by peerage, office, conviction, &c., may become a candidate; and by the Parliament (Qualification of Women) Act (1918) women are also eligible for election. Candidates are required to have agents for election expenses, and in promoting their candidatures they are bound to see that no breach of the law is committed, and that the total expenses are kept within the limits prescribed by the Corrupt Practices Act (1883), as amended—the scale of expenses was here reduced—by the Representation of the People Act (1918). If more candidates come forward than there are seats to be filled, a day is fixed for taking a poll of the electors; rooms or booths are fitted up for that purpose; each polling place is supplied with a ballot-box, voting-papers, &c., and presided over by the returning-officer or one of his deputies. The elector votes by placing a cross opposite the name of the candidate of his choice; his paper is folded up by himself and dropped into the box; elaborate rules are made by the Ballot Act, 1872 (amended by the Representation of the People Acts, 1918 to 1920), to protect the secrecy of the vote (see BALLOT). Since 1918 absent voters may in certain circumstances vote by post or by proxy. Under the Representation of the People Act (1918) all polls at a general election, except in university

constituencies, must be taken on the same day. Any material infraction of the law in conducting an election may be made the ground of a petition; the petitioners are required to find security for the costs: the petition is tried by two judges, who decide such questions of law and fact as may be raised, determine whether the person petitioned against has been duly elected or not, and report to the Speaker the result of their inquiry. If there is reason to believe that corrupt practices have extensively prevailed, commissioners may be appointed to make inquiry and report, and persons guilty of criminal offences may be prosecuted. The foregoing rules apply to the conduct of a general election, and also to the conduct of an election to fill a vacancy in the House of Commons caused by death, expulsion, or acceptance of office under the crown. The law does not permit a member of parliament to resign; if it is desired to retire, a member makes application for the stewardship of the Chiltern Hundreds (q.v.), or of the manor of Northstead, and the acceptance of either of these offices has the effect of vacating the seat. On the acceptance of high political office the vacation of a seat is the general rule and presentation for re-election is necessary.

Meeting of Parliament—Acts of Parliament.—When the Lords and Commons assemble at Westminster the Commons are directed to choose a Speaker. This having been done, and the members of both Houses having taken the oath of allegiance, the causes for which parliament has been called together are declared in the King's Speech, which is read by the sovereign in person, or by the Lord Chancellor in the sovereign's presence, or by one of the lords commissioners who represent the sovereign in absence. The two Houses are free to take up matters not laid before them by the crown; business is usually begun in each House by reading a bill *pro forma*, in order to assert the right of free deliberation. Two members are chosen in each House by ministers to move and second an address in answer to the royal speech; in the Commons this motion gives rise to an aimless and discursive debate, in which the whole policy of the government is attacked by the opposition. Such are the forms with which the first session of a new parliament is begun. Each House may adjourn at its own discretion from day to day and for the customary holidays. The session comes to an end when parliament is prorogued by the crown: prorogation puts an end to all sessional orders and to all pending business, except impeachments, writs of error, appeals to the House of Lords, and bills which are being passed under the Parliament Act (1911). The public acts of parliament passed in a session form one statute, which is divided into chapters for convenience of reference. Thus, 'the 30 and 31 Vict. chap. 20' means the 20th chapter of the statute law made in a session which began in the 30th and continued into the 31st year of Queen Victoria's reign—in other words, the session of 1867. Copies of the statutes are engrossed for preservation among the rolls of parliament, and printed copies are sent to judges and magistrates; but no form of publication is required to give validity to a statute; all subjects are bound to take note of and obey the law. In applying the rules of a statute the courts are guided by the intention expressed in the act itself; they will not look at the arguments or assurances addressed to parliament in the course of debate. An act comes into force as soon as it receives the royal assent, unless some other time has been indicated in the act. It is a rule that no bill may be introduced twice in the same session; it has sometimes been found necessary to prorogue parliament in order that a rejected bill may be brought in again without delay.

Divisions—Committees.—A division is taken in either House by the voices of those present, the Lords crying 'Content' or 'Not content,' the Commons 'Aye' or 'No.' If the Speaker's decision as to the result of the vote is challenged, members pass out into the lobbies, and are 'told' or counted by members appointed for that purpose. In case the numbers are equal, in the Lords the question is decided in the negative; in the Commons the Speaker gives a casting vote. Matters which cannot conveniently be dealt with in the House are referred to a committee of the whole House, such as has been already described, or to a select committee. Witnesses may now be examined before committees of both Houses on oath. When a private bill—a bill, that is, furthered by persons outside parliament and devoted to matters of individual, local, or corporate interest—is sent to a committee, the promoters and opponents attend with their counsel and agents; the inquiry partakes of a judicial character. The expense of proceedings before parliamentary committees is very great, and many proposals have been made to alter the existing system. Scottish private bills are dealt with by a different procedure, adopted as an improvement under the Private Legislation Procedure (Scotland) Act (1899). In the House of Commons there were formerly four grand committees—for religion, for grievances, for courts of justice, and for trade. These four were discontinued in 1832; in 1882 two standing committees were appointed for the consideration of bills relating to law and courts of justice and to trade—bills uncontentious in character but needing careful scrutiny in detail. These committees continued to be appointed till 1907, when provision was made for the appointment of four standing committees, a number increased in 1919 to six. One of these committees is appointed for the consideration of all public bills relating exclusively to Scotland; the others deal with any bills that may be referred to them and not as previously only with those relating to law or to trade, and now reference to a standing committee is the rule except in the case of money bills or provisional order bills; great party measures are, of course, also exceptions. The House, if it so desire, may vote not to send a bill to a standing committee. The committees have within their limits undoubtedly forwarded the business of the House.

Prorogation and Dissolution.—When parliament has been prorogued it may be summoned to meet for another session; the new session is opened with a royal speech. When the government determines to 'go to the country'—i.e. to hold a general election—it is customary to put an end to the session by prorogation, and afterwards to issue a proclamation dissolving the parliament and to give directions for the issue of new writs of summons. Dissolution puts an end to the House of Commons for the time being: the members are no longer addressed by the title of M.P., and the Speaker becomes an ordinary commoner. The law directs that not more than three years shall elapse between the dissolution of a parliament and the calling of a new one; but, inasmuch as the Commons will not vote more than an annual supply of money, it is absolutely necessary that there should be at least one session of parliament in each year. No parliament may endure for more than five years from the time when it is first summoned to meet. Triennial parliaments were established by a law of 1641; in the same year the Long Parliament got the king to agree to a bill depriving him of the right to dissolve that parliament without its own consent; the Triennial Act was repealed after the restoration of Charles II., and re-enacted in 1694. The period of seven years was fixed, instead of three years, by the Septennial Act,

passed in 1716, soon after the accession of George I., at a time when the government desired to avoid the changes of popular opinion produced by frequent general elections. Under the Parliament Act (1911) the maximum duration of parliament was reduced to five years.

'Omnipotence' of Parliament.—In foreign countries and in the British colonies the legislature is a limited body, which exercises the powers conferred upon it by a written constitution; its acts are void if they exceed its powers. An act of the congress of the United States, for example, may be set aside by a court of law if it is beyond the constitutional competence of congress. No British court can set aside an act of parliament on any such ground, for parliament defines its own powers and is not bound by any written constitution. In the words of Sir Edward Coke, the power of parliament 'is so transcendental and absolute that it cannot be confined, either for causes or persons, within any bounds.' The other legislative authorities of the empire act within the limits laid down for them by parliament. If a colonial government, for instance, wishes to deal with some matter outside the colony, it must, as a general rule, obtain an act of parliament for the purpose; a colonial legislature has an authority which is plenary as to causes and persons, but limited as to territorial area. The Septennial Act, cited above, illustrates what is meant by the omnipotence of parliament. A parliament elected for three years, under the Act of 1694, concurred in prolonging its own mandate to a period of seven years; in the same way during the Great War a parliament elected in 1910 suspended the clause in the Parliament Act (1911), limiting its life to five years, and by a series of such suspensions continued its existence till 1918; in both cases its action was perfectly legal and constitutional. Whether we should gain or lose by bringing the powers of parliament within legal bounds, it is not easy to decide.

Petitions to Parliament.—Petitions may be addressed to either House of Parliament by British subjects and persons resident in the British dominions; a petition must be presented by a member of the House to which it is addressed, except petitions from the corporation of London, which are presented by the sheriffs of London at the bar. The Lord Mayor of Dublin has also been allowed to present a petition, and the same privilege would probably be conceded to the Lord Provost of Edinburgh. It was formerly not unusual for the member presenting a petition to make a speech, but the standing orders of the Commons now forbid this to be done. There is a committee on public petitions which reports twice a week during the session.

Parliamentary Returns.—Each House may obtain information from the executive departments by asking for returns and papers. In dealing with a subordinate department, or a department created and regulated by statute, either House may order returns; if the department is that of a high officer of state, or if the matter inquired of concerns the sovereign's prerogative, it is usual to move a humble address, praying that the documents required may be furnished. Neither House will order a return regarding the proceedings of the other; but the members of one House have seldom any difficulty in obtaining papers printed for the use of the other. No return may be ordered from private persons and associations, unless under the provisions of an act of parliament. Confidential documents (e.g. cabinet memoranda, or opinions of the law officers of the crown) are never laid on the table in either House, unless for special reasons the government thinks it desirable.

For the history of parliament, see the constitutional histories of Stubbs, Hallam, and May; for its laws and

customs, May's *Parliamentary Practice*, and Anson's *Law and Custom of the Constitution*. The details of electoral law will be found in the works of H. Fraser. See further G. B. Smith's *History of the English Parliament* (2 vols. 1892); Todd's *Parliamentary Government in England* (1892); Redlich's *The Procedure of the House of Commons* (trans. from German, 3 vols. 1908); E. and A. G. Porritt's *The Unreformed House of Commons* (2 vols. 1909); A. L. Lowell's *The Government of England* (1912 ed.); Pollard's *The Evolution of Parliament* (1920); works by MacIlwain (1910) and Ilbert (1911); and popular and descriptive accounts by MacDonagh (1897-1921), and H. Graham (1910). On the parliaments of Scotland and of Ireland there are separate works by Rait (1901 and 1924) and by J. G. Swift MacNeill (1885 and 1917). See also the articles

Appeal.	Edward I.	Reform.
Ballot.	England (Hist. of).	Reporting.
Bribery.	Government.	Representation.
Cabinet.	Hansard.	Sovereign.
Chartism.	Impeachment.	Taxation.
Commissions.	Montfort.	Treasury.
Congress.	Nobility.	Westminster.
Cromwell.	Privy-council.	Witenagemót.

Parma, a town of Italy, formerly the capital of the duchy of Parma, is situated on the ancient Via Emilia, and on the river Parma, 12½ miles S. from the Po, and by rail 56 miles NW. of Bologna and 79 SE. of Milan. The town is surrounded by walls and has a citadel (1591); the streets are straight and wide. Of the sixty or more churches the chief is the cathedral (1059-74), built mostly in the Lombardo-Romanesque style, with frescoes by Correggio. Other notable edifices are the baptistery, one of the most splendid in Italy, begun in 1196 and completed in 1281; the church of Madonna della Steccata (1521-39), containing 'Moses breaking the Tables of the Law' and other paintings by Parmigiano, and the tombs of the Farnese dukes; the church of St John the Evangelist (1510), with frescoes by Correggio; the ducal palace, containing art galleries (Correggio's works), a great library (with many incunabula and rare works), the archives, &c.; and numerous other palaces, public and private. There are also a university (1599), a music school, a museum of antiquities, &c. The principal industrial products are pianofortes, silks, cast-iron wares, woollens, earthenware, paper, soap, &c. There are cattle, corn, and silk markets. Pop. (1921) 58,469. Founded by the Etruscans, Parma became a Roman colony in 183 B.C. After the fall of the western empire it was known as Chrysopolis (Gold Town). A stout opponent of the emperors, it was besieged and taken by Frederick II. in 1245, and again invested, but without success, in 1248. It then belonged successively to the houses of Correggio, Este, Visconti, and in 1511 to the pope.—The province has an area of 1278 sq. m., and a pop. of 353,000.

Formerly Parma was the name of a sovereign duchy of Italy, lying between the Apennines and the Po, touching Sardinia (Piedmont) on the west and Modena on the east. It comprised the two duchies of Parma and Piacenza, and had an area of 2377 sq. m. (see geography under ITALY). The territories of the cities of Parma and Piacenza fell into the hands of the pope in 1511. Pope Paul III. of the house of Farnese (q.v.) incorporated them (1545) as a duchy for his natural son Pier-Luigi, the grandfather of the celebrated Alessandro Farnese, regent of the Low Countries. On the extinction of the male line of Farnese in 1731 the duchy passed to Don Carlos of Spain, but was transferred to Austria four years later. In 1748 it was restored, along with Guastalla, to the Spanish Bourbons. In 1796 it was seized by the French, in 1802 incorporated with France, and in 1814 was granted to the ex-empress Maria Louisa. On her death in 1847 it passed to the Bourbon Duke of Lucca. From this time until the incorporation with the kingdom of Italy in 1860 the duchy was in a most unsettled condition: the

people were strongly revolutionary in feeling, and desired a union with Sardinia; but the rulers were reactionary and, supported by Austria, successfully beat down all attempts at revolution until after the battle of Magenta, when the Austrian troops withdrew and the regent for the youthful duke fled.

Parmenides, a Greek philosopher of Elea (*Velia*) in Lucania, and in the opinion of the ancients the greatest member of the Eleatic School (q.v.), flourished about the middle of the 5th century B.C. Nothing is known with certainty regarding his life, but Plato tells us he visited Athens in his old age together with his pupil Zeno, and conversed with Socrates, then quite a youth—an anachronism most probably intended to account for the influence which the philosophy of Parmenides undoubtedly exercised on that of Socrates and Plato themselves. Parmenides, like his master Xenophanes of Colophon, sometimes regarded as the first of the Eleatics, expounded his philosophy in verse—his only work being a didactic poem *On Nature*. The extant remains have been rendered into English hexameters by Thomas Davidson (*Journal of Speculative Philosophy*, St Louis, 1870), and paraphrased in English prose by W. L. Courtney (*Studies in Philosophy*, 1882). The leading design of this poem is to demonstrate the reality of Absolute Being, the non-existence of which Parmenides declares to be inconceivable, but the nature of which, on the other hand, he admits to be equally inconceivable, inasmuch as it is dissociated from every limitation under which man thinks. The permanent unity of the universe is thus the ultimate object of knowledge. Parmenides is not a theologian in speculation, seeking rather to identify his Absolute Being with *Thought* than with *Deity*.

The fragments have been edited in Karsten's *Philosophorum Græcorum Reliquiæ* (1835), and by Diels (1897). See also the histories of philosophy of Brandis, Erdmann, Schwegler, Ueberweg, and Zeller.

Parmigiano, or PARMIGIANINO, the nickname of GIROLAMO FRANCESCO MARIA MAZZOLA, painter of the Lombard school, and the most distinguished of those who followed the style of Correggio, was born at Parma, 11th January 1504. He began to paint when little more than fourteen years of age. In 1523 he went to Rome, and was favourably noticed and employed by Clement VII. When that city was stormed by the imperialists under Constable Bourbon in 1527 Parmigiano sat calmly at work on his picture of 'The Vision of St Jerome' (now in the National Gallery, London), and was protected from the soldiers who burst in upon him by their leader. After this event he left Rome for Bologna, where he painted various works, including a celebrated altarpiece, the 'Madonna and Child,' and returned to Parma in 1531. Having engaged to execute a series of frescoes in the church of S. Maria Steccata, and having got payment in advance, he delayed so long with the work that he was thrown into prison for breach of contract, and on being released fled to Casal Maggiore, in the territory of Cremona, where he died on 24th August 1540. His best-known picture is 'Cupid shaping a Bow,' he painted portraits too, as of Charles V., Amerigo Vespucci, and himself.

Parnahyba, a river of Brazil, rises in the Serra Mangabeiras, about 9° S. lat., and throughout its course (650 miles) forms the boundary between the states of Maranhão and Piauí. It enters the Atlantic by six mouths. The stream is swift, but navigable by boats for nearly 350 miles.

Parnassus, a mountain in Phocis, regarded by the ancient Greeks as the central point of the earth. On its southern slope lay Delphi (q.v.), the seat of the famous oracle, and the fountain of

Castalia (q.v.). The highest peak (8036 feet) was the scene of the orgies of the worship of Dionysus, (Bacchus); all the rest of the mountain was sacred to Apollo and the Muses. For the Parnassian poets, see FRANCE (*Literature*), LECONTE DE LISLE; and for Parnassia see GRASS OF PARNASSUS.

Parnell, CHARLES STEWART, Irish politician, was born at Avondale, in County Wicklow, June 28, 1846. His father belonged to an old Cheshire family, which purchased an estate in Ireland under Charles II., and from which had sprung Thomas Parnell the poet and Sir Henry Brooke Parnell, created Baron Congleton in 1841. His great-grandfather was that Sir John Parnell who was long Chancellor of the Irish Exchequer, and an active supporter of Grattan in his struggle against the Union; his grandfather, William Parnell, sat for County Wicklow, and published in 1819 a foolish political novel, anything but Irish in sentiment; his mother, Delia Tudor Stewart, was daughter of Admiral Charles Stewart of the United States navy. He was educated at Yeovil and elsewhere in England under private masters, and was for some time a member of Magdalene College, Cambridge, but took no degree. In 1874 he became High Sheriff of County Wicklow; next year he contested County Dublin without success, but in April 1875 was returned as an avowed Home Ruler for County Meath. He attached himself to Joseph Biggar, the member for Cavan, who was the first to discover the value of deliberate obstruction in parliamentary tactics, and during 1877 and 1878 he gained great popularity in Ireland by his audacity in the use of the new engine. There were many scenes of violence and excitement, and the new horror of all-night sittings became familiar to the House of Commons. Throughout the struggle Parnell showed equal audacity and coolness, and acquired a masterly knowledge of parliamentary forms. Mr Butt, the Irish leader, disapproved of this development of the active or obstructive policy, but his influence quickly gave way before Parnell's, and in May 1879 he died. The year before Parnell had been elected president of the English Home Rule Association. He now threw himself with energy into agrarian agitation, gave it its watchword—'Keep a firm grip of your homesteads'—at Westport in June, and in October was elected president of the Irish National Land League, which had been founded by Michael Davitt. Mr Parnell next visited the United States to raise funds for the cause, was allowed like Lafayette and Kossuth to address congress itself, and carried home £70,000. At the general election of 1880 he was returned for the counties of Meath and Mayo and for the city of Cork, and chose to sit for the last. He was now formally elected chairman of the Irish parliamentary party by twenty-three votes over eighteen for Mr Shaw. Meantime the agrarian agitation grew, and in a speech at Ennis, September 19, 1880, he formulated the method of boycotting as an engine for punishing an unpopular individual. Mr Gladstone's government now came to the conclusion that the objects of the Land League were contrary to the law, and in December put Parnell and several other members of the executive on trial, but the jury finally failed to agree. Next session the government brought in a Coercion Bill, which Mr Parnell opposed vigorously. In the course of the struggle he was ejected from the House, after a stormy scene, together with thirty-four of his followers, February 3, 1881. Mr Gladstone next carried his famous Land Bill, but this Parnell refused to accept as a final settlement until the result of certain test cases before the new Land Court was seen. On the 13th October Mr Gladstone sent him to Kilmainham gaol, and there he lay till released on May 2, 1882,

after some private negotiations with the government conducted through the medium of Captain O'Shea. Mr Forster resigned the Irish secretaryship in consequence of the release, and next followed the terrible tragedy of Phoenix Park, of which Parnell in his place in the House of Commons expressed his detestation. The Crimes Act was now hurried through parliament in spite of the strenuous opposition of the Irish party. Already the Land League had been proclaimed as an illegal association after the issue of the 'No Rent' manifesto, but early in 1884 the Nationalists succeeded in reviving it under the name of the National League, and Mr Parnell was elected its president. The year before the sum of £35,000, mostly raised in America, had been presented to him by his admirers. After an unsuccessful attempt to make terms with the Conservatives, in the course of which he had a famous interview with Lord Carnarvon, the viceroy, Parnell flung his vote—now eighty-six strong since the lowering of the franchise—into the Liberal scale, and so brought about the fall of the short-lived first Salisbury government. Mr Parnell nominated the greater number of Nationalist candidates for the Irish constituencies, and the firm hand with which he controlled his party was seen in the promptitude with which he crushed a revolt of Healy and Biggar against his nomination of Captain O'Shea for Galway.

Mr Gladstone's views on the question of Home Rule had by this time undergone a complete change, and accordingly he introduced a Home Rule Bill, which was defeated owing to the defection of a large number of Liberal members headed by Lord Hartington and Mr Chamberlain. The consequent appeal to the country (July 1886) gave Lord Salisbury a Unionist majority of over a hundred votes, and threw Parnell into a close alliance with Mr Gladstone and the portion of the Liberal party that adhered to him. It was at this period that the *Times* newspaper published its series of articles entitled 'Parnellism and Crime'—a tremendous indictment against the chief Nationalist leaders, the most startling point in which was a series of letters published in fac-simile, one, signed by Parnell, expressing approval of Mr Burke's murder. The public excitement occasioned led to the appointment of a Special Commission to inquire into the whole matter. After an elaborate trial (extending to 128 days, and closing November 22, 1889), the most sensational event in which was the breakdown under cross-examination, and the flight and suicide at Madrid, of Pigott, the wretched Irishman who had imposed upon the *Times* with forgeries, Mr Parnell was formally cleared of the charge of having been personally guilty of organising outrages, but his party were declared to have been guilty of incitements to intimidation, out of which had grown crimes which they had failed to denounce. Parnell now raised an action against the *Times*, which was quickly compromised by a payment of £5000. The 'uncrowned king' of Ireland had now reached the summit of his power—the height of the wave was marked by the presentation of the freedom of Edinburgh, July 30, 1889, and the banquet given him on his forty-fourth birthday. But his fall in public esteem was quickly to follow. A few months later his frequent mysterious absences from his parliamentary duties were explained by his appearance, or rather his non-appearance, as co-respondent in a disgraceful divorce case brought by Captain O'Shea against his wife. After formal evidence was led by the petitioner, the usual decree was granted with costs against Parnell (November 17, 1890). The Gladstonian party in England now demanded his retirement from the leadership of the cause, and Mr Gladstone informed the Irish members

that they must make their choice between Parnell and himself. They met and reappointed Parnell chairman, expecting, as the majority explained later, that after this recognition of his past services he would voluntarily retire at least for a time. But they had not calculated upon the characteristic obstinacy of his nature, and quickly found that their leader had no mind to efface himself for his country's good. After some days of profitless and heated wrangling the majority ended the discussion by leaving the room and electing Justin M'Carthy as their chairman. Parnell, with the shattered remnants of his party, now carried the warfare into Ireland; but his condemnation by the Church and the emphatic defeat of his nominees at by-elections foretold the complete collapse of his party at the general election of 1892, when seventy-two Anti-Parnellites were returned as against but nine who claimed his name and the succession to his policy. For the great discredited and discredited leader had died suddenly at Brighton, 6th October 1891, but five months after his marriage to Mrs O'Shea. Parnell's commanding personality might have made defeat less disastrous, but could hardly have prevailed against the strong conviction forced on Nationalists and English Home Rulers alike, that he had fatally confounded personal ambition with patriotism.

See R. Barry O'Brien's *Life of Charles Stewart Parnell* (2 vols. 1898), McCarthy's *History of Our Own Times* (1897), a memoir by his brother (1916), Katharine O'Shea's *Charles Stewart Parnell* (2 vols. 1914), and St John Ervine's *Parnell* (1925).

Parnell, THOMAS, a minor Queen Anne poet, born in Dublin in 1679, son of a commonwealth's man who at the Restoration left Congleton in Cheshire for Ireland. He had his education at Trinity College, took orders, and in 1705 received the archdeaconry of Clogher, later a prebend from Archbishop King and the vicarage of Finglass. The head of an English family settled in Ireland, with property both in that country and in Cheshire, he spent most of his time in London, where his wit procured him the friendship of Harley, Swift, and Pope, and opened to him the Scriblerus Club. Dr Johnson tells us that his well-timed change of politics coincided with the ejection of the Whigs in the end of Queen Anne's reign. After his wife's death he took to drinking, and died at Chester in October 1718, while on his way to Ireland. Next year Pope published a selection of his poems, mostly translations or adaptations, with the merit at least of being ever smooth and easy in versification. The best known of his poems is the *Hermit*, a polished and harmonious poem, based upon a tale in the *Gesta Romanorum*. Still better as poetry, however, are the two remarkable odes, the *Night-piece* and the *Hymn to Contentment*. See the admirable *Life* by Goldsmith, reprinted in the Globe edition of Goldsmith's works (1881).

Pärnu, the Estonian name of Pernau (q.v.).

Parody, a burlesque and consciously exaggerated imitation of a serious poem, the words of which should strike the ear with the very echo of the original. So to parody a writer is obviously to pay a compliment to his popularity, and at the outset we may admit the truth of Shaftesbury's paradox that 'a subject that will not bear raillery is suspicious,' provided it be not taken to mean that ridicule is to be the test of truth.

The name parody is due to the Greeks, and the first parodist, according to Aristotle, was Hegemon of Thasos, whose parody of the *Gigantomachia* made the Athenians forget for a moment even their disasters in Sicily. Others ascribe its origin to Hipponax, a comic poet, who flourished about 540 B.C. The well-known *Batrachomyomachia*, or

Battle of the Frogs and Mice, is an ancient mock-heroic *epos*; and there is extant, preserved in Athenæus, a fragment of several hundred lines by Matron, on an Attic banquet, in which each dish is introduced with epic solemnity after the manner of Homer. The comedies of Aristophanes contain many subtle touches of sarcastic banter belonging more or less definitely to this order, and we find a further development in the hexameter *Silli* of Timon of Phlius. Among the Romans we first meet this form of literature in the period of decline. The first satire of Persius is interspersed with numerous parodies on the most popular poems of the day, but there seems no adequate evidence for the assertion that the most severe of these were aimed at the verses of Nero. In France the burlesques of Scarron (*Virgile travesti*) and Dassoucy created a taste which Boileau and others strove to counteract, and were imitated in England by Charles Cotton. Of modern English parodies some of the most felicitous examples are to be found in the *Rejected Addresses*, full of clever and genial satire unblemished by vulgarity, of which its authors could say that of the twelve poets imitated 'not one ever betrayed the least soreness or refused to join in the laugh that we had occasioned.' The *Bon Gaultier Ballads*, by Aytoun and Sir T. Martin, contain six admirable imitations professing to be by the unsuccessful candidates for the laureateship on the death of Southey. There are some exquisite examples in the two classical children's books of Lewis Carroll, but few parodies can be compared with those to be found in C. S. Calverley's *Verses and Translations and Fly Leaves*. Among elaborate prose parodies most famous are the *Epistolæ Obscurorum Virorum* (q.v.). Of modern English examples may be mentioned Thackeray's 'Coddingsby' on Disraeli, and 'George de Barnwell' on Lytton; Bret Harte's *Condensed Novels*; and F. C. Burnand's 'New Sandford and Merton,' and 'Strapmore' on a too popular novel by Ouida.

See the article BURLESQUE; Delepierre, *La Parodie chez les Grecs, les Romains, et les Modernes* (Lond. 1871); for a vast collection of English examples, Walter Hamilton's too voluminous *Parodies of the Works of English and American Authors* (6 vols. 1884-89); and *Parodies and Imitations Old and New*, by J. A. Stanley Adam and Bernard C. White (1912).

Parole (Fr., 'word') is the declaration made on honour by an officer, in a case in which there is no more than his sense of honour to restrain him from breaking his word. Thus, a prisoner of war may be released from actual prison on his parole that he will not go beyond certain designated limits; or he may even be allowed to return to his own country on his parole not to fight again, during the existing war, against his captors. To break *parole* is accounted infamous in all civilised nations, and an officer who has so far forgotten his position as a gentleman ceases to have any claim to the treatment of an honourable man, nor can he expect quarter should he again fall into the hands of the enemy he has deceived. For parole evidence see EVIDENCE.

Paronychiaceæ, or ILLECEBRACEÆ are now included in Caryophyllaceæ.

Paropamisus, an ancient name still used for a ridge, less than 1000 feet above the adjacent country, which forms part of the northern edge of the great plateau of Persia and Afghanistan, almost connecting the Hindu Kush (q.v.) on the east with the Elburz Mountains to the west (see ASIA).

Paros, one of the larger islands in the Cyclades; a low pyramid with an area of 64 sq. m. The capital is Paroikia. Wine, figs, and wool are ex-

ported. The quarries of the famous white Parian marble are near the summit of Mount St Elias (ancient *Marpessa*), and are not yet exhausted. Archilochus and Polygnotus, the painter, were born on Paros.

Parotid Gland. See DIGESTION, SALIVA.

Parquetry, a kind of wood mosaic used only for flooring. Parquetry floors are usually of oak, but other and more ornamental woods have also been much used for giving variety and beauty to the pattern. In the more elaborate kinds of parquetry veneers are used, but it is much more generally composed of blocks of wood squared at the sides, and laid down so as to combine and form a geometric pattern.

Parr. See SALMON.

Parr, CATHARINE, the sixth wife of Henry VIII., was the daughter of Sir Thomas Parr, and was born in 1512. Married first to one Edward Borough, possibly Lord Borough, and afterwards to Lord Latimer, she on July 12, 1543, became queen of England by marriage with Henry VIII. She was distinguished for her learning and for her knowledge of religious subjects, her discussion of which with the king had well-nigh brought her to the block, like so many of her predecessors. Her tact, however, saved her; for she made it appear to the king's vanity that she had only engaged him in discourse about the Reformation in order to derive profit from his majesty's conversation. She persuaded Henry to restore the right of succession to his daughters, and interested herself on behalf of the universities. After Henry's death she married (1547) Thomas, Lord Seymour, and died from childbirth at Sudeley Castle, 7th September 1548.

Parr, SAMUEL, a once notable scholar, was born the son of a surgeon at Harrow-on-the-Hill, January 15, 1747. He attended Harrow School, and, after being found unfit for apprenticeship to his father's profession, was sent to Emmanuel College, Cambridge, in 1765. Two years later his father's death obliged him to leave Cambridge and accept an assistant-mastership at Harrow. Here he remained nearly five years, but, disappointed of the head-mastership on Dr Summer's death (1771), started an independent school at Stanmore, and kept it going five years. He was head-master of Colchester grammar-school (1776-78) and of Norwich (1778-86). His clerical preferences were the rectory of Asterby in Lincolnshire, the vicarage of Hatton near Warwick, and a prebendal stall in St Paul's Cathedral. He spent almost the half of his life at Hatton, and here he died, March 6, 1825. The degree of LL.D. was given him by Cambridge in 1781. In 1787 he published an edition of Bellen-den, to which he prefixed his celebrated preface, which is as remarkable for its uncompromising advocacy of Whig principles as for the scrupulous Ciceronianism of its Latinity.

It is almost impossible to understand the reputation which Dr Parr once had. None of his voluminous writings justify it. That he was in some respects an accomplished scholar is undoubted, for he could write Latin of Ciceronian purity and finish; but it is equally undoubted that he never did anything with his boasted scholarship, and has left the world absolutely nothing to keep him in remembrance. Yet his complete works (edited by Dr J. Johnstone in 1828) form eight enormous tomes, and contain 5734 octavo pages, many of them printed in small type. They relate to matters historical, critical, and metaphysical, but in all 'the thread of Parr's verbosity is finer than the staple of his argument.' To his conversational powers alone he owed the fame that he enjoyed during his life. He was an amazing, an overwhelming talker.

Bold, dogmatic, arrogant, with a memory profoundly and minutely retentive, and with a genuine gift of ephemeral epigram, he seemed, at the tables of statesmen, and wits, and divines, to be a man of tremendous talent, capable of any literary feat; but the learning and the repartee have left little trace of their existence, and posterity declines to admire the wonders that it has neither seen nor heard.

See E. H. Barker's ill-arranged *Parriana* (2 vols. 1828-29), De Quincey's essay, and the Lives by Field (1828) and Johnstone (1828).

Parr, THOMAS ('Old Parr'), was born, according to the tradition, in 1483 and died in 1635. See LONGEVITY.

Parra. See JACANA.

Parrakeet, or PARROQUET, a name very commonly given to many of the smaller species of the parrot family. The



Budgerigar
(*Melopsittacus undulatus*).

Warbling Grass-parrakeet (*Melopsittacus undulatus*) or Budgerigar ('good cockatoo'), is a very beautiful little species, often brought to England, and will breed in confinement. In the vast inland plains of Australia this parrakeet is to be seen in flocks of many hundreds feeding on the seeds of the grasses, which afford food also to many other small species. See PARROT.

Parramatta, a town of New South Wales, stands on a stream which runs into the head of Port Jackson (the whole of which inland from

Sydney is generally called the Parramatta River). It is connected with Sydney (14 miles) both by steamer and railway. In the early days of Australian settlement it was the centre of the farming district, and it is the oldest town in Australia outside Sydney. The surrounding district is now devoted to fruit-growing, especially to oranges and table-grapes. In the town itself the manufacture of Australian woollens was first begun. Pop. (1901) 12,560; (1921) 15,050.

Parrhasius, one of the greatest painters of ancient Greece, was at Athens and already distinguished among artists about the year 470 B.C. According to Xenophon, he held a conversation with Socrates, and he was a younger contemporary of Zeuxis. Parrhasius appears to have surpassed all his predecessors in purity of design, accuracy of drawing, force of expression, and what is technically called 'finish.' And it seems that his vanity and pride were equal to his artistic skill.

Parricide (Lat. *paricida*) is rather a popular than a legal term. In the Roman law it comprehended every one who murdered a near relative; but in English the term is usually confined to the murderer of one's father, or of one who is *in loco parentis*. The parricide does not, in any respect, differ in Britain from the murderer of a stranger; in both cases the punishment is death by hanging. In the Roman law a parricide was punished in a much more severe manner, being sewed up in a leather sack, along with a live cock, viper, dog, and ape, and cast into the sea.

Parrish, EDWARD (1822-72), an American pharmacist, member of a family of distinguished physicians, connected for many years with Philadelphia, and best known through 'Parrish's Chemical Food.' This is the popular name for a non-official preparation medicinally known as *Compound Syrup of Phosphate of Iron*, every drachm of which contains 1 grain of phosphate of iron, 2½ of phosphate of lime, besides soda and potash.

Parrot, the type of a large and important group of birds, divided into numerous families and genera. The parrots form an extremely compact group, showing but little structural variation, and offering no 'intermediate forms' to indicate their relationship to other birds. It has been suggested that they come nearest to the birds of prey, but this is at present no more than a suggestion. They are pre-eminently tropical birds, and arboreal in habit; some species, however, range into colder countries—e.g. Patagonia and New Zealand—and some, such as the burrowing Ground Parrot of New Zealand (*Strigops*), now nearly exterminated by the cats run wild which infest the scrub, are not arboreal. They are fruit and seed eating birds, with the exception of the Kea (q.v.), which has, since the colonisation of New Zealand, taken to a carnivorous diet. As a rule the parrots are brightly coloured birds, being often, like other forest-frequenting creatures, green; there are some species, however, which are not brilliantly coloured. There is occasionally a difference of colour in the two sexes, which is best marked in species belonging to the genus *Eclectus*; in these the prevailing colour of the female is red, and of the male green; the differences are so marked that they were actually referred to quite different genera until Dr A. B. Meyer showed conclusively that the red and green forms were merely the two sexes of the same species. The intelligence of parrots has been often commented upon, as also their power of imitating human speech; any one, however, who can endure for a sufficient time that pandemonium of noise, the parrot-house at the Zoological Gardens, will find that the clearness of utterance of the Myna or Indian Starling exceeds that of any parrot. The

great age to which parrots will live has often been exaggerated, but it is at any rate certain that some species will survive for fifty years in confinement, for an individual of the Greater Vasa Parrakeet (*Coracopsis vasa*) lived for more than fifty years at the Zoological Gardens. Parrots make their nests in holes, and lay white eggs, as is commonly the case where the eggs are concealed. Garrod has divided the parrots, on anatomical



The Gray Parrot.

grounds, into two families: (1) Palæornithidæ (including the Cockatoo, q.v., and Lory, q.v., the flightless New Zealand *Strigops*, and the large genus Palæornis) and (2) Psittacidæ (including the Macaws, the African parrots of the genus *Psittacus*, the American *Chrysotis*, the Australian *Platycercus*, and some other forms). The Gray Parrot (*Psittacus erythacus*), which has been a familiar cage-bird in Europe for hundreds of years, is a native of Africa, especially of West Africa. The Great Macaw belongs to the sub-family of Conurinae, found mainly in America, one

genus only (*Palæornis*) occurring in India and Africa. See Dr W. T. Greene's *Parrots in Captivity* (3 vols. 1884).

Parrot-fish, or PARROT-WRASSE (*Scarus*), a genus of fishes of the family Labridæ. The name seems to refer to the frequently bright colours, and partly to the shape of the mouth; for the jaws form a strong and sharp beak, and the teeth are soldered together. Over a hundred species are known, especially from the tropical coral-banks, on which they browse. The most northern species (*S. cretensis*) is the fucus-eating *Scarus*, prized by Greek and Roman epicures.

Parry, SIR CHARLES HUBERT HASTINGS, composer and historian of music, son of Thomas Gambier Parry, of Highnam Court, Gloucester (decorative painter and inventor of the 'spirit-fresco' process; 1816-88), was born at Bourne-mouth, 27th February 1848, and studied at Eton and Oxford. Unsuccessful as an underwriter at Lloyd's, he soon abandoned business. He was strongly influenced by Edward Dannreuther, by whose means many of his compositions were given a hearing, and impressed those who were qualified to judge. His work for the orchestra (four symphonies, symphonic variations, &c.) never gained such wide recognition as his choral compositions—'The Glories of our Blood and State,' 'Blest Pair of Sirens,' 'Judith,' 'Ode on St Cecilia's Day,' 'L'Allegro ed il Penseroso,' 'De Profundis,' Dunbar's 'Ode on the Nativity,' and a number of cantatas, &c. Parry became director of the Royal College of Music in 1894, professor at Oxford in 1899. Important books by him are *The Evolution of the Art of Music*, Vol. III. of *The Oxford History of Music* ('The Seventeenth Century'), *Johann Sebastian Bach, Style in Musical Art*. He died 7th October 1918. His Life has been undertaken by C. L. Graves.

Parry, SIR WILLIAM EDWARD, born at Bath 19th December 1790, entered the navy, and, sent in 1810 to the Arctic regions in command of a ship to protect British whale-fisheries, worked out rules for determining accurately the altitude of the pole by observations of the fixed stars. Parry took command in five expeditions to the Arctic regions: (1) in 1818, under Ross, who set out to find the North-west Passage; (2) in 1819, in chief command of two vessels, he explored Barrow Strait, Prince Regent's Inlet, and Wellington Channel, and wintered in Melville Island, but his attempt in the spring to reach Behring Strait was frustrated by the state of the ice; (3) from May 1821 to November 1823 he was again at the head of an expedition, which, however, achieved little; (4) a fourth voyage in 1824-25 had a like result; (5) his last voyage was an attempt (1827) to reach the North Pole on sledges by way of Spitsbergen—in which he was of course unsuccessful. After his return home from his second expedition he was awarded the £5000 which parliament had offered to the navigator who first crossed 110° W. long. In 1823 he was appointed hydrographer to the navy; in 1829 was knighted, along with Sir John Franklin; and in 1837 was made comptroller of a department of the navy. In 1846 he retired, accepting the post of superintendent of Haslar; in 1852 he was raised to the rank of rear-admiral, and in the following year was appointed governor of Greenwich Hospital, an office which he held till his death, 8th July 1855, at Ems in Germany. A collected edition of his voyages was published in 1833 (Lond. 5 vols.). See *Life* by his son, Rev. Edward Parry (Oxford, 1857).

Parsees (*Parsis*, 'people of Pars or Fars'—i.e. ancient Persia; sometimes called Guebres, q.v.) is the name of the small remnant of the followers of

the ancient Persian religion, as established or reformed by Zoroaster (Zarathustra or Zerdusht). The relation in which Zoroaster stood to the ancient Iranian faith and his date have been much debated; the very fact of his historical existence has even been denied; and accordingly it is difficult to dogmatise on the original principles of the Zoroastrian faith. These questions will be more fully discussed under the heads ZOROASTER and ZEND-AVESTA. It has been alleged that at first the doctrine was a pure Monotheism; that Zoroaster taught the existence of but one deity, the Ahura-Mazdão (Ormuzd), the creator of all things, to whom all good things, spiritual and worldly, belong. The principle of his speculative philosophy, on the other hand, was dualism: there being in Ahura-Mazdão two primeval causes of the real and intellectual world—the Vohu Manô, the Good Mind or Reality (Gaya), and the Akem Manô, or the Naught Mind or Non-reality (Ajyâiti). Certainly, however, the pure idea of Monotheism, if it ever existed, did not long prevail. The two sides of Ahura-Mazdão's being were taken to be two distinct spirits, Ahura-Mazdão and Angrô-Mainyush (Ahriman), who represented Good and Evil—God and Devil. These each took their due places in the Parsee pantheon ere long, and Parsism became a characteristic dualism.

The Zoroastrian creed flourished up to the time of Alexander the Great, throughout ancient Irania, including Upper Tibet, Sogdiana, Bactriana, Media, Persis, &c.; but after Alexander's death it gradually lost ground, rapidly declined under his successors, and under the Arsacidæ was much depressed. On the establishment of the Sassanians (212 A.D.), a native Persian dynasty, by Ardashir (Artaxerxes), the first act of the new king was the general and complete restoration of the partly lost, partly forgotten books of Zerdusht, which he effected, it is related, chiefly through the inspiration of a Magian Sage, chosen out of 40,000 Magi. The sacred volumes were translated out of the original Zend into the vernacular and disseminated among the people at large, and fire-temples were reared throughout the length and breadth of the land. The Magi or priests were all-powerful, and their hatred was directed principally against the Greeks. 'Far too long,' wrote Ardashir, the king, to all the provinces of the Persian empire, 'for more than five hundred years, has the poison of Aristotle spread.' The fanaticism of the priests often also found vent against Christians and Jews. The latter have left us some account of the tyranny and oppression to which they as unbelievers were exposed—such as the prohibition of fire and light in their houses on Persian fast-days, of the slaughter of animals, the baths of purification, and the burial of the dead according to the Jewish rites—prohibitions only to be bought off by heavy bribes. In return the Magi were cordially hated by the Jews; but later we frequently find Jewish sages on terms of friendship and confidence with some of the Sassanian kings. From the period of its re-establishment the Zoroastrian religion flourished uninterruptedly for about 400 years, till in 651 A.D., at the great battle of Nahavand (near Ecbatana), the Persian army under Yezdejird was routed by the khalif Omar. The great mass of the population was converted to the Mohammedan faith; the small remnant fled to the wilderness of Khorasan, but suffered, as might be expected, severe oppression and persecution. Some nine thousand 'Guebres' are still found in Persia, mainly in Yezd, Kerman, and at Teheran. Others, who preferred emigration to the endless tribulations inflicted upon them by the conquering race, found a resting-place along the western coast of India, chiefly at Bombay,

Surat, Ahmedabad, and the vicinity, where they now live under English rule, and are recognised as one of the most respectable and thriving sections of the community, being for the most part merchants and landed proprietors. Parsee traders have also settled at Calcutta, Madras, Aden, Zanzibar, in Burma, and in China. They bear equally with their poorer brethren in Persia the highest character for honesty, industry, and peacefulness, while their benevolence, intelligence, and magnificence outvie that of most of their European fellow-subjects. Their general appearance is to a certain degree prepossessing, and many of their women are strikingly beautiful. In all civil matters they are subject to the laws of the country they inhabit; and its language is also theirs, except in the ritual of their religion, when Zend, the holy language, is used by the priests, who as a rule, however, have no more knowledge of it than the laity. They are forward to embrace the advantages of English education, and not a few have studied law in England. Conspicuous amongst Parsee merchant-princes was Sir Jamsetjee Jejeebhoy (q.v.). In 1921 there were over 100,000 Parsees in India, 85,000 of them in Bombay with its states.

We have spoken of the leading fundamental doctrines as laid down by their prophet. Parsees do not eat anything cooked by a person of another religion; they also object to beef and pork, especially to ham. Marriages can only be contracted with persons of their own caste and creed. Polygamy, except after nine years of sterility and consequent divorce, is forbidden. Fornication and adultery are punishable with death. Their dead are not buried, but exposed on an iron grating in the Dakhma, or Tower of Silence, to the fowls of the air, to the dew, and to the sun, until the flesh has disappeared, and the bleaching bones fall through into a pit beneath, from which they are afterwards removed to a subterranean cavern.

Ahura-Mazdâo being the origin of light, his symbol is the sun, with the moon and the planets, and in default of them the fire. Temples and altars must for ever be fed with the holy fire, brought down, according to tradition, from heaven, and the sully of whose flame is punishable with death. The priests themselves approach it only with a half-mask over the face, and never touch it but with holy instruments. But however great the awe felt by Parsees with respect to fire and light (they are almost the only eastern nation who abstain from smoking), yet they never consider these as anything but emblems of divinity. The fires are of five kinds. There are also five kinds of 'Sacrifice,' which term, however, is rather to be understood in the sense of a sacred action—including the slaughtering of animals; prayer; the sacrifice of expiation, consisting either (a) in flagellation or (b) in gifts to the priest; and, lastly, the sacrifice for the souls of the dead. The purification of physical and moral impurities is effected, in the first place, by cleansing with holy water, earth, &c.; next, by prayers and the recitation of the divine word; but other self-castigations, fasting, celibacy, &c. are considered hateful to the Divinity. The ethical code may be summed up in the three words—purity of thought, of word, and of deed: a religion 'that is for all, and not for any particular nation,' as the Parsees say. Various superstitions have in the course of the tribulations of ages and the intimacy with neighbouring countries defiled the original purity of this creed, and its forms now vary much among the different communities of the present time. There are two main sects amongst them, as well as Conservatives and Liberals in usage.

See PERSIA, ZEND-AVESTA, ZOROASTER (and works there quoted), DEVIL; Haug, *Essays on the Sacred*

Language, Writings, and Religion of the Parsis (ed. by West, 1915); Dosabhai Framji Karaka, *History of the Parsis* (2 vols. Lond. 1884); Bharucha, *A Brief Sketch of the Zoroastrian Religion and Customs* (Bombay, 1893); Menant, *Les Parsis* (Paris, 1898, &c.); Kapadia, *The Teachings of Zoroaster and the Philosophy of the Parsi Religion* (1905); Spiegel, *Papers on Iranian Subjects* (1908); Rosenberg, *Notices de littérature parsie* (St Petersburg, 1909); Modi, *Papers on Parsee Subjects* (Bombay, 1912); Maneckji Nusservanji Dhalla, *Zoroastrian Theology* (1915); J. Hope Moulton, *Early Zoroastrianism* (1913), and *The Treasure of the Magi* (1918); Hodivala, *Studies in Parsi History* (Bombay, 1920).

Parsley (*Petroselinum*), a genus of plants of the natural order Umbelliferae. The species are annual or biennial, branching, smooth, herbaceous plants, with variously pinnated leaves. Common Parsley (*P. sativum*), which has tripinnate shining leaves, one of our best-known culinary plants, is a native of the south of Europe, growing chiefly on rocks and old walls, and naturalised in some parts of England. The cultivation of parsley is extremely simple, seed requiring to be sown annually in order to keep up a constant supply. A variety with curled leaflets is generally preferred to the common kind with plain leaflets, as finer and more beautiful, being often used as a garnish; it is also safer, as the poisonous Fool's Parsley (q.v.) is sometimes gathered by mistake instead of the other. Hamburg Parsley is a variety with a large white carrot-like root, cultivated for the sake of its root, and much in the same way as the carrot or parsnip. To produce large roots and of delicate flavour a very rich soil is required. The foliage of parsley is not merely of use for flavouring soups, &c., but is nutritious at the same time that it is stimulating, a quality which it seems to derive from an essential oil present in every part of the plant. Parsley contains also a peculiar gelatinous substance called *Apiine*. The bruised leaves of parsley are sometimes employed as a stimulating poultice. The seeds are a deadly poison to many birds, and when powdered they are sometimes used for killing lice.

Parsnip (*Pastinaca*), a genus of plants of the natural order Umbelliferae, having compound umbels with neither general nor partial involucre; yellow flowers, with roundish, involute, sharp-pointed petals; calyx almost without teeth; fruit dorsally compressed and flat, with a broad border, the ridges very fine. The species are annual, biennial, or perennial herbs, with carrot-like, often fleshy roots and pinnate leaves. The Common Parsnip (*P. sativa*) is a native of England, although not of Scotland, and is abundant in some districts, particularly in chalky and gravelly soils. It is also found in many parts of Europe and of the north of Asia. It is a biennial, with angular furrowed stem, 2 to 3 feet high, pinnate leaves with ovate leaflets, rather shining, cut and serrated, and a three-lobed terminal leaflet. The root of the wild plant is white, aromatic, mucilaginous, sweet, but with some acridness; and injurious effects have followed from its use. Cultivation has greatly modified the qualities both of the root and foliage, rendering them much more bland. The parsnip has been cultivated since Roman times, for the sake of its root, which in cultivation has greatly increased in size and become more fleshy. The flavour is disliked by some, as well as the too great sweetness, but highly relished by others; and the root of the parsnip is more nutritious than that of the carrot. The produce is also on many soils of larger quantity; and although the parsnip delights in a very open rich soil, it will succeed in clayey soils far too stiff for the carrot. It is rather remarkable that it has not been extensively cultivated as a field-crop, and for the feeding of cattle, except in the Channel

Islands and in limited districts of continental Europe, more especially as cattle are very fond of it; and not only is the flesh of cattle fed on it of excellent quality, but the butter of dairy-cows fed on parsnips in winter is said by many to be superior to that produced by almost any other kind of winter-feeding. The mode of cultivation of the parsnip scarcely differs from that of the carrot. There are several varieties in cultivation. These may be grouped in three types, viz. the Hollow Crown, the Long, and the Turnip-rooted. The first are the most generally useful and most widely grown. The second require exceptionally deep and free soils, while the last are suitable for shallow or stony ground. The parsnip is used chiefly in winter, whether for the table or for feeding cattle. It is improved rather than injured by frost, but is apt to become *rusty* if allowed to remain too long in the ground, and exhibits acrid qualities after it has begun to grow again in spring. The root of the parsnip is much used in the north of Ireland for making a fermented liquor with yeast and hops, and both in England and Ireland for making *parsnip wine*. A spirit is also obtained from it similar to that of the potato. The Cut-leaved Parsnip or Sekakul (*Malabaila pumila*), having pinnatifid cut leaflets, a native of India, Syria, and Egypt, is cultivated in the Levant, and is very similar in its uses to the common parsnip.

Parson, the incumbent of a benefice in a parish. He is called parson (Lat. *persona*, 'mouthpiece') because he represents the church. See CLERGY, DILAPIDATION, ORDERS, PARISH, RECTOR, VICAR, TITHES, CHURCH-RATES, CHURCHYARD, &c. For the Parson Bird, see HONEY-EATER.

Parsons, SIR CHARLES ALGERNON, born 13th June 1854, fourth son of Lord Rosse (q.v.) the astronomer, was educated at St John's College, Cambridge. He is best known for his Steam-turbine (q.v.).

Parsons, FATHER ROBERT, the chief of the English Jesuits in their golden age, and a man of remarkable talents and achievements, was born of respectable parents in Somersetshire in 1546. When eighteen years of age he passed from the free school at Taunton to St Mary's Hall, Oxford, and after two years migrated to Balliol College, where he took his degrees of bachelor and master, and became a fellow and tutor. Here he twice took the oath abjuring the papal supremacy, but he never received orders in the English Church. His enemies in college brought charges against him which led to his forced retirement from Oxford in 1574. He shortly afterwards became a Roman Catholic, and went to Padua with a view of there studying medicine, but, soon changing his mind, he set out on foot to Rome, and offered himself to the Society of Jesus, which he entered July 1575. He was ordained priest in 1578. When in the following year Dr (afterwards Cardinal) Allen, superior of the Douay seminary, succeeded in persuading the Jesuits to join with the seminary priests in the work of the English mission, Parsons and Campion (q.v.) were selected for the new venture. They left Rome in April 1580, with strict injunctions to meddle neither directly nor indirectly in affairs of state. Parsons landed at Dover, June 11, disguised as a merchant of jewels, in a coat of 'buff laid with gold-lace, with hat and feather.' His activity and success took both Catholics and Protestants by surprise. He employed six printers on a secret press, and by the rapidity of his movements for twelve months baffled all the attempts of the government to catch him. But soon after the apprehension of his companion, Campion, in July 1581, Parsons

found it prudent to escape to the Continent, from which he never again returned to England.

Meanwhile, following the natural bent of his mind, and ignoring or evading his original instructions, he had busied himself with state intrigues, sounded the political dispositions of influential Catholic laymen when treating with them of their consciences, and thought out schemes for the subjection of England to the pope by force of arms. In Normandy, whither he at first retired, he had conferences with the Duke of Guise and with Father Creighton, who had been despatched by the pope into Scotland to negotiate with the Duke of Lennox for the liberation of the Queen of Scots; and a little later, during April and May 1582, he was at Paris conferring with the Provincial of the French Jesuits, the Archbishop of Glasgow, the papal nuncio, and the agent of the king of Spain, concerning a project for the invasion of England. The plan, which was chiefly the offspring of Parsons' brain, was carried by Creighton to the pope, and by Parsons himself to King Philip at Madrid. Now began his intimacy and influence with the Spanish king, and the series of political enterprises which culminated in the Armada of 1588. Affairs of state did not, however, exclusively occupy the Jesuit's active mind. At Rouen in 1582 he had finished his book, the *Christian Directory*, which has found favour with Protestant divines; and, with the aid of the Duke of Guise, he founded at Eu a seminary for youths in preparation for the colleges of Douay and Rome. For a short time in 1588 he was rector of the college at Rome; and after the failure of the Armada he organised seminaries or clerical establishments for his countrymen at Valladolid in 1589, St Lucar in 1591, Seville and Lisbon in 1592, and at St Omer in 1593. In the reaction which followed on the death of Allen (1595) the jealousy and suspicion with which the more loyal section of the clergy had for some time regarded the ambitious schemes of the Jesuits and the Spanish party developed into a scandalous quarrel. Disturbances broke out among the prisoners at Wisbeach and in the English college at Rome. Parsons, who went from Madrid to Rome to again assume the rectorship of the English college, now persuaded the pope to appoint George Blackwell (q.v.), a partisan of the Jesuits, as archpriest over the secular clergy, with the view of keeping the chief direction of affairs, political and ecclesiastical, in his own hands. The appointment was resisted by the leaders of the seculars with an animosity which threatened to create a schism. Parsons, upon whom the odium of the appointment chiefly fell, was accused of deceiving the pope, of tyranny over the clergy, and of continued treason against his country. The stringency of the penal laws against Catholics was laid at his door. An appeal carried to Rome by four delegates of the secular clergy led to a diminution of the Jesuits' power, though Parsons persisted to the end in resisting the endeavours of his opponents to obtain an episcopal government. He died at Rome, as rector of the English college, April 15, 1610.

His industry and power of work were extraordinary. He wrote English forcibly and lucidly, and was a master in the arts of controversy. His domineering spirit and political partisanship created for him bitter enemies, while his mode of prosecuting his ends justly exposed him to charges of double-dealing, equivocation, and reckless slander of his opponents. He was otherwise irreproachable in his private morals. His ambition was for his order and not for himself, and he modestly avoided the cardinal's hat. He knew how on occasions to exercise tact and prudence, and, when it was his purpose to do so, no one could write with more persuasive piety. Among the best known of his

voluminous publications is *The Conference on the next Succession to the Crown*, written with the assistance of Allen and Sir Francis Englefield in favour of the infanta of Spain. He here insists on the right of the people to set aside, on religious grounds, the natural heir to the throne; and advocates principles which afterwards obtained for him the title of the first English Whig. Parliament (35 Eliz.) made it treason to possess a copy of the book, which was reprinted in the interests of Cromwell in 1648. It was again reprinted in 1681, and publicly burned at Oxford in 1683. Another curious work by Parsons, for some time disseminated in manuscript only, was his *Memorial for the Reformation*, in which he lays down rules for the guidance of the government, in the expected event of England's subjection to the pope. The book was read at dinner-time in the English college at Valladolid when Philip was preparing another Armada. The Jesuit's power of invective may be seen in his *Responsio ad Elizabethæ edictum*—a bitter libel on the queen's ministers in reply to the royal proclamation of November 1591. His *Apology* for the government of the archpriest (1601) is historically interesting, while his *Manifestation of the Great Folly and Bad Spirit of Certain in England calling Themselves Secular Priests*, a passionate attack upon the conduct and morals of his clerical brethren, exhibits him on his weakest side.

An impartial biography of this many-sided personality is still a desideratum. A brief sketch of his life and works will be found in Wood's *Athenæ* (i. 83), and from other points of view in Dodd's *Church History* and Oliver's *Collections*. The best estimate of his character as a Jesuit missionary is that by Richard Simpson in his *Life of Campion*, where Parsons' career in England is fully traced. For his political intrigues between 1582 and 1595 the *Letters and Memorials of Cardinal Allen*, published by the Fathers of the Oratory, must be consulted. An account of his quarrels with the secular clergy will be found in the *Conflicts of Jesuits and Seculars in the Reign of Elizabeth*, by Thomas Graves Law; and a number of letters and documents are scattered through Tierney's *Dodd* and Foley's *Records of the English Province of the S. J.* See also Father E. Taunton's *History of the Jesuits in England* (1901).

Parsonstown, or BIRR, a market-town in King's County, Ireland, on the river Brosna, 89 miles by rail W. of Dublin. The castle, anciently the seat of the O'Carrolls, was granted by James I. to Laurence Parsons, ancestor of the Earls of Rosse. Parsonstown is a handsome, well-built town, with a statue of the Duke of Cumberland, the victor of Culloden, and a bronze statue (1876) by Foley of the Earl of Rosse, the astronomer. Pop. 4000.

Parthenogenesis (Gr. *parthenos*, 'a virgin,' and *genesis*, 'production'). See EMBRYOLOGY, GENERATIONS (ALTERNATION OF), INSECTS, SEA-URCHINS.

Parthenon (Gr., 'maiden's-chamber'), the temple of Athena (q.v.) at Athens, probably the most perfect specimen of Greek architecture. It is a great Doric temple, designed under the artistic directorship of Phidias, by the architects Ictinus and Callicrates. Built of Pentelic marble, it has eight pillars in the width and fifteen at each side (not counting those at the corners). The total length is 228 feet; height to top of pediment, 64 feet. The sculptures are, in the orthodox view, held to have been designed by Phidias, and to have been executed in part possibly by himself and in part by assistants under his superintendence; but the theory has also been advanced that except for the celebrated statue of Athena, Phidias had nothing to do with the sculptures. This magnificent relic of Periclean times stood little injured by weather or war until, when it was being used as a Turkish magazine in 1687, a bomb from a Venetian

mortar burst within, and the explosion reduced the building to ruins. Restoration was begun in 1925. Illustrations will be found at GREEK ARCHITECTURE; a view of the ruins at ATHENS; and part of the frieze at ELGIN MARBLES. See Dr A. S. Murray, *The Sculptures of the Parthenon* (1903).

Parthenopean Republic. See NAPLES.

Parthia, anciently a district in what is now northern Persia, lay between Media on the west and Bactria on the east, was separated from the Caspian Sea on the north by the savage land of Hyrcania, and was bordered on the south by the Iranian deserts. The Parthians were of Scythian descent, immigrants and nomads, who eventually adopted the Median dress and a semi-Aryan speech. But in war they clung to their national habits: they always fought on horseback, and both horse and rider were clad throughout in scale armour; their weapons were bows and arrows, which they discharged backwards during pretended flight as well as forwards in direct attack. Their armies were made up principally of slaves, commanded by their masters, the aristocratic nucleus of the Parthian nation. Parthia was subject successively to the Assyrians, the Medes, Persians, Greeks (Alexander the Great and his generals), and the Seleucids of Syria. In or about 250 B.C. a chief named Arsaces founded an independent kingdom in Hyrcania; his brother and successor, Tiridates, established himself in Parthia in 241 B.C. But the early kings of Parthia had much ado to maintain their position against their suzerains, the Seleucid 'great kings,' and it was not until Mithridates I. (171-138) ascended the throne, and had subdued Bactria, Media, and Babylonia, that the Parthian princes shook off completely the Syrian (Greek) yoke and became independent. This king made Parthia supreme in Iran. He greatly strengthened his power by resting it in great part upon the Magi (q.v.) and the ancient creed of Zoroaster. In the reign of his successor the Seleucid king made a determined effort to recover the lost provinces in Iran, but the expedition cost him his life and his army (129 B.C.). No sooner was this enemy disposed of than another and more formidable foe appeared in the east—the Scythians. They defeated and slew (128) Phraates, king of Parthia, levied tribute from his kingdom, and established themselves within its borders. During the first half of the 1st century the Parthian kings, by interfering in the affairs of Armenia, first came into contact with the Romans. The unprovoked invasion of Mesopotamia by Crassus (53 B.C.), his disastrous defeat and his death, make the first act in the drama of real contest that then ensued between Rome and Parthia. The remaining acts were the conquest of Syria and Palestine by Parthia (40-38); the disastrous campaign of Antony in Armenia (36 B.C.); then, after a century and a half of, in Parthia, mostly internal dissensions, the renewal of hostilities by Trajan (115-117 A.D.); the brilliant campaign of Avidius Cassius (164-165); the capture of Ctesiphon by Severus (199) and his repulse before Atrā (201); and the defeat of Macrinus, the Roman emperor, and his ignominious payment of fifty million denarii to his enemy (217-218). During nearly all this period the Euphrates was looked upon by both combatants as the frontier line between their respective empires. The Parthian capital was Ctesiphon, a suburb or twin-capital with Seleucia, all through the duel with Rome. The Parthian empire was overthrown in a battle fought in 224 (or 227) by Artashir, a prince of Persis, a province of ancient Iran, who founded the subsequent dynasty of the Sassanids (see PERSIA). The Parthian kings during the most flourishing period

of their power used Greek as their official language, adopted some of the Greek deities, and in other ways put themselves under the influence of Greek civilisation. But the hold of this civilisation grew weaker as time went on, and Greek ceased to be the official language in the 2d century A.D.

See histories of Parthia by Rawlinson (1873), Schneideworth (Heiligenstadt, 1874), and Spiegel (Leip. 1887).

Partick, from 1852 a police burgh, since 1912 part of Glasgow, prettily situated, chiefly on a rising ground on the Kelvin, immediately above its junction with the Clyde, and 3 miles WNW. of the Cross, has shipbuilding yards, besides flour-mills and brassfoundries, and extensive ranges of handsome villas.

Partinico, a town of Sicily, 32 miles SW. of Palermo by rail. Pop. 21,000.

Partnership is the relation which subsists between persons carrying on business in common with a view to profit. Technically it has no reference to the relation between shareholders and a limited company. The law of partnership for the United Kingdom has been placed on a clear and intelligible footing by the Partnership Act, 1890, 53 and 54 Vict. chap. 39, which does not change the law established by decisions, but states it in an authoritative manner. Joint tenancy, or joint property, or sharing gross returns does not by itself make a man a partner. The receipt of a share of net profits is a strong indication of partnership, but it is not conclusive in such cases as a creditor, a servant or agent, the widow or child of a deceased partner, the vendor of the good-will of a business, receiving payment or remuneration by way of a share in net profits. Where the person carrying on the business becomes bankrupt, however, the creditor or vendor who is paid out of profits is postponed to the other creditors. In Scotland the firm is a legal person distinct from the individual partners, but a partner may be charged on a decree against the firm, and on payment of a firm debt is entitled to relief *pro rata* from the firm and the other partners. In all ordinary transactions each partner, as agent, binds the firm, unless the person dealt with knows that the partner has in fact no authority. The firm is not bound where the partner pledges its credit for a purpose apparently not connected with the business. In England and Ireland the partners are liable jointly, in Scotland severally, for firm debts: in England and Ireland the estate of a deceased partner is subject to prior payment of separate debts. The firm is liable for the misapplication by a partner of property received by the firm, except in the case of property of which the partner is trustee when the other partners have no notice of the trust. Every person who by words or conduct holds himself out as a partner, or permits himself to be so represented by others, is liable to anybody who relied on such representations. But this will not make the executors of a deceased partner liable because the name of the deceased has been used by the firm after his death. The admissions of a partner bind the firm, and notice of any fact to a partner is also notice to the firm, except in the case of a fraud upon the firm. A new partner does not become liable, nor does a retiring partner cease to be liable, to existing creditors. But the consent of creditors to discharge a retiring partner, or to accept the new firm as the only debtor, is easily presumed from a course of commercial dealing. Continuing guarantees or cautionary obligations are revoked as to future transactions by any change in the constitution of the firm which is debtor or creditor in the obligation. Unless the contrary appears, property bought with the money of the firm is held to have been bought on account of the firm. Heritable property

bought for the firm is treated as movable between partners. Unless otherwise agreed, all partners are entitled to share equally in profits and capital, and must contribute equally to losses. The firm must indemnify every partner in respect of proper payments made and liabilities undertaken by him. If a partner advances capital beyond his share, he is entitled to interest at 5 per cent. Every partner may take part in management, but no partner is entitled to remuneration for so doing.

No new partner may be introduced without the consent of all the other partners. The majority of partners cannot expel a partner. Every partner has access to the firm books. If no time has been fixed for the duration of the firm, any partner may at any time dissolve it by notice to his copartners. If the partners go on trading after the time fixed for dissolution they are presumed to do so under their former agreement so far as that may be applied to a partnership at will. Every partner must account to the firm for any benefit derived by him from any partnership transaction, or any use of partnership property or business connection. The same rule applies if without consent a partner carries on a separate business competing with the firm. An assignment by a partner to his creditor of a share in the business does not entitle the creditor to inspect books, or to require accounts, or to interfere in management, but merely to receive share of profits, or to receive the value of the share when realised on dissolution. Apart from agreement, partnership is dissolved by the death or bankruptcy of any partner, or by the business becoming unlawful. Further, the court may decree a dissolution (1) where partner is of permanently unsound mind; (2) when partner becomes permanently incapable of performing his duties; (3) when partner's conduct prejudicially affects the carrying on business; (4) when partner persistently breaks the agreement, or so conducts himself that it is not reasonably practicable for the other partners to act with him; (5) when the business can only be carried on at a loss. A person dealing with a firm after change in its constitution is entitled to treat all *apparent* members of the firm as still partners until he receives notice of the change. A retiring partner, not known to be a partner, is not liable for debts contracted after his retirement. After dissolution the authority of partners to bind the firm continues so far as necessary for a proper winding up—viz. in having the property of the partnership applied to payment of the debts and liabilities of the firm, and the surplus assets applied in payment of what is due to the partners after deducting what is due by the partners to the firm. If after a partner's death or retirement the other partners carry on business without any settlement of accounts, they must account for share of profits or pay interest at 5 per cent. in the option of the outgoing partner or the representatives of deceased partner. An option to purchase, however, is generally given by the contract in such cases.

In Scotland, as already stated, the firm is a distinct *persona*. Therefore in actions by or against the firm the individual partners need not be named, though in practice one or two of them generally are named. Each partner may also sue the firm; and the firm may be sequestrated without any of the partners being sequestrated.

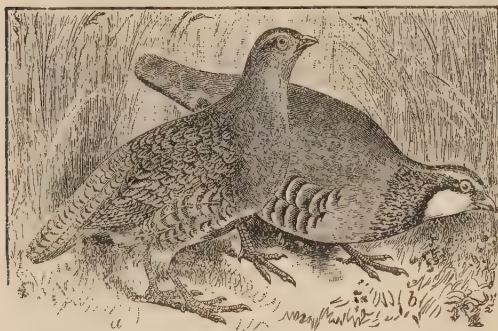
By the Limited Partnerships Act, 1907, 7 Edw. VII. chap. 24, a system of limited liability in partnership was introduced, resembling the 'commandite' partnership (see *COMMANDITE*), which had been in operation for many years in Europe and in the United States. This act permits the formation of partnerships consisting of one or more *general* partners, liable for all the debts and obligations of the firm, and one or more *limited* partners,

liable only up to the amount contributed by them to the firm capital, subject to the fulfilment of the requirements of the act as to registration.

The law of the United States is based on English common law, but many of the states of the Union have their own special legislation.

See Lord Lindley's *Treatise on the Law of Partnership* (9th ed. 1924), the great authority; Sir F. Pollock's *Digest of the Law of Partnership* (11th ed. 1920); and, for the United States, besides Kent's *Commentaries* (14th ed. 1896) and Story's *Law of Partnership* (1841), works by T. Parsons (4th ed. 1893), Bates (1888), and Burdick (2d ed. 1906). See also the articles COMPANY, CORPORATION.

Partridge (*Perdix*), a genus of gallinaceous birds, of the family Phasianidæ, having a short, strong bill, naked at the base; the upper mandible convex, bent down at the tip; the wings and tail short; the tarsi as well as the toes naked, the tarsi not spurred. The Common Partridge or Gray Partridge (*P. cinerea*) is the most plentiful of all game-birds in Britain, and becomes increasingly plentiful as cultivation is extended, whilst the range of the moorfowl is restricted. Hence it has



a, Common Partridge (*Perdix cinerea*); b, Red-legged Partridge (*P. rufa*).

greatly increased during the 19th century in Britain, and, though not preserved to the same extent as are pheasants, it affords considerable sport. It is not found in the Outer Hebrides. On the continent of Europe it is abundant in almost all districts suitable to its habits, from Scandinavia to the Mediterranean, and is found also in the north of Africa, and in some parts of the west of Asia. It varies considerably in size, those found in rich arable lands being generally the largest, and about 12½ inches in entire length, whilst those which inhabit poorer and more upland districts, or where heather abounds, are rather smaller. The female is rather smaller than the male. The upper parts of both are ash-gray, finely varied with brown and black; the male has a deep chestnut crescent-shaped spot on the breast, which is almost or altogether wanting in the female. A variety called the Mountain Partridge has the plumage brown. The Partridge is seldom found far from cultivated land: It feeds on grain and other seeds, insects and their larvæ and pupæ; and the pupæ of ants are generally the food sought at first for the young. The nest is usually on the ground, among brushwood and long grass, or in fields of clover or corn, and generally contains from twelve to twenty eggs. The young run as soon as they are hatched. Both parents show a very strong attachment to their young, and great courage in repelling assailants; they have also recourse, like many other birds, to stratagem to draw off the most powerful and dangerous enemies, such as dogs, in another direction, fluttering close before them as if broken-winged, whilst the brood escape. Until the end

of autumn the parent birds and their brood keep together in a *covey*; late in the season several coveys often unite into a *pack*, when it becomes much more difficult for the sportsman to approach them. The flight of the partridge is strong and rapid for a short distance, but it does not seem to be capable of a long-sustained flight. The eggs of partridges are often hatched, and the young birds reared, by the domestic hen, the chief requisite being a plentiful supply of ants when the birds are very young. Partridges thus reared become very tame, but they seldom breed in the aviary.

The Red-legged Partridge (*P. rufa* or *Caccabis rufa*, the genus or sub-genus *Caccabis* being distinguished by a rudimentary blunt spur on the tarsi) is a native of the south of Europe and of the Channel Islands, often called the French Partridge. It is now also plentiful in some parts of England, particularly Norfolk and Suffolk, into which it has been introduced, and whence it has largely driven out the common breed. It is said to have been brought to England from Guernsey during the reign of Charles II.; and the French Revolution of 1789, with its sudden abolition of the game-laws, is said by Carlyle to have caused 'two signs—emigrant flights of French seigneurs, emigrant winged flights of French game.' The red-leg is rather larger than the common partridge, stronger on the wing, and less easily approached by the sportsman, whilst it is also less esteemed for the table. The upper parts are of a reddish-ash colour; the throat and cheeks white, bounded by a collar of black, which expands in black spots on the breast; and the sides exhibit bars of black. The plumage is smooth. Two other species, nearly allied to this, are found in some of the southern parts of Europe, and one of them is found as far east as India. In Africa there is the Barbary Partridge (*P. petrosa*). The habits of all the species much resemble those of the common partridge, but the *P. rufa* prefers heavy clay land and heaths, in which respect it greatly differs from the gray partridge.—The name is loosely used for a North American Grouse (q.v.), the Virginian Quail (q.v.), the Tinamou (q.v.), and other birds. See H. A. Macpherson, *The Partridge* (1893).

Partridge Berry. See GAULTHERIA.

Partridge-wood, a very pretty hardwood from the West Indies and Brazil; the product of the leguminous tree *Andira inermis*. See ANDIRA.

Pasadena, a pretty country town in southern California, 10 miles by rail E. of Los Angeles; pop. 45,000. There are two important observatories on neighbouring mountains.

Pasargadæ, one of the most ancient cities of the Persians, containing a palace and great treasures, was in the province of Persis, and stood in a plain surrounded by mountains, on the river Cyrus. It is identified with ruins near the modern Murghab, north-east of ancient Persepolis, and 70 miles north-east of the modern Shiraz.

Pascagoula, a navigable river in the south-eastern part of Mississippi, formed by the junction of the Leaf and Chickasawha. It flows 85 miles south to a small bay of the same name on the Gulf of Mexico.

Pascal, BLAISE, one of the best writers and profoundest thinkers France has produced, was born of a good legal family, at Clermont-Ferrand in Auvergne, 19th June 1623. His father, Etienne Pascal, was a president of the Court of Aids there, and was himself a man of high character and capacity; his two surviving sisters, Gilberte and Jacqueline, grew up beautiful and accomplished women, with something of their brother's intellect and all his spiritual elevation of character. The

elder of the two, Gilberte (born 1620), married her cousin M. Périér in 1641, penned a tender and touching sketch of her brother's life, as well as her sister's, and had her own history written by her gifted and austere daughter Marguerite (1646-1733). Jacqueline (born 1625) wrote verses as a child, and in maturer life remarkable letters and *Thoughts* on the 'Mystery of the Death of Christ.' After a troubled spiritual experience she became one of the sisters of Port Royal in 1652, but failed to find all the happiness she sought for, and died nine years later, immediately after having been persuaded into subscribing against her conscience the formula required from the Port-Royalists, which she had vehemently resisted as a treasonable betrayal of the cause. Her brother, at first willing to submit, now offered the strongest opposition to any further concessions, and, at an interview with Arnauld, Nicole, and Sainte-Marthe, argued the point with such vehemence that he fell fainting to the ground.

Their mother died in 1626 or 1628, and in 1630 their father went to live in Paris amongst the men of science of his time. He trained his gifted son with the greatest care, and Madame Périér has told us of the child's astonishing precocity, how he refused to rest without knowing the reason for everything, and how, when purposely kept from mathematical books, he worked out for himself at twelve the propositions of Euclid as far as the thirty-second in the first book. Still more, at sixteen he wrote a treatise on conic sections which called forth the mingled incredulity and astonishment of Descartes, and indeed founded the modern treatment of the subject, though not published for more than a century. Leibniz saw it, and Pascal himself gave a résumé of it in his *Essai pour les Coniques* (1640). His father's protest against one of Richelieu's financial measures brought him into trouble, and indeed drove him awhile into hiding, but the cardinal's anger was abated by the intercessions of Jacqueline and her charming acting in a representation by young girls of Scudéry's *L'Amour Tyrannique*. Richelieu sent him as Intendant to Rouen in 1641, and here about 1646 an accident brought him into contact with the Jansenists, and turned into a new current the destinies of his children. Here the boy gave himself to study with unbroken devotion, despite wretched health and almost incessant sufferings from nervous prostration. To this period belongs his first conversion, and we find him in the intemperate zeal of a first love testifying to the earnestness of his convictions by denouncing to the archbishop the errors in the teaching of a Capuchin monk at Rouen. In 1647 he published his *Nouvelles Expériences sur le Vide*, and next year occurred his famous Puy de Dôme experiments on atmospheric pressure, which may be said to have completed the work of Galileo and Torricelli. The reputation he gained earned him the jealousy of Descartes, and the attacks of the Jesuit fathers of Montferrand and Paris.

His calculating machine was a brilliant achievement of the first years at Rouen; the later scientific labours of his life were contributions to the infinitesimal calculus, to the theory of the equilibrium of fluids, the mathematical theory of probability, and the properties of the cycloid. In the very last months of his life we find him busily engaged in a scheme for running omnibuses on the streets of Paris.

In the autumn of 1647 he returned to Paris, and we find him frequently accompanying Jacqueline in her visits to the church of Port Royal. Next year their father returned to Paris as Councillor of State, and took the pair to Clermont for nearly two years. In September 1651 he died, and Jacqueline, now free to carry out her desire, joined Port

Royal in the January of 1652. From some of her exaggerated phrases Pascal has been needlessly supposed to have lived a worldly life with the Duc de Roannez and other friends, and his *Discours sur les Passions de l'Amour* has been interpreted as inspired by a hopeless passion for Charlotte Gouffier de Roannez, the duke's sister, then about sixteen years old. Certain it breathes a genuine passion throughout, and there can be little doubt that it was written out of some real experience. If Pascal did love her, it is most probable that he never told his love, for he continued to the close the warm friend and correspondent of herself and her brother alike. She vacillated awhile between the cloister and the world, passed through her novitiate at Port Royal, then married the Duc de la Feuillade, saw her children die and her own health decay, and early sank into the grave.

In the autumn of 1654 Pascal's second conversion occurred, and from this period date those severe and gloomy austerities which darkened his life and doubtless hastened him to the grave. The immediate occasion may have been a narrow escape from death through his horses running away when driving to Neuilly, but the moment that remained ever sacred in his memory was that of a remarkable vision or ecstasy, November 23, 1654, commemorated in a few broken sentences of impassioned and mystical devotion in his Profession of Faith, or Amulet, as Condorcet called it, which was found after his death, copied in his own handwriting both on paper and parchment, and sewn into his doublet, being apparently stitched anew into every change of clothes. (See, but only for its facts, Lélut's *L'Amulette de Pascal*, 1846.) From this time a complete change passed over his life; he subjected himself to the most rigid mortifications, complete denial of self, boundless charity, and absolute obedience to his spiritual director, and ever wore around his body a girdle of iron, the sharp points of which he would press into his flesh when he felt in danger from worldly temptations or wandering thoughts. For a time he lived in Port Royal, and henceforth he threw himself with a passionate devotion into its cause. Arnauld was condemned by the Sorbonne in 1655, not merely for doubting whether the famous Five Propositions condemned were actually contained in the work of Jansen, but also for asserting the identity of the Augustinian and Jansenist doctrines of *gratia efficax*, and for declaring that the arguments used against the *Augustinus* were themselves erroneous or falsified; and his friends now thought the time had come for the public to be informed about the whole question at issue.

In a happy hour Pascal was induced to lend his pen to the cause, and on the 23d January 1656, in the interval between the first and second judgment of the Sorbonne on Arnauld, appeared *A Letter written to a Provincial by one of his Friends*. A second was issued a few days later, and as its successors followed he assumed the pseudonym of 'Louis de Montalte.' These 'little letters'—the greatest tracts for the times that were ever issued—flew from hand to hand, and the rage and fury of the Jesuits knew no bounds. Never before had been seen in the whole range of controversy such delicate yet scathing irony, such lightness of touch yet keenness of thrust, such Socratic directness and point, such mastery of incisive argument wedded to perfect grace and felicity of phrase and rare distinction of style. 'The best comedies of Molière have not more wit than the first Provincial Letters,' says Voltaire, and he adds, 'Bossuet has nothing more sublime than the concluding ones.' Voltaire tells us that Bossuet himself confessed that had he not written his own, he would rather have written them than any other book he knew; even Madame

de Sévigné bowed her head before their sovereign delicacy and perfection of style; Boileau owned them unsurpassed in ancient or modern times; Perrault places them above Plato for wit, Lucian for delicate and artful railery, and Cicero's orations for strength and ingenuity of reasoning; and Gibbon tells us that almost every year he perused them with fresh pleasure, and from them learned 'to manage the weapon of grave and temperate irony, even on subjects of ecclesiastical solemnity.' There are altogether eighteen Letters from the pen of Pascal himself, a brief fragment of a nineteenth ascribed to him, and a twentieth on the Inquisition from the pen of M. Le Maitre. The first two deal with the special question between Arnauld and the Sorbonne; the third and two concluding letters are closely connected with these; the intervening thirteen (4-16) open up the whole subject of the moral theology of the Jesuits, and form the most formidable attack ever made upon the order. The fabric of the moral theology or casuistry of the Jesuits, with all its subtle equivocations and refinements for the extenuation of sin, appalled the austere soul of Pascal as he read into it; and by the end of the tenth letter, after completing his exposition of their theology, he turns to address the Jesuit fathers directly, and breaks into language of eloquent and indeed sublime denunciation. The eleventh defends the application of the method of railery to serious subjects; the twelfth and thirteenth rise to an eloquence equalled only in Demosthenes; the sixteenth is that the length of which he excuses because he had not had time to make it shorter. In the composition of his Letters Pascal owed much to the materials collected in the Port Royal work, *La Théologie Morale des Jésuites* (1644). His quotations were confessedly often furnished for him from the wider reading of friends like Nicole and Arnauld, but he tells us that he himself read Escobar's seven volumes twice through, and never made use of a single passage supplied to him without having specially examined it and its context. It has been charged against him that he sometimes quotes inexactly, and that he is unfair in taking quotations out of their setting, but the real grievance of his adversaries is nothing more than this, that he turns their flank by taking their own positions and developing them practically to their natural conclusions. And if it be said that he treated with too great seriousness the statements and arguments of inferior writers, it must be remembered that all these books were issued under the *imprimatur* of the order. At anyrate the Jesuits were much readier with denial and denunciation than counter-arguments and proof; the replies of Piro (1657), Daniel (1694), and Dumas (1700) were pitiful failures, and hardly more can be said of the onslaught of Joseph de Maistre (in *De l'Eglise Gallicane*, 1821) and of the Abbé Maynard's edition of the Letters with a professed refutation (1851). Pascal's own final judgment of his work was expressed in these solemn words: 'Though my Letters be condemned at Rome, what I condemn in them is condemned in Heaven. Ad tuum, Domine Jesu, tribunal appello.'

Between his conversion and the beginning of his great controversy Pascal seems to have lived chiefly at Port Royal under the spiritual guidance of M. de Saci, but he never took up his abode as a regular inmate there. His Letters occupied him till the spring of 1657, and during the following year he busied himself in a scheme for a great Apology of religion, his faith meanwhile being quickened by his belief in the famous Miracle of the Holy Thorn, according to which his niece, Marguerite Périer, a pupil at Port Royal, had been miraculously cured of an obstinate *fistula lacrymalis* by a touch of a fragment of the crown of Christ. But his

health gave way during 1658, and thenceforward to the close he bore the burden of constant suffering with more than saintly patience and resignation. Indeed he laboured to deaden every sensation of pleasure in life, in his food, his studies, and even the affections of his friends. Meanwhile his weakness grew upon him, study and composition became possible only in brief intervals, and on 19th August 1662 he sank to rest under his sister's roof at Paris, his own house having been given up to a poor family one of whose children had been seized with smallpox.

Seven years later (1669) appeared his *Pensées*, with a preface by Madame Périer's son—the result of the editorial labours on his fragmentary papers of a committee of influential Jansenists. Unhappily these perplexing fragments were garbled to a great extent in the interests of orthodoxy and ecclesiastical policy by exaggerated prudence and misdirected zeal, just as they were in 1776 by Condorcet in the interests of heterodoxy. The Abbé Bossut's edition in 1779 was long accepted as authoritative; but in 1842 Cousin first showed the real state of the case in his celebrated Report to the French Academy, and startled the world by declaring that Pascal was a complete sceptic in philosophy, and a Christian only through external influences entirely unconnected with logic or reason. To M. Prosper Faugère belongs the honour of first giving (1844; Eng. trans. by Pearce, 1850) a complete and authentic text, although all readers will not accept his supposed discovery of the indications of an interior arrangement. Havet (1852), thought it hopeless to discover the true order, and therefore returned to Bossut's arbitrary but familiar arrangement. Victor Rocher, again (1873), adopted an elaborate arrangement, professedly founded on Pascal's original plan, and maintained that everything falls naturally into it. A standard edition is that of Molinier (1877-79), an independent arrangement mainly on the lines of Faugère's, admirably translated into English by C. Kegan Paul (1885). Another is that of Brunschvicg (1897).

Pascal's *Pensées* are detached thoughts dashed rapidly off, intended as materials to be shaped into his projected Apology for the Christian faith. They are thrilled through and through with passionate emotion and ever-present personality, and they contain some of the most profound, suggestive, and startling thoughts that have ever been expressed on the greatest mysteries within the range of human speculation. From one point of view it is easy to construct from them, as Cousin did, a theory that their author was a pessimist and sceptic of a far deeper dye than Montaigne, but profounder study proves this view but a shallow paradox at best. The conversation with De Saci (first published in 1728 by Des Molets) offers the best key to Pascal's philosophy of life. Here he takes Montaigne and Epictetus as his representatives, the first of the Pyrrhonist, Epicurean, and sceptic, who mocks man's aspirations after spiritual truth, and insists upon his weakness, his ignorance, and doubt; the second, of the Stoic, who looks at man only on his lofty side, insists on his freedom and moral dignity, and points out in his moral nature the image and likeness of God. Pascal regards these two opposites as united in the gospel of Christ, the overwhelming certainty of which arises out of its alone affording a key to the tormenting anomalies and contradictions of nature, at once to the moral law as revealed by conscience within and to all the disorder of the world as discovered by conscious experience—to man's greatness and man's degradation, and the reason for both the one and the other. Man's spiritual capacity alone enables him to realise his intrinsic greatness, which was revealed to him once for all when for his sake the Highest was joined to the lowest, in the incarnate union of Divine Power and Love with human degradation and pain. This is a mystery beyond man's power of demonstration, and a deeper ground for certainty must be sought in its essential

correspondence, not with the intellect alone, but with the whole complex nature of man. Yet with all this there exist in the *Pensées* startling fragments deeply tinged with scepticism, although many of these may be interpreted with Sainte-Beuve as a kind of shorthand notes to fix ideas that flashed across his mind of difficulties to be afterwards considered. Of these none is more famous than the wager essay, in which, as has been said, and with truth, Pascal plays at pitch and toss with the existence of God and the immortality of the soul. Such a passage as this is a product, says Tulloch, of one of those 'moments of terrible doubt, when the soul is so borne away on the surge of the sceptical wave that rises from the depth of all human speculation that it can only cling to the Divine by an effort of will, and with something of the gamester's thought that this is the winning side.' The *Pensées* owe much to Montaigne and Charron, and, as Molinier has shown, to the 13th-century Spanish writer Raymond Martin.

More or less complete editions of Pascal's works are those of Bossut (1779), Lahure (1858), Faugère and Brunschvicg (1886-1904). Of the *Provincial Letters*, besides the Abbé Maynard's edition (1851) already mentioned, and Lesieur's reprint of the original quarto (1867), there are editions by Villemain (1829), De Sacy (1877), De Soyres (Lond. 1880), L. Derome (1885 *et seq.*), and Molinier (2 vols. 1891). The famous Latin translation by Wendrock [Nicole], for which he read his Terence thrice over, appeared at Cologne as early as 1658. There are English translations by Royston (1657), Pearce (1849), and Dr Mc'Crie (1846). Of the *Pensées* there are editions by Frantin (1835), Faugère (1844, containing what seems to be the most authentic portrait), Havet, with an admirable commentary (1852; 3d ed. 1881), Lahure (1858), Louandre (1854), Rocher (1873), and Molinier (1877-79). English translations are those by Walker (1688), Craig (1825), Pearce (1850), and Kegan Paul (1885). For Jacqueline Pascal's Life, see the works by Cousin (1845) and Sophy Winthrop Weizel, *Sister and Saint* (New York, 1880). Her miscellaneous writings, letters, and poems, together with those of Madame Périer and Marguerite Périer, were edited by Faugère (Paris, 1845).

See vols. ii. and iii. of Sainte-Beuve's *Port Royal* (1842-48), and Charles Beard's *Port Royal* (1861); the studies by Reuchlin (Stutt. 1840), Vinet (1856), Cousin (1857), H. Weingarten (Leip. 1863), Dreydorff (admirable, Leip. 1870), Tulloch (1878), Joseph Bertrand (1891), and Boutroux (1901). Admirable articles on Pascal are those in the *Edinburgh Review* for January 1847 (by Henry Rogers), the *Quarterly Review* for October 1879 and April 1906, the *British Quarterly Review* for October 1884 (by C. Kegan Paul). See also the articles ARNAULD, JANSEN, and PORT ROYAL in this work; and Madame Duclaux, *The French Ideal; Pascal, Fénelon, and other Essays* (1911).

Paschal. See PASSOVER, EASTER, HOLY WEEK.

Pasco. See CERRO DE PASCO.

Pascoli, GIOVANNI (1855-1912), Italian poet and critic, born in Romagna, was educated at Bologna, became a teacher of Latin and Greek, professor of Latin Literature at Messina and Pisa, and of Italian Literature at Bologna. As a follower of Carducci he produced several volumes of poetry from 1891 on, as well as a study of Dante and other prose works. See a book by Croce (1920).

Pas-de-Calais (Fr. for Strait of Dover), a department in the north of France, formed out of Artois and Picardy, and bounded on the W. by the Strait of Dover and the English Channel. Area, 2550 sq. m.; pop. (1861) 724,338; (1911) 1,068,155; (1921) 989,967. The surface is level, with the exception of a low ridge running to the north-west, and ending in Cape Gris-nez (q.v.). The soil is fertile, mostly under cultivation, and watered by numerous short rivers, the majority of which are

navigable and connected by canals. The coast-line is 80 miles in length, and the shores are in certain parts low and sandy. The climate is exceedingly inconstant. Fishing is actively carried on, particularly in the neighbourhood of Boulogne. Coal, iron, and other minerals are raised and worked, and considerable quantities of turf are cut. The industrial establishments are numerous and important, as iron-foundries, beet-root sugar factories, glass-works, potteries, tanneries, and others. Boulogne and Calais are the principal harbours. There are six arrondissements—Arras, Béthune, St Omer, St Pol, Boulogne, and Montreuil. The capital is Arras.

Paseng. See GOAT.

Pasewalk, a town of Prussia, 26 miles by rail WNW. of Stettin, has varied industries. It was plundered and burned three times by the Imperialists in the Thirty Years' War, by the Poles in 1657, and by the Russians in 1713, and passed from Sweden to Prussia in 1720. Pop. 11,000.

Pasha' (spelt also *pacha* and *bashaw*), a title applied to Turkish military commanders of high rank. The title was limited in the early period of the Ottoman empire to the princes of the blood, but was subsequently extended to great officers of the empire. The three grades of pashas used to be distinguished by the number of the horse-tails—three, two, or one—borne before them as their standards. This antique system was abolished by Mahmud II.

Pashto, PUSHTU, or PUKHTU, the language of the Afghans proper (see AFGHANISTAN), is, according to Darmesteter, not intermediate between the Iranic and Indic branches of the Indo-Germanic stock, but is directly derived from the Zend, with Persian, Hindustani, and Arabic admixture. See Darmesteter's *Chants Populaires des Afghans* (1890).

Pašić, or PASHICH, NIKOLA, Serbian 'Old Radical' leader, born in 1846 at Zaječar, studied at Zürich polytechnic, and became an engineer. A member of the Skupština from 1878, leader of the radicals from 1881, he was condemned to death in 1883 and to five years' imprisonment in 1899, and was prime minister in 1891-92, 1904-5, 1906-8, 1912-18, and (of Yugoslavia) from 1921.

Paskevich, IVAN FEODOROVICH, Count of Erivan and Prince of Warsaw, a Russian field-marshal, was born at Poltava, 19th May 1782. He was educated in the school of pages, entered the army, served against the French in the campaign in 1805 which was ended by the defeat of Austerlitz, and afterwards against the Turks. Then he took a prominent part in the campaigns of 1812-14, especially in the battles of Smolensk, Borodino, Leipzig, and in the capture of Paris. In 1826 he was appointed commander-in-chief against the Persians, whom he completely defeated, conquering Persian Armenia, taking Erivan, and ending the war by a peace (1828) exceedingly favourable to Russia. In recompense for these services he was created Count of Erivan, and received a grant of £100,000. In 1828 and 1829 he made two campaigns against the Turks in Asia, took Kars, Erzerüm, and other fortresses, and terminated the war by the treaty of Adrianople in 1829. In 1831 he suppressed the rising in Poland by capturing Warsaw, and was made governor of the reconquered country. Under his rule Poland was (1832) definitively incorporated as Russian territory. When the Hungarians took up arms in 1848 Paskevitch was sent to the assistance of Austria, and, after defeating the Hungarians in several battles, compelled Görgei to surrender at Vilagos (1849). In 1854 he took command of the Russian army on the Danube; but fortune, which had

hitherto invariably smiled upon him, deserted him at Silistria, where he was wounded. Thereupon he resigned the command, retired to Warsaw, and died 1st February 1856.

Paspalum, a large genus of grasses, chiefly tropical, with some in temperate America. Many are cultivated for grain or fodder. See MILLET.

Pasque Flower. See ANEMONE.

Pasquinade, an anonymous or pseudonymous publication of small size, sometimes printed, sometimes only posted up or circulated in manuscript, having for its object the defamation of a character, or at least the turning of a person to ridicule. The name is derived from *Pasquino*, a tailor remarkable for his wit and sarcastic humour, who lived in Rome towards the close of the 15th century, and attracted many to his shop by his sharp and lively sayings. Some time after his death a mutilated fragment of an ancient statue, considered to represent Menelaus supporting the dead body of Patroclus, was dug up opposite his shop, and placed at the end of the Braschi Palace, near the Piazza Navoni. It was named after the defunct tailor, and the practice originated of affixing to its placards containing satires and jests relative to the affairs of the day—the pope and the cardinals being favourite victims of the invisible satirists. See a French monograph by Mary Lafon (2d ed. 1877).

Passacaglia (Ital. from Span. *pasacalle*; *pasar*, 'to pass,' *calle*, 'street'), in music, a slow dance-form in triple time, similar to the chaconne, constructed over a ground-bass. It occurs in suites and by itself.

Passaic, a city of New Jersey, on the Passaic River, 11 miles by rail NW. of Jersey City. Besides foundries and print-works, it has manufactories of woollens and shoddy, whips, india-rubber, chemicals, &c. Pop. (1890) 13,028; (1920) 63,824.

Passamaquoddy Bay, in North America, opens out of the Bay of Fundy, at the mouth of the St Croix River, between Maine and New Brunswick. It is 15 miles long by 10 wide, and shut in by a cluster of islands so as to form an excellent harbour.

Passarowitz, or more correctly POŽAREVAC, a town of Serbia, 9 miles S. of the Danube and 40 ESE. of Belgrade. Pop. 15,500. Here was signed, 21st July 1718, the treaty between Venice and the emperor, on the one side, and the Porte on the other, by which a truce of twenty-five years was established, and the Banat of Temesvar, the western portion of Wallachia and Serbia, Belgrade, and part of Bosnia were secured to Austria.

Passau, a town of Bavaria, stands on a rocky tongue of land, on the right bank of the Danube, beside the influx of the Inn, and opposite the confluence of the Ilz with the Danube, close to the frontier of Austria, and 72 miles by rail SE. of Ratisbon. The city proper is connected with its suburbs on the other side of the Inn and the Danube by means of iron bridges; and picturesque hills encircle the whole town. The cathedral was rebuilt after a fire in 1680; the bishop's palace is now in part converted into public offices. The Passau Agreement between the Roman Catholic and Protestant estates of the empire was signed here on 29th July and 15th August 1552. Passau was long an important fortified post, being looked upon as the key of the Danube in that part of its course. There were two strong citadels, one dating from 737, the other from 1215–19, besides other fortified works. The town grew up around an old Roman camp, and in 739 was made the seat of a bishopric founded by St Boniface. The town came into the hands of Bavaria in 1803. It has important manufactures of leather, porcelain, paper, and parquet-floors, besides boats, metal-ware, and mirrors, and consider-

able trade in salt, timber, corn, graphite, and Passautes (made at Oberzell). Pop. 20,500.

Passenger Pigeon (*Ectopistes migratorius*), a kind of arboreal pigeon, once abundant in eastern North America, but now apparently extinct. It was the only species of the genus. The head was small, the bill short, the tail very long and wedge-shaped. The wings were long and pointed and the flight was very rapid. The male was about 16½ inches in length of body, or 25 inches including the tail. The colour was grayish blue above, reddish brown on the breast and sides, white on the rest of the ventral surface. The female was smaller and duller in colour. The birds were famous for their huge numbers, for their great flights in search of food, and for their crowded, noisy roosts. In 1878 a roost at Petosky in Michigan was described as extending for 28 miles in length by 3 or 4 in breadth. Somewhat peculiar were the sharp call-note and the single egg. As late as 1888 flocks of millions used to be seen, and the rapidity of the extermination (by shooting and netting and otherwise) is puzzling. In 1912 there was an old female alive in the custody of the Zoological Society of Cincinnati, but the species seems now to be extinct. See Rothschild's *Extinct Birds* (1907).



Passenger Pigeon
(*Ectopistes migratorius*).

Passe-pied, in music, a dance-form in triple time, resembling a quick minuet, said to have been derived from the dancing of Breton sailors through the streets. It was often introduced in suites.

Passeriformes, the huge order of perching birds, including all British songsters and many more. See BIRD.

Passifloraceæ, a family of dicotyledons mostly included in the genus *Passiflora* (see PASSIONFLOWER).

Passionflower (*Passiflora*), a genus of plants for the most part natives of the warm parts of America, and belonging to the family Passifloraceæ. The flowers are hermaphrodite, with a coloured calyx, generally of five segments; the corolla also of five segments or wanting; always having a more or less conspicuous crown of filaments springing from the throat of the tube formed by the base of the calyx and corolla. The stamens are five, inserted in the tube of the calyx, united in a tube to near the apex, where they divide, and are surmounted by the much-reflexed anthers. The ovary is one-celled, elevated on a stalk, surmounted by three thick styles with thick clove-like stigmas. The fruit is fleshy. This genus has received its name from fanciful persons among the first Spanish settlers in America imagining that they saw in its flower the emblems of Christ's passion; the filamentous processes being taken to represent the crown of thorns, the nail-shaped styles the nails of the cross, and the five anthers the marks of the wounds. The species are mostly half-shrubby evergreen or stove climbers, of rapid

growth; and most of them have lobed leaves, with from two to seven lobes. The flowers of many



Passionflower (*Passiflora caerulea*).

are large and beautiful, on which account they are often cultivated in hot-houses. Some of the species

are also cultivated in tropical countries for their fruit, particularly those whose fruit is known by the name Granadilla. The apple-fruited Granadilla or Sweet Calabash of the West Indies, *P. maliformis*, has a fruit about two inches in diameter, containing within a hard stringy shell an agreeable gelatinous pale yellow pulp. *P. quadrangularis* is the common Granadilla, a native of Jamaica and South America, but is cultivated in all parts of tropical South America, and occasionally in hot-houses in Britain for the sake of its fruit. The fruit is oblong in shape, often six inches in diameter transversely. The skin when ripe is greenish yellow in colour, thin, but tough and leathery, and contains a very succulent pulp of a purple colour which is sweet and slightly acid. It is generally eaten with wine and sugar. The root of the plant is poisonous, owing to the presence of an active principle called *passiflorine*, the properties of which are similar to morphine. The laurel-leaved Granadilla is *P. laurifolia*, the fruit of which is named *Water-lemon* by the English and *Pomme de Liane* by the French in the West India Islands. It grows to about the size of a hen's egg, becomes yellow, dotted over with white when ripe, and contains within the tough thin rind a whitish sweet watery pulp, delicately aromatic and slightly acid. It quenches thirst, allays heat, and induces appetite. *P. incarnata*, a species with herbaceous stems, a native of the warm parts of South America, produces an edible orange-coloured fruit about the size of an ordinary apple. The fruit of *P. edulis* is about two inches long and slightly less in diameter, assuming a livid purple colour when ripe, and contains an orange-coloured pulp with the flavour of a somewhat acid orange. The fruit of some species of passionflower, however, is not only uneatable, but fetid; and the roots, leaves, and flowers of some have medicinal properties, narcotic, emmenagogue, anthelmintic, febrifugal, &c. The hardest species, the Blue Passionflower (*P. caerulea*), grows well enough in some parts of France, and even in the south of England.

Passionists, a religious congregation of priests of the Roman Catholic Church, the object of whose institute, indicated by their name, is to preach 'Jesus Christ and him crucified.' The founder, St Paul of the Cross, was born in 1694 near Genoa, obtained the sanction of Benedict XIV. in 1741, and died at the mother-house of the society on the Cœlian Hill at Rome in 1775. The cross appears everywhere as their emblem, and a large crucifix forms part of their very striking costume. They practise many personal austerities, and their ministerial work consists chiefly in holding what are called 'missions' wherever they are invited by

the local clergy, in which sermons on the passion of Christ, on sin, and on repentance, together with the hearing of confessions, hold the principal places. For a time the congregation remained in obscurity; but in the first half of the 19th century it rose into notice. In 1842 it secured a footing in England, whose conversion had been the founder's special aim.

Passion Music. See ORATORIO, BACH.

Passion Play. See MYSTERIES.

Passion-Week, the name commonly given in England to the week immediately preceding Easter, and otherwise called Holy Week (q.v.). But, by the proper rubrical usage, Passion-Week is that which precedes Holy Week, commencing on Passion Sunday, the fifth Sunday of Lent. In the Roman Catholic Church, with this Sunday begins the more solemn part of Lent, and during the succeeding fortnight the *Gloria Patri* is omitted at the Introit, and all pictures, crucifixes, statues, and other sacred representations are veiled.

Passive Obedience. See DIVINE RIGHT, BODIN, FILMER.

Passover, a well-known feast of the Jews. The English word *passover* is a translation of the Hebrew *pesach*, which in Aramaic with the post-positive article becomes *pascha*; whence the Greek, Latin, and various Romance forms of the word. The original meaning of the verb may perhaps be traced in 1 Kings, xviii. 26, where it is rendered 'leap' or (revised version margin) 'limp,' and suggests a religious dance. The Passover is one of the oldest recurrent sacrifices of the Hebrews; an account of its origin is given in Exod. xii.; famous celebrations of it are described in 2 Chron. xxx., xxxv., and Ezra vi.; and the laws and regulations relating to it will be found in Exod. xii. 1-51, xiii. 3-10, xxiii. 14-19, xxxiv. 18-26, Lev. xxiii. 4-14, Numb. ix. 1-14, xxviii. 16-25, Deut. xvi. 1-8. These laws were formerly held to be all practically contemporary pieces of legislation; but they are now known to be of very various dates and to relate to widely-different religious and social conditions (see PENTATEUCH). In all of them the Passover is intimately associated with the Feast of Unleavened Bread; but the latter is essentially an agricultural festival, and the earliest origin of the Passover must doubtless be sought in the times when the Israelites were still a purely nomadic and pastoral people, and gave religious expression to their thankfulness for the annual increase of their flocks and herds by sacrifices 'of the firstlings of the flock and the fatlings thereof' (Gen. iv. 4). The recollection of such an annual festival, which would naturally be held in spring, survives in the Jehovistic narrative of the events preceding the exodus, which largely turned on the refusal of Pharaoh to allow the people to go out into the wilderness to sacrifice. It was, we infer, a nocturnal lunar feast, held at the spring full moon, and this character it retained throughout; it consisted of the firstlings of the flock and of the herd, and even as late as the close of the 7th century B.C. the victim was not necessarily a lamb (Deut. xvi. 2; cf. 2 Chron. xxxv. 7: 'lamb, kids, bullocks'). With the settlement of the Israelites as an agricultural people in Canaan, the agricultural festivals, marking the various stages of harvest and ingathering, naturally gained in prominence, and the pastoral Passover came to be more and more closely associated with a harvest feast which also fell in spring—that of unleavened bread—when after the presentation of the first sheaf before Jehovah the people entered at once upon the enjoyment of the new corn, without waiting for the tedious process of leavening their dough. The usages of the various local and domestic sanctuaries in the land were made uniform (Deut. xvi. 1-16)

by the promulgation of the law of one exclusive place of worship. Of subsequent modifications made on the Deuteronomic code by the Priestly legislation the most interesting perhaps are the stricter definition of the kind of victim, the substitution of roasting for 'boiling' (see Deut. xvi. 7, Revised Version margin), and the interpolation of an additional day into the accompanying feast (Deut. xvi. including the Passover in the seven days of unleavened bread, while Numbers xxviii. counts the seven days from the 15th, not the 14th, of the month).

The celebration of the Passover in later times had public and official aspects which were invested occasionally at least with great pomp and ceremony, as may be gathered from the descriptions already referred to in Chronicles and Ezra; but, just like great ecclesiastical functions in our own day, it also had its private and domestic side. From Talmudic sources we gather a good deal that is of interest as to Passover customs in connection with the life of Jesus and the last supper. The company for a single lamb varied from ten to twenty; first the cup of consecration, over which the master of the house had pronounced a blessing, was drunk; then hands were washed and the meal served, consisting of bitter herbs, cakes of unleavened bread, a sauce called *haroseth*, made from dates, raisins, and vinegar, the paschal lamb, and the flesh of subsidiary (Deuteronomic) sacrifices. The master of the house dipped a morsel of unleavened bread into the *haroseth*, and ate it, and a similar 'sop' was given to every one present. Afterwards the paschal lamb was eaten, and three other cups of wine were drunk at intervals with thanksgivings and singing of the Hallel (Psalms cxiii.-cxviii.). To the Jews of the Dispersion the Passover, together with the Feast of Unleavened Bread, has always had great importance, though the lamb, not being slain at the Temple, is not regarded as strictly the paschal lamb of the law.

That the paschal lamb typified Christ is taught by Paul (1 Cor. v. 7), and also by the author of the fourth gospel (John, xix. 36), who, as is well known, represents the crucifixion as having taken place at the time of the Passover, and attaches importance to the fact.

For the history of the Passover in its bearings on Old Testament criticism, see Wellhausen's *Prolegomena to the History of Israel* (1885), Dr W. H. Green's *Hebrew Feasts* (New York, 1885), and the commentaries on the principal passages mentioned above. See also G. B. Gray's *Sacrifice* (1925), chaps. xxiii. sqq.

Passow, FRANZ, scholar, born at Ludwigslust in Mecklenburg, 20th September 1786, was educated at Gotha and Leipzig, and in 1815 became professor of Archaeology at Breslau, in 1829 director also of the museum of art there. He died 11th March 1833. His *Handwörterbuch der griechischen Sprache* (1819-25; 5th ed. 1841-57) is the work that preserves his memory, and formed the basis of Liddell and Scott's *Greek Lexicon*. See his *Life* by Wachler (Bresl. 1839).

Passport, a warrant of protection and permission to travel, granted by the proper authority, to persons moving from place to place. Passports proceed from the authorities of the state to which the traveller belongs, and ought to bear the *visa* or countersignature of the minister or consul of the country which he is about to visit. The system of issuing passports had been dropped in most European countries before the Great War, but since then it has been revived. Within the United Kingdom no passports are required; but for a British subject travelling in some parts of the Continent they are still requisite. The passport most used by British subjects is that of the British Secretary of State for Foreign Affairs, which

is now granted to any British subject for a fee of seven shillings and sixpence, and is good for five years. If the applicant be not personally known to the Secretary of State, he must either be recommended to him by some person who is known to him, or produce an application in his favour by some banking firm established in London or elsewhere in the United Kingdom, or a certificate of identity signed by a mayor, magistrate, justice of the peace, minister of religion, physician, surgeon, solicitor, or notary resident in the United Kingdom. In certain cases the production of a certificate of birth may be required. If the applicant be a naturalised British subject his certificate of naturalisation must be forwarded to the Foreign Office.

In time of war passports or safe-conducts may be granted in special cases by neutral powers, to protect persons and property from belligerents, and by a belligerent to protect from interference by its own ships or forces.

Passy, a western suburb of Paris (q.v.).

Pasta, GIUDITTA (JUDITH), opera singer, was born of Jewish parents, Negri by name, at Comon near Milan, 9th April 1798, and received her musical education at Como and in the conservatoire at Milan. She married a singer called Pasta before 1816, and was at first a failure on the stage. Her first great triumph was achieved at Verona in 1822, seven years after she began to sing. The year following she was engaged at the Paris Italian Opera, where her singing excited great admiration. From 1825 to 1833 was the period of her most splendid triumphs, which were won principally in London and Paris. She withdrew from the stage in the following year, and resided on the banks of Lake Como till she died on 1st April 1865. She had a magnificent voice, which passed easily from the highest soprano notes to the gravest contralto tones. In addition she possessed fine dramatic power. Her principal rôles were Medea, Desdemona, Semiramide, La Sonnambula (the opera of this name was written for her by Bellini), Nina, Camilla, and Giulia in *Romeo e Giulia*.

Pasteboard. See CARDBOARD, MILLBOARD, STRAWBOARD.

Pastel, chalk mixed with other materials and various colours, and formed into Pencils or Crayons (q.v.). Drawings with such dry, coloured crayons may be made on paper or parchment, and have been especially used in portraiture—Pastel is also a name for Woad (q.v.).

Pastes. See GEM.

Pasteur, LOUIS, distinguished for his researches in chemistry and pathology, and more precisely for many discoveries in regard to bacteria, was born on 27th December 1822, at Dôle in the department of Jura. From the college of Arbois he passed to Besançon, and thence to the École Normale and the Sorbonne in Paris. After the completion of his preparatory studies he held various academic positions at Strasburg, Lille, and Paris, where in 1867 he became professor of Chemistry at the Sorbonne. From 1886 onwards the centre of his work was at the Pasteur Institute in Paris. His work was at first chemical. Following up well-known researches by Arago, Biot, and Mitscherlich, Pasteur discovered the facets on tartrate crystals and what are called left-handed tartrates. He also propounded the theory that 'molecular dissymmetry'—supposed to be expressed in the power which solutions of some organic substances have of causing a beam of polarised light to rotate—was characteristic of living matter and its products.

It is said that a German manufacturer of chemicals noticed that impure tartrate of lime fermented

when dissolved and exposed in the sun, and that this prompted Pasteur to an investigation, the result of which was the discovery of a living ferment—a micro-organism comparable in its powers to the yeast-plant which Cagniard-Latour and Schwann had discovered in alcoholic fermentation. Pasteur was further able to show that the little organism would, in a solution of paratartrate of ammonia, select for food the 'right-handed' tartrates alone, leaving the 'left-handed,' although the difference between these is merely physical not chemical. Having got hold of a clue, Pasteur went on to show that other fermentations—lactic, butyric, acetic—are essentially due to organisms. He was naturally led to corroborate and extend Schwann's researches on putrefaction, which is also due to micro-organisms, and this path of investigation enabled him to make important practical suggestions in regard to the making of vinegar and the prevention of wine disease, as also to correct insufficiently careful experiments which were leading many to believe that spontaneous generation was demonstrable.

Prompted by his illustrious master Dumas, Pasteur next (1865) directed his inquiries to those diseases of silkworms by which the silk industry in France had been almost ruined. It is said that he had never before even seen a silkworm, though he knew the supposed disease-germs which had been demonstrated by previous investigations in the insect's blood. These he traced from egg to larva, from chrysalis to moth; and, as the pébrine disease is distinctly manifest in the adults, though it may be hidden in the young, the practical conclusion was plain that unhealthy moths should be rejected, and that all precautions should be taken to prevent infection. But Pasteur's work on the diseases of silkworms overstrained him, and in 1868 he was laid aside by paralysis. Soon, however, he was at work again, investigating beer as he had investigated wine, detecting the intruders which sometimes interfere with the life of the yeast-plant and spoil the brew. His researches began to come yet closer to human life, for he attacked the problem of splenic fever, the bacillus of which had been discovered by Davaine (1863), and skilfully traced from stage to stage by Koch (1876). Of Pasteur's investigations in this connection, that by which he showed that birds were not liable to fall victims to splenic fever, because the temperature of their blood is too high for the prosperity of the germ, may serve as a characteristic illustration. Passing from splenic fever to fowl cholera, Pasteur showed that it was possible to attenuate the virulence of injurious micro-organisms by exposure to air, by variety of culture, or by transmission through various animals. He thus 'tamed' the bacillus of splenic fever, and demonstrated by a memorable experiment that sheep and cows 'vaccinated' with the attenuated bacilli were protected from the evil results of a subsequent inoculation with the virulent virus. Pasteur's subsequent researches in regard to hydrophobia (q.v.) are discussed in that article, originally contributed to this work by himself. He wrote books on most of the special researches and discoveries by which he enriched science and benefited humanity. He died 28th September 1895, and was transferred from a temporary resting-place to a tomb in the Pasteur Institute on 26th December 1896.

See Lives of Pasteur (who was a devout Catholic) by his son-in-law (trans. 1885), Bournand (1896), Vallery-Radot (trans. 1919), and Duclaux (trans. 1920); and an English Life by Percy and Grace Frankland (1898). For his scientific career, see L. Descour, *Pasteur and his Work* (trans. 1922).

Pastille, usually an aromatic paste or mixture, such as *fumigating pastilles*, which are burned

either as incense or as a means of diffusing an agreeable odour. They are composed of charcoal powder, with such aromatic gums as benzoin, ladanum, &c., and powders of sweet-scented woods and barks, as sandalwood, cinnamon, and especially cascarilla barks. Essential oils are also added, and the whole are worked into a paste with a little gum-mucilage, and formed into small sharp-pointed cones about an inch and a half high, and half an inch broad at the base. When perfectly dry they are used by lighting at the point, and as they burn down an agreeable odour is given out with the smoke. Another kind of pastille, usually in the form of a small pill covered with gold or silver leaf, is used for perfuming the breath; it is made of similar ingredients, excepting the charcoal.

Pastinaca. See PARSNIP.

Pasto, a town in the south-west of Colombia, in a fertile valley 8350 feet above sea-level. Above it rises the volcano of Pasto (14,000 feet above the sea); and in 1827 the town was destroyed by an earthquake. Pop. 30,000.

Paston Letters, a collection of over a thousand letters and papers, mostly written by or to particular members of the Norfolk family of Paston, and covering almost the whole 15th century (1422-1509). They are of especial value as giving a glimpse into the life of England during the Wars of the Roses. The family took its name from the village of Paston, near the sea, about 20 miles N. of Norwich, and gradually grew upwards out of the condition of the smaller gentry of Norfolk. Its most famous members were William Paston, Justice of Common Pleas under Henry VI.; his son John, executor to the famous Sir John Fastolf; Clement Paston, a brave sailor under Henry VIII.; Sir Robert Paston, created under Charles II. first Viscount, then Earl, of Yarmouth. His son William married Lady Charlotte Boyle, an illegitimate daughter of Charles II., but with him the main line and the title became extinct. It was due to the extravagance of the last that the letters were sold to Peter Le Neve, from whom they passed into the hands of 'honest' Tom Martin of Palgrave, and eventually of Sir John Fenn, who edited a selection in two quartos in 1787. The editor presented the originals of these to the king, and was knighted, but the originals strangely disappeared till discovered in 1889 at Orwell Park in Suffolk. Volumes iii. and iv. followed in 1789; vol. v. posthumously, edited by Mr Serjeant Frere, in 1823. The originals of vol. v. were discovered at Mr Serjeant Frere's house at Dungate, Cambridgeshire, in 1865; those of iii. and iv. were long missing, but the whole 220 were discovered in 1875 at the family mansion of the Freres at Roydon Hall near Diss, together with 95 unpublished letters of the same period, included in Mr Gairdner's third edition. 311 of these letters (the others missing) were offered for sale in 1888 and bought for 500 guineas; since 1896 they have been in the British Museum.

There are admirable editions of the Paston Letters by James Gairdner (3 vols. 1872-75; new ed. 1901; complete library edition, 6 vols. 1904). These contain twice as many letters as Fenn's, and the letters were for the first time arranged in chronological order. Mr Gairdner's answer (*Fort. Review*, No. 11) to Herman Merivale's attack on the authenticity of the Paston Letters (*Fort. Review*, No. 8) was completely satisfactory.

Pastor (*Pastor roseus*), a beautiful bird in the starling family, often called the rose-coloured starling. The back, shoulders, breast, and belly are rose-pink, the rest glossy-black with a violet or greenish sheen. With headquarters in Asia, it is a common migrant in Europe and a straggler in

Britain. It devours insects, e.g. locusts, and



Pastor (*Pastor roseus*).

sometimes grain. The name may refer to its habit of following sheep.

Pastoral is an artificial form of literature, in verse or prose, narrative or drama, in which a pastoral background is given to the treatment of a subject, a rustic scene being chosen and the characters appearing as shepherds and shepherdesses. In the 16th and early 17th century pastoral attained a great height of popularity. The pastoral poems of our modern literatures are essentially a humanistic revival of the Greek *idyl* of Theocritus, Bion, and Moschus, and the Latin *eclogue* of Virgil, and first made their appearance in Tuscany in the 16th century. The earliest dramatic pastoral is the *Favola di Orfeo* of Politian, performed at the court of Mantua in 1472, but the first complete pastoral was Agostino Beccari's comedy, *Il Sacrificio*, played at Ferrara in 1554. Its finest and most famous successors were the *Aminta* of Tasso, represented at the court of Ferrara in 1573, and Guarini's *Pastor Fido*. The earliest non-dramatic pastoral was G. Sannazaro's *Arcadia* (1504), which through Sidney's famous romance with the same title exercised a great influence upon English literature. In Spain the pastoral flourished during the 16th century, some of the most notable names being Gil Vicente, Jorge de Montemayor (*Diana*, 1524), and Cervantes (*Galatea*, a pastoral romance, 1584). In France we already find Remy Belleau's miscellany, *La Bergerie* (1565), and the writing of pastorals was practised long after even by the great Richelieu. After Honoré d'Urfé's *Astrée* (1610), came a long succession of lengthy pastoral romances by Mdlle. de Scudéry, La Calprenède, and Gomberville. Henryson's *Robin and Makyns* has been reckoned the first pastoral in English (i.e. Scots). In any case England had already had Alexander Barclay's translations of Baptist Mantuan, and Barnabe Googe's *Eglogs*, *Epytaphes*, and *Sonnettes* (1563), before the twelve charming eclogues composing Spenser's *Shepherd's Calendar* (1579) formed once for all a faultless model for posterity. The poem is appropriately dedicated to Sir Philip Sidney, whose pastoral romance of *Arcadia* outstrips in point of literary beauty all other fictions of that class. Its successors were Robert Greene's *Morando* (1584) and *Menaphon* (1589), Lyly's *Gallathea* (1584), Peele's *Arraignment of Paris* (1584), and, most famous of all, Lodge's *Rosalynde* (1590). Spenser's poetical idealisation of pastoral life, again, gave rich inspiration to Drayton, Daniel, Barnfield, Marlowe, Nicholas Breton, Wither, William Browne, Herrick, Ben Jonson (*Sad Shepherd*), and Fletcher (*Faithful Shepherdess*, 1610, the finest of all pastoral plays). Shakespeare employed the pastoral form in *As You*

Like It, and Milton in *Lycidas* and in *Comus*. An 18th-century revival gave us the highly conventional pastorals of Ambrose Philips and of Pope; Gay's *Shepherd's Week* was much better than either. Allan Ramsay also achieved a success in his *Gentle Shepherd*, which is almost as good as Gay, though far behind Spenser. In later times Shelley (*Adonais*), and Arnold (*Thyrsis*) produced elegies in the pastoral tradition, and in the work of Cowper, Burns, Tennyson, and others the influence of the pastoral is to be seen. See E. K. Chambers, *English Pastorals* (1895); W. W. Greg, *Pastoral Poetry and the Pastoral Drama* (1906).

Pastoral Epistles. See TIMOTHY, TITUS.

Pastorales. See BASQUES.

Pastoral Letter, a letter addressed, either at certain stated times or on the occurrence of some notable occasion, by a 'pastor,' but especially by a bishop, to the clergy under his jurisdiction, to the laity of his flock, or to both.

Pastoral Staff, or Crosier (q.v.), one of the insignia of a bishop, sometimes also borne by an abbot. It is a tall staff of metal, or of wood ornamented with metal, having, at least in the Western Church, the head curved in the form of a shepherd's crook, as a symbol of the pastoral office. From an early time the pastoral staff was connected with the actual possession of the jurisdiction which it symbolises. The giving of it was one of the ceremonies of investiture; its withdrawal was part of the form of deprivation; its voluntary abandonment accompanied the act of resignation; its being broken was the most solemn form of degradation. We annex as a specimen of the highest art the pastoral staff of William of Wykeham, now preserved in his foundation, New College, Oxford. A very early form of the pastoral staff is represented at FILLAN (St).



Pastoral Staff.

Pastoral Theology, that branch of theological science which regards the duties and obligations of pastors in relation to the care of souls.

Pasture. A pasture may be defined as a crop of mixed grasses and clovers, or other leguminous plants, intended for purposes of grazing. Such a crop often occupies the land for many years, and is then called permanent pasture. The chief benefit accruing to the farmer is that the mixed plants occupy the land more completely than the same constituents grown in separate plots. The various species of the mixture overlap and foster one another; thus produce is increased, and quality of herbage improved. From this point of view, a pasture is an agricultural device for increasing the amount of land at disposal, since from a single acre of mixed crop as much produce may be obtained as from, say, 1½ acre laid down under pure sowings.

The chief plants used in Britain for forming pasture may be classified thus:

(A) *Top Grasses*.—Cock's-foot (*Dactylis glomerata*), Meadow Fescue (*Festuca pratensis*), Meadow Fox-tail (*Alopecurus pratensis*), Timothy (*Phleum pratense*), Italian Ryegrass (*Lolium italicum*).

(B) *Bottom Grasses*.—Crested Dog's-tail (*Cynosurus cristatus*), Fiorin (*Agrostis stolonifera*),

Hard Fescue (*Festuca duriuscula*), Rough-stalked Meadow Grass (*Poa trivialis*), Smooth-stalked Meadow Grass (*Poa pratensis*), Wood Meadow Grass (*Poa nemoralis*), Sweet Vernal (*Anthoxanthum odoratum*), Yellow Oat-grass (*Trisetum flavescens*), Perennial Ryegrass (*Lolium perenne*).

(C) Clovers and Leguminous Plants.—Alsike Clover (*Trifolium hybridum*), Red Clover (*Trifolium pratense*), White Clover (*Trifolium repens*), Trefoil (*Medicago Lupulina*), Bird's-foot Trefoil (*Lotus corniculatus*).

This list includes several species which are not permanent, but of short duration, as Timothy, Italian and perennial ryegrass, red and Alsike clover, and trefoil. Timothy lasts from four to six years, and at times even longer. Perennial ryegrass has a very misleading name, inasmuch as it may die out in three or four years; in other cases, where seeding is prevented, the ryegrass may become, to all intents and purposes, a perennial plant. The reasons for including short-lived constituents in permanent pasture are obvious. They not only give increased produce during the first years of the lea, when the permanent species are slow in coming forward, but hold possession of land which would otherwise be bare, and thus keep out worthless plants. Place is made for the expanding perennials by the short-lived species which gradually die out. This must be carefully borne in mind when fixing the proportion of short-lived plants in a mixture.

The following are the leading principles according to which the various constituents of a mixture are proportioned: (1) To obtain maximum produce, the land must be filled with roots as thoroughly and completely as possible. This is accomplished by incorporating deep-rooted and shallow-rooted plants in due proportions. If, for example, a soil is 3 feet deep, and the roots occupy merely 1 foot of this depth, two-thirds of the land is, evidently, lying idle and unutilised, not for one year, as when under an ordinary crop, but for a long series of years in the case of a permanent pasture.

(2) The nutritive value of the mixed herbage depends upon the relative proportion of grass and clover: the albuminoid ratio increases with the amount of clover. For a permanent pasture good proportions are clovers, 25 to 30 per cent. of total area; grasses, 70 to 80 per cent.

(3) As many species as possible should be represented in the mixture. If one is injuriously affected by drought, another, which revels in drought, is ready to take its place; if one is late, another is early; if one is not relished by the browsing animal, another is, and so on.

(4) Those species which are best and most suitable for the soil should be most largely represented.

(5) Certain species liable to overrun the pasture, or to destroy other good plants, ought to be represented in extremely small proportions. This applies more particularly to ryegrasses (especially Italian), crested dog's-tail, and smooth-stalked meadow grass.

(6) The short-lived components should not cover more than one-third of the whole land.

According to these principles, a mixture suitable for a wet clay might be proportioned as follows:

Area of the land to be covered by clovers, 20 per cent:

Red clover.....5 per cent.	White clover.....5 per cent.
Alsike clover.....5 "	Bird's-foot trefoil...5 "

Area to be covered by short-lived grasses, 20 per cent:

Timothy.....15 per cent.	Perennial ryegrass....5 per cent.
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Area to be covered by permanent grasses, 60 per cent:

Cock's-foot.....20 per cent.	Rough-stalked meadow
Meadow fescue.....15 "	grass.....10 per cent.
Meadow fox-tail....10 "	Smooth-stalked do. 5 "

The percentage area of land to be occupied by

each component being determined and known, the percentage numbers have to be translated into pounds of seed per acre. To get the number of pounds corresponding to these areas the covering power of each kind of seed used must be known. We assume, as a basis for calculation, that the seed is perfect in quality—i.e. the percentage of purity is 100, and the percentage of germination also 100. According to Stibler, one acre of land is covered by the following amounts of perfectly pure and germinating seeds:

	Lbs. of Seed per acre.		Lbs. of Seed per acre.
Cock's-foot.....	28	Hard fescue.....	19
Meadow fescue.....	56	Sweet vernal.....	12
Meadow fox-tail.....	10	Yellow oat-grass.....	7
Timothy.....	21	Perennial ryegrass.....	58
Italian ryegrass.....	49	Alsike clover.....	14
Crested dog's-tail.....	20	Red ".....	24
Florin.....	11	White ".....	12
Rough-stalked meadow grass.....	13	Trefoil.....	23
Smooth-stalked ".....	13	Bird's-foot trefoil.....	7

In using these numbers as a basis for calculating mixtures, allowance must be made for seeds which cannot germinate on account of imperfect tillage, and also for the overlapping of the plants when grown in mixture. An allowance of 50 per cent. is found, in ordinary cases, to meet these requirements. The amount of seed per acre actually used in mixtures is, accordingly, the amount calculated for an acre and a half.

The mixture already given for a wet clay soil when translated into pounds of perfect seed per acre (making an allowance of 50 per cent.) is:

Red clover.....	1·8	Cock's-foot.....	8·4
Alsike clover.....	1·0	Meadow fescue.....	12·6
White ".....	9	Meadow fox-tail.....	1·5
Bird's-foot trefoil.....	5	Rough-stalked meadow	
Timothy.....	4·6	grass.....	1·9
Perennial ryegrass.....	4·3	Smooth-stalked ditto.....	9

By simple proportion pounds of perfect seed can be immediately converted into pounds of commercial seed of any given quality.

Patagonia, the southern region of the South American continent, extending from about S. lat. 39° southwards; area about 400,000 sq. m., including the islands to west and south. Like the rest of the continent, Patagonia is divided by the Andes into two very unequal and dissimilar territories. Since 1881 nearly the whole country east of the watershed has been formally recognised as part of the Argentine Republic; while Chile, which previously claimed a considerable share of that area, has contented herself with the country to the west and a strip along the southern coast.

Western or Chilean Patagonia is rugged and mountainous. Along the coast are numerous islands with precipitous shores, the principal between Chiloé and Tierra del Fuego being the Chonos Archipelago (q.v.), Wellington Island, the Archipelago of Madre de Dios, Queen Adelaide's Archipelago, and Desolation Island. These islands, together with several peninsulas, notably Taytao, form a coast almost as rugged as that of Norway; but in none of them do the mountains rise to the snow-line. Even in the Cordilleras proper the summits are less lofty towards the south; but the following are worthy of note—the volcanoes of Minchinmavida and Corcovado (respectively 8000 and 7510 feet high), Monte San Valentín (12,697), Chalten or Fitzroy volcano (7120), Mount Agassiz (10,597), and Mount Stokes. From the Andes to the Pacific the strip of shore is so narrow that the longest river of this district has its origin only about 13 miles from the coast. In the island of Chiloé (q.v.), to the north of Western Patagonia, the mean temperature of winter is about 40°F., that of summer rather above 50°; while at Port Famine, 800 miles nearer antarctic latitudes, the mean temperature is in winter about 33°, and

in summer about 50°. This unusually small difference in the mean temperature of the extremes of Western Patagonia is due to the great dampness of the atmosphere all along the coast. The prevailing winds blow from the west; heavily charged with moisture from the Pacific Ocean, they strike against the Andes and cause almost perpetual precipitation from Chiloé to the Strait of Magellan. South of 47° S. lat. hardly a day passes without rain, snow, or sleet. This continual dampness has produced forests of almost tropical luxuriance, which yield valuable timber. Coal is mined in the neighbourhood of Punta Arenas (Sandy Point).

Eastern or Argentine Patagonia consists mainly of high undulating plains or plateaus rising in successive terraces, and frequently intersected by valleys and ravines. These plateaus are occasionally covered with coarse grass, but more frequently with a sparse vegetation of stunted bushes and herbs; elsewhere the surface is strewn with huge boulders, and again rugged with heaps or ridges of bare, sharp-edged rocks. Keen and often piercing blasts sweep chiefly from the west; and as this wind has already parted with its moisture on the other side of the mountains, hardly any rain falls in Argentine Patagonia during seven or eight months of the year. The soil in many places is strongly impregnated with saltpetre, and salt-lakes and lagoons are numerous. North of the Río Chico, and towards the seacoast, there is a wild, weird, desolate region called by the Indians 'The Devil's Country.' Several wastes of this kind fringe the Atlantic, and formerly induced the belief that Patagonia was a barren and waterless desert; but the interior, though not fertile, really abounds in lagoons, springs, and streams, and the banks of the rivers are capable of cultivation. Along the eastern base of the Andes, also, there is a great tract of territory which is astonishingly picturesque and fertile, with great forests to which the Indians retire for shelter from the freezing winds of winter. Eastern Patagonia has probably been raised above the sea-level in the Tertiary period, and its most characteristic geological feature is its boundless expanses of shingle. The flora is in consequence exceptionally poor, and appears to be mainly derived from the lower slopes of the Andes. Herds of horses and, in the more favoured regions, cattle are bred; pumas and foxes, armadillos, skunks, and tucotucos (a peculiar rodent) are met with; and among the birds are condors, hawks, partridges, and flamingoes, ducks, and other water-fowl. But by far the most important animals are the guanaco or Huanaco (q.v.), sometimes in herds of two hundred or more, and two species of Rhea (q.v.).

Inhabitants.—The population of Western Patagonia, with Tierra del Fuego and other islands, numbers 106,000, including some small indigenous nomadic tribes of Araucanian stock who live by fishing and hunting, and the settlers at Punta Arenas or Magellan's Colony and elsewhere, mainly immigrants from other parts of Chile. In Eastern Patagonia the Argentine herdsmen are beginning to pasture their cattle in the northern valleys, and Chilean immigrants are moving eastwards. The Patagonians proper or Tehuelche Indians, who are confined to Eastern Patagonia, are perhaps about 100 strong. Of their two divisions, which speak the same language, but are distinguishable by difference of accent, the northern range chiefly over the district between the Cordilleras and the Atlantic, from the Río Negro to the Chubut, and even the Santa Cruz River. The southern, who appear to be on an average taller and finer, and are more expert hunters, occupy the rest of Patagonia as far south as the Strait of Magellan. The two divisions are much intermixed. Magellan

described the Patagonians as 'so tall that the tallest of us came up only to their waists;' and, though such extravagant statements have led others to deny the claim of the Patagonians to be considered exceptional, there is no doubt that they are one of the tallest races on the globe. The average height of the male members of Musters's party was rather over 5 feet 10 inches; two others, measured at Santa Cruz, stood 6 feet 4 inches each; Pikechoche, who was in Berlin in 1879, was 5 feet 9 inches high, and stretched 5 feet 11 inches with his arms. The muscular development of the arms and chest is extraordinary, and in general the body is well proportioned. The Patagonians are splendid swimmers, can walk great distances and for two and even three days on end without being tired. Their cranial characteristics are somewhat disguised by the fact that the hinder part of the skull is artificially flattened, the custom being to strap the child's head back to a board to prevent it 'wagging' when carried about the country on horseback. This process, however, appears only to exaggerate a natural tendency; and it is asserted by the most scientific investigators that the Patagonian skull is, next to that of the Lapps, the shortest in the world. The jaws are powerful, though with no trace of prognathism. The expression of their face is ordinarily good-humoured though serious; their eyes are dark brown, bright and intelligent, their noses aquiline and well-formed, their foreheads open and prominent. The complexion of the men, when cleansed from paint, is a reddish or rather yellowish brown. Thick flowing masses of long coarse, black, glossy hair cover their heads. The scanty natural growth of beard, moustaches, and even eyebrows, is carefully eradicated. The young women are frequently good-looking, displaying healthy, ruddy cheeks when not disguised with paint. The dress of the men consists of an under-garment round the loins, a long mantle of hide with the fur inside, and boots or buskins of skin. The dress of the women is very similar. Both sexes are fond of ornaments. Besides mantles of guanaco hide, their only manufactures are saddles, bridles, stirrups, and lassos, which often evince wonderful ingenuity and nicety of execution.

History.—Magellan, before passing through the strait, had in 1520 sailed along the whole of the Patagonian coast; and it is commonly believed that it was from the large footsteps (*patagones*) observed near his winter-quarters at S. Julián that the country derived its name. Another suggested etymology is the Quichua word *patacuna*, 'terraces,' the rule of the Incas having extended hither. The great plain was traversed by Rodrigo de Isla in 1535. Sarmiento de Gambo (commemorated by the mountain in Tierra del Fuego) added greatly to the knowledge of the west and south (1579–80), and founded Spanish settlements, doomed to early extinction, at Nombre de Dios and San Felipe (Port Famine). English interest in the country, aroused by Drake's voyage in 1577, was kept up by Davis, Narborough, Byron, Wallis, and the Jesuit Falkner, and at last the beginning of a real scientific acquaintance with the interior was made by King, Fitzroy, Darwin, and Musters. Since 1870 careful explorations have been carried out by Argentine travellers. For Welsh settlements, see CHUBUT.

English works on Patagonia are by Falkner (1774), Snow (1857), Musters (1871), Beerbohm (1878), Lady F. Dixie (1880), Coan (1880), Prichard (1902), and Skottsberg (1911); and see Fossarieu (French, 1884), Burnmeister (Spanish, 1891), and Fouck (Spanish, 1896).

Patan, a walled town of India, in Baroda, 64 miles NW. from Ahmadabad, stands on a tributary of the Banas, and manufactures swords, spears,

pottery, and silk and cotton goods; the capital of native dynasties from the 8th century to the present day, it has many ruins; population, 27,000. —Patan is also a town of Nepal, 1½ mile SE. of Khatmandu (q.v.); pop. about 30,000.

Patanjali is the name of two celebrated authors of ancient India, the one the author of the system of philosophy called Yoga (see SANSKRIT LITERATURE), the other the critic of Pāṇini (q.v.), circa 140 B.C. They are identified by late Indian tradition, but they differ in their philosophical views, and the philosopher may have lived as late as c. 300 A.D.

Patches. During the whole of the 17th and beginning of the 18th century these fantastic ornaments were commonly worn by women and sometimes by men. In *Jack Drum's Entertainment, or the Comedie of Pasquil and Katherine* (1601; 2d ed. 1616), they are thus mentioned: 'For even as blacke patches are worne, some for pride, some to stay the Rheume, and some to hide the scab,' &c.; and in the *Artificial Changeling* (1650) there is a woodcut showing the lady of fashion, with a coach, coachman, two horses, and postillions gummied on to her forehead, and the rest of her face ornamented with a star, two crescents, and a large round spot. In the same year (1650) a Bill against 'painting, black patches, and immodest dresses' was read for the first time, but got no further. In vain were sermons preached; in vain did *Morbus Satanicus, or The Sin of Pride*, in 1666 reach the 15th edition; in vain did satirists assail the *Metamorphosis of Fair Faces into Foul Visages* (temp. James I.); the senseless custom was still rife when (1712) Pope described among the treasures of Belinda's toilet-table 'Puffs, Powders, Patches, Bibles, Billet-doux' (*Rape of the Lock*, i. 138). Attempts have been made to revive the fashion, but without success. See Fairholt's *History of Dress and Costume in England* (2d ed. 1860).

Patchouli, a perfume derived from the dried branches of *Pogostemon Heyneanus* (family Labiatae), first introduced into Britain as an article of merchandise in 1844. The name is from the Tamil *patchei*, 'gum,' and *elei*, 'leaf.' The plant, a low shrub 2½ or 3 feet high, is a native of Silhet, the Malay coast, Ceylon, Java, the neighbourhood of Bombay, and probably also of China; but, owing to the fondness of Asiatics for the perfume which it yields, it is difficult to say where it is native or cultivated. Every part of the plant is odoriferous, but the younger portions of the branches with the leaves are chosen; they are usually about a foot long. The odour is peculiar and difficult to define, but it has a slight resemblance to sandalwood; it is very powerful, and to many persons is extremely disagreeable. The odour of patchouli was known in Europe before the material itself was introduced, in consequence of its use in Kashmir to scent the shawls with a view of keeping out moths, which are averse to it; hence the genuine Kashmir shawls were known by their scent, until the French found the secret, and imported the herb for use in the same way. In India it is used as an ingredient in fancy tobaccos and as a perfume for the hair. It is also much prized for keeping insects from linen and woollen articles. The essence of patchouli is a peculiar heavy brown oil, with a disagreeably powerful odour; it is obtained by distillation, and requires extreme dilution for perfumery purposes. A cwt. of the plant yields about 28 oz. of the oil. The Arabs believe it to be efficacious in preventing contagion and prolonging life.

Patella. See KNEE, and LIMPET.

Paten (Lat. *patina*, 'a dish'), a small circular plate employed for the wafers or bread in the

eucharistic service. It is always of the same material as the chalice, often richly chased or carved, and studded with precious stones.

Patent Medicines, in popular language, include not only patent medicines strictly so called, but also all proprietary medicines and all medicines liable to stamp-duty. A preparation to be liable to stamp-duty must be one which is to be 'used or applied externally or internally as a medicine or medicament for the prevention, cure, or relief of a disorder or complaint incident to or in any wise affecting the human body.' Then it must also be brought under one of the following six causes, which constitute liability to duty: (1) the seller must have or claim to have a secret art or for making or preparing; or (2) an exclusive right or title to making or preparing; or (3) it must have been patented; or (4) it must be, or have been, recommended to the public as a nostrum (Lat. 'our') or proprietary medicine, or (5) as a specific, or (6) as beneficial for the prevention, cure, or relief of any disease. Any one of these entails liability to stamp-duty independently of the others. All other medicines are exempt from stamp-duty; that is to say, drugs the 'denominations, properties, qualities, virtues, and efficacies' of which are known and admitted in medicine, and in the making or preparing of which no secret art or exclusive right is claimed by any person.

Patents. In the widest sense of the term, a patent is a royal grant made by letters-patent (*litteræ patentes*) or open letters, 'so called because they are not sealed up, but exposed to open view, with the Great Seal' (or a lawful substitute for the Great Seal) 'pendant at the bottom; and are usually addressed by the sovereign to all the subjects of the realm' (Blackstone). The principal grants made by letters-patent are titles of honour, such as peerages and baronetcies, appointments to judicial and administrative offices, charters of incorporation, and monopolies of the right to make, use, exercise, and vend new inventions. Of these grants it is here proposed to consider the last mentioned alone, to which the term patent is in common parlance restricted. It may, however, be observed in passing that the procedure connected with royal grants other than patents for inventions is still intricate and technical, resembling that which was in use for patents of invention before the Patent Law Amendment Act of 1852, and that such grants are enrolled on the Patent Rolls, and may be seen at the Record Office or, in the case of recent grants, at the Chancery Enrolment Office, London.

From a very early period in our history the sovereign has enjoyed and exercised the prerogative of securing to inventors, for a limited term, 'the sole right of making, using, and vending' new and useful inventions. Thus, it is stated that Edward III., on the representation of some alchemists, granted a commission to two friars and two aldermen to inquire whether a philosopher's stone might be made, and, on their reporting that the project was feasible, granted to the two aldermen a patent of privilege that they and their assignees should have the sole making of the philosopher's stone. Upon the royal prerogative, however, of which this case offers an early, though in all probability by no means the earliest, illustration, the common law placed certain definite and well-understood restrictions. (1) The sovereign could not grant the sole right to sell articles in common use. Thus, letters-patent granting to one John Pechey the sole importation of sweet wines into London were, at a parliament held in the fiftieth year of the reign of Edward III., declared to be void. (2) A grant of the sole right to exercise a known occupation was bad. This was decided as to the manufacture and

importation of playing-cards in the leading case of *Darcy v. Allin*. (3) The grantee was required to have been at least the *introducer* of the invention within the realm. (4) The term of the grant must be for some limited period, such as might be sufficient for the instruction of others. (5) The subject-matter must be such as, in the result, led to a new trade or manufacture. (6) The patented invention must possess the incidents of utility and novelty, and must not be prejudicial or inconvenient to trade (1 Webster Patent Cases, 7. n.).

In the reign of Elizabeth, however, and still more emphatically in the reign of James I., the old common-law monopoly changed its character. The number of *bona-fide* inventions or discoveries was small. But the financial and political difficulties of the sovereign were great. The royal prerogative of granting limited monopolies 'for the good of the realm and the furtherance of trade' came, with many other doubtful expedients, to the sovereign's assistance. The common-law limitations were ignored. Currants, salt, iron, powder, cards, calfskin, paper, tin, sulphur, and a hundred other commodities in common use were appropriated to monopolists for practically unlimited periods. The patentees were enabled to charge extortionate prices for inferior articles, to enter (at least under the saltpetre patents) private houses and ransack stables and cellars for infringing articles, and to have infringers brought before the council and punished for contempt of the royal authority. After a protracted struggle, in the course of which Queen Elizabeth recalled most of her obnoxious grants, and James published a counterblast against monopolies, which influenced his subsequent conduct very slightly, the famous Statute of Monopolies was passed in 1624. The purview of the measure has often been misrepresented. It did not, as we have seen, *create* the royal prerogative to grant letters-patent for inventions. But it declared that all such monopolies as the sovereign had latterly been granting were contrary to law and void. It then excepted from this sweeping prohibition (*inter alia*) 'grants of privilege for the term of fourteen years or under, thereafter to be made, of the sole working or making of any manner of new manufactures within the realm, to the true or first inventor or inventors, which others, at the time of making such letters-patent and grants, shall not use, so as also they be not contrary to the law, nor mischievous to the state, by raising prices of commodities at home, or to the hurt of trade, or generally inconvenient.'

This saving clause in the Statute of Monopolies is the foundation of the modern English patent system. It preserves, and at the same time limits, the royal prerogative to grant monopolies of inventions, and it gives a most succinct, and yet a complete, statement of the characteristics of a valid patent-grant. The *term* of the grant is to be fourteen years *or under*; and patents were in fact always granted for a term of fourteen years till the period was raised to sixteen years by the Patents and Designs Act, 1919. The *grantee* is to be 'the true and first inventor'—words which a series of judicial decisions has interpreted as including the first importer from abroad—of the patented invention. The *privilege* conferred is the sole and exclusive right to work or make the invention; and the *subject-matter* of a valid grant is 'any manner of new manufacture within the realm' which is (a) not in use at the date of the grant, (b) not contrary to law or mischievous to the state, (c) not to the hurt of trade, or (d) not generally inconvenient. The next important measure in the history of our patent law is Lord Brougham's Act, 1835. At common law, letters-patent were wholly void for

any defect in part, not being a mere clerical error which the Master of the Rolls could correct; and a patentee was liable to be deprived of his patent from the failure of some condition, such as *want* of novelty in a very trifling part of the invention. The Act of 1835 enabled a patentee to enter with the clerk of patents, by permission of the crown, signified by the *fiat* of the law officer, a *disclaimer* of any part of the title or a memorandum of any alteration therein, which upon being filed by the clerk of patents, and enrolled with the description of the patent, was deemed and taken to be part of the letters-patent in all courts whatever. A still more important change was introduced by the Patent Law Amendment Act, 1852. The policy of granting patents is not only to reward inventors, but to induce them to disclose their inventions to the public. Different means of attaining the latter object have been adopted at different stages in the history of our patent law. The earliest practice was to insert in the grant a proviso requiring the inventor and his assignee to take apprentices during the last seven years of the term, and to teach them 'the knowledge and mystery' of his invention. In the reign of Queen Anne the patentee was required within a certain period (usually six months) after obtaining his patent to enrol at one of the public record offices a *specification* or description of his invention, upon the accuracy and sufficiency of which the validity of his grant in great measure depended. This practice had several grave disadvantages. There were three offices in which specifications might be enrolled—the Enrolment Office, the Rolls Chapel, and the Petty Bag Office; in each of these offices a laborious search might have to be made before a particular specification could be discovered and inspected. Again, the interval of time which elapsed between the grant of a patent and the enrolment of the specification enabled a patentee first to obtain protection for what might be merely a crude idea, and then to work out its details, altering and modifying them at will, during the protected interval. The Patent Law Amendment Act of 1852, adopting a practice which was in force in several continental countries, and which was strongly recommended by most of the witnesses who gave evidence before the committees of 1829 and 1851, provided that a petition for the grant of letters-patent should be accompanied by a statement in writing, describing the nature of the invention which it was sought to patent; this statement was called the *provisional specification*. The effect was that a patentee might use his invention for six months without prejudice to his patent by that user. The patentee was thereby protected against the consequences of his own publication, and enabled to employ workmen and obtain machinery without the risk of being betrayed.

The existing law, including the various Patents, Designs, and Trade-marks Acts, 1833-1902, was repealed, but in substance re-enacted with alterations by the measure introduced by Mr Lloyd George in 1907, which came into force in 1908, and which has, in turn, been amended by the Patents and Designs Act, 1919. The present procedure to obtain a patent is as follows: An application signed by the inventor himself, and accompanied by a 'provisional specification,' in which the nature of his invention is briefly and generally described, is lodged at the Patent Office. The application and specification are then referred by the comptroller-general, who is the official head of the department, to an examiner who ascertains and reports to him whether (1) the nature of the invention has been fairly described, (2) the application, specification, and drawings, if any, have been prepared in the prescribed manner,

(3) the title selected by the applicant sufficiently indicates the subject-matter of the invention, and (4) the specification does not describe more than one invention. Provision is made for an official examination of the Patent Office records (limited to fifty years) to find out if the proposed new patent had been in any way forestalled. If the examiner report against the applicant on any of the grounds mentioned above, the comptroller may require the application, specification, or drawings to be amended before he proceeds. Against this decision the applicant may appeal to the law officer, whose judgment is final. The comptroller may also refuse to grant a patent for any invention of which the use would, in his opinion, be contrary to law or morality, and from such refusal no appeal can be taken. If, however, the examiner report in the affirmative upon each of the issues submitted to him, the application is accepted. If the provisional specification is found satisfactory, within a period of six months (formerly nine months) from the date of his application the applicant must deposit at the Patent Office a *complete specification*, particularly describing the nature of the invention and the best method of carrying it out. If the examiner report that the complete specification (1) does not fairly describe the invention, (2) does not terminate with a distinct claim or claims, (3) claims more than one invention, or (4) varies materially from the provisional, the comptroller may refuse to accept it unless and until it has been amended to his satisfaction. From such a refusal the applicant may appeal as before to the law officer, whose decision is final. When the complete specification has been accepted it is printed and published, and the details of the applicant's invention are then for the first time thrown open to public inspection. The comptroller-general causes the fact of the acceptance to be advertised in the official journal of the Patent Office, and the patent is not granted until after the expiration of two months from the date of such advertisement. At any time within that period any person may oppose the grant on any one or more of the following grounds: (1) that the applicant had obtained the invention from the opponent or from some person of whom the opponent is the legal representative; (2) that the invention had been patented in this country on an application of prior date; (3) that the complete specification describes or claims an invention other than that described in the provisional, and that such other invention forms the subject of an application made by the opponent between the leaving of the provisional and of the complete specifications. At any time after the sealing of a patent it may be indorsed by the comptroller, at the request of the applicant, with the words 'licences of right.' The effect of this indorsement is to entitle any person as of right to a licence under the patent on such terms as, in default of agreement, may be settled by the comptroller. Where, at any time after the expiration of four years from the date of a patent, the comptroller is satisfied, on the application of any interested person, that there has been an abuse of the monopoly rights, either by the non-working, or inadequate working of the invention within the United Kingdom, or the refusal of, or conditions attached to the grant of licences, he may order (a) the patent to be indorsed 'licences of right;' or (b) the grant of a licence, exclusive or otherwise, to the applicant; or (c) the revocation of the patent. Every such order is subject to an appeal to the court. Prior to 1835 the term of a patent could only be extended by a special act of parliament. But the frequency of applications for statutory assistance suggested the propriety of framing some general measure for the extension or

prolongation of letters-patent, and Lord Brougham's Act was passed with that view. Other enactments, of which the interest is now chiefly historic, followed; and section 25 of the act of 1883 empowered the Judicial Committee of the Privy-council to extend for a further period of seven, or in exceptional cases of fourteen, years the term of a patent which, although highly meritorious and useful, had not adequately remunerated the patentee, from circumstances beyond his control, during the original term. Under the acts of 1907 and 1919 petitions for prolongation of the patent beyond the statutory term of sixteen years are decided by the High Court (instead of the Judicial Committee of the Privy-council, as formerly), and the expense, which was often prohibitive, is thus kept within reasonable bounds. The term for which an extension may be granted is now five, or, in exceptional cases, ten years. Conditions more favourable to the patentee were granted in respect of a single patent for cognate inventions, 'patents of addition,' and the revival of lapsed patents.

The infringement of a patent may be restrained by injunction, and punished by damages awarded in an action at law. A patent will be *revoked*—or, as it is termed in Scotland, *reduced*—if it is proved to the satisfaction of the proper court to have been obtained by fraud or false suggestion on the part of the patentee, or to lack the essential requisites of novelty and utility. The procedure in Scotland under the Patent Act, 1907, is regulated by an Act of Sederunt, dated 16th July 1910.

A patentee is not compelled to mark articles made according to his invention as 'patented.' But any person who represents that an article sold by him is patented, when in fact no patent has been granted for the same, is liable on summary conviction to a fine not exceeding £5.

Patent Agents.—Before the Patent Law Amendment Act, 1852, only about 500 patents were taken out annually in England. The patent business of the country would not, therefore, support a separate profession; and the parliamentary reports of 1829 and 1851 throw a somewhat painful light on the proceedings of many of those persons who carried on the work of patent agents in connection with other callings. Under the act of 1852, however, the number of patents annually obtained greatly increased; foreigners and British subjects abroad desired to patent their inventions more frequently than before, and consequently the work of the patent agent became a distinct profession. On the 12th of August 1882 an Institute of Patent Agents was incorporated under the Companies Acts, 1862 to 1880. The Patents Act, 1888 (sect. 1), created a Register of Patent Agents, on which (see sect. 18 of the act of 1919) every person who assumes the name of 'patent agent' must be enrolled under a penalty not exceeding £20. The *Register of Patent Agents Rules*, issued by the Board of Trade, came into operation on 12th June 1889, and gave to the Institute of Patent Agents (which received a royal charter in 1891) practically complete control over the whole profession. A communication to a patent agent is not privileged from disclosure in a court of law though he be a solicitor.

The Patent Office.—All the formal, and much of the judicial, work connected with the grant of letters-patent for inventions is done at the Patent Office in Southampton Buildings, Chancery Lane, London. At the head of the whole department is an officer called the comptroller-general, who is appointed by, and responsible to, the Board of Trade, and is assisted by a staff of examiners, clerks, &c. In addition to his formal and judicial duties relating to applications, the comptroller attends to the Register of Patents, in which the

names of patentees and notifications of all assignments and licenses must be entered, and prepares an annual report as to the work of the Patent Office, which is laid before both Houses of Parliament. The Patent Office contains a valuable free public reference library and reading-room, in which all the publications of the Patent Office—specifications, reports of cases, illustrated official journals, &c.—may be consulted.

Patents in the United States.—Before the Declaration of Independence patents were occasionally issued by the colonial governments; and the constitution of the United States expressly vested in congress powers 'to promote the progress of science and useful arts by securing for limited times to authors and inventors the exclusive right to their respective writings and discoveries.' The congress of 1790 passed an act regulating the issue of patents for inventions, requiring the would-be patentee to petition the Secretary of State, the Secretary of War, or the Attorney-general; with the approval of any two of these the description of the patent was certified by the Attorney-general, and the president directed the issuing of the patent. The patent was recorded in the office of the Secretary of State, and delivered to the patentee under the great seal of the United States. Under this law, which remained practically unchanged till 1836, patents were granted with little examination, and the responsibility of deciding whether the patentee had made out his case was left wholly to the courts—a system found to be inconvenient and unsatisfactory for the interests of the public. On occasion of a fire at the Patent Office, when many of the documents were destroyed, congress repealed former acts and established a new system, which remains in force till now. The general principles of the law are the same as in Britain, but the term for which patents are granted is seventeen years—longer than elsewhere. The Patent Office is attached to the department of the Secretary of the Interior. The commissioner, assistant-commissioner, and examiners-in-chief are appointed by the president, with the consent of the senate. The chief clerk, a staff of examiners (principal, first assistants, second assistants, third assistants), draughtsmen, copyists, attendants, &c. are nominated by the commissioner of patents and approved by the Secretary of the Interior. The office publishes pamphlets on *The Patent Laws and Laws relating to the Registration of Trade-marks and Labels*, and *The Rules of Practice in the United States Patent Office*, which may be had on application. But inventors are recommended to secure the assistance of 'patent lawyers,' who are a distinct branch of the legal profession. The minimum expense may be stated at \$60; but difficulties and references to various authorities may greatly increase the outlay. An act of 1897, among other minor alterations, provides that the proprietor of a foreign patent, wishing to patent his invention in the United States, must do so within two years of the date of his original patent, instead of any time during its existence, as formerly.

The International Convention.—It had long been the desire of inventors and legislators to bring about an assimilation of the patent laws of the world. As early as 1851 a society called the 'Association of Patentees' included in their list of proposed reforms in the patent law 'international arrangements for a mutual recognition of the rights of inventors.' Adopting in substance the views of Sir H. Bessemer, Sir William Armstrong, and Mr C. W. Siemens, the Select Committee of 1872 recommended that 'Her Majesty's government be requested to inquire of foreign and colonial governments how far they are ready to concur in international arrangements' in relation

to the proposed international patent law. In accordance with this recommendation Earl Kimberley, then Colonial Secretary, directed the governors of the British colonies to ascertain the state of colonial opinion upon the subject. At the same time our representatives abroad were required by Lord Granville to prepare succinct reports upon the patent laws of the countries to which they were severally accredited, and these reports were published and laid before parliament in 1873 (C—741). The inquiries thus held showed that colonial and foreign official opinion was in the main favourable to the proposed change, and also that, all divergencies notwithstanding, there existed in the patent laws of the world ample materials out of which an international patent system might eventually be created. The International Congress at Vienna in 1873 and the Paris Congress, organised during the Exhibition of 1878, carried the movement forward; and on 20th March 1883 an 'International Convention for the Protection of Industrial Property' was signed at Paris. The plenipotentiaries of the contracting parties exchanged ratifications on 6th June 1884, and the convention came into effective operation a month later. The original signatories were Belgium, Brazil, Spain, France, Guatemala, Italy, Holland, Portugal, Salvador, Serbia, and Switzerland. The accession of Great Britain was delayed until special statutory power had been given to the crown to allow the *ante-dating* of patents granted under the convention, but subsequently took place. The United States, Cuba, Honduras, Uruguay, Tunis, Mexico, Denmark, Dominican Republic, Japan, Rumania, Bulgaria, Finland, Luxemburg, and Germany have subsequently joined the International Union. Among the Colonies, arrangements have been made with the Commonwealth of Australia, Ceylon, New Zealand, Trinidad, and Tobago. The principal changes introduced into our patent system by this important treaty are these: (1) Formerly a patentee could not import into some of the states now comprised in the union articles manufactured according to his patent in this and other countries without forfeiture of his rights. Free importation of such articles without the penalty of forfeiture is now allowed. (2) An applicant for a patent in any one of the contracting states may obtain protection for the same invention here at any time within seven months (by act of 1901 altered to twelve months) from the date of his foreign application. The subsequent application is *ante-dated* to the date of the first application, and is consequently not defeated by prior publication or user in the protected interval. This may be explained by an illustration. A, a French inventor, applies for a patent in Paris on 1st June 1890. At any time within twelve months from that date he may apply to the English Patent Office to protect the same invention which he is patenting in France, and the *English application, and the patent granted thereunder, are dated back to the 1st of June*. The result is that A may, for almost twelve months after his French application, use his invention in England with perfect safety. No one can say that the patent subsequently granted to him is bad for want of novelty, because the patent ultimately bears the date of the 1st of June, and thus protects the period during which he was using the invention in England. The rights conferred on a person who has applied for protection of an invention in a foreign state extend to his legal representatives and assignees (Patents and Designs Act, 1914).

In connection with the international Convention an international office or bureau has been established at Berne in Switzerland. Its expenses are defrayed by the governments of all the contracting

states, and it publishes a monthly periodical entitled *La Propriété Industrielle*, which is devoted to the interests of the union. The convention provides for conferences being held successively in one of the contracting states by delegates from the said states with a view to perfect the system of the union. The first meeting took place at Rome in April and May 1886.

In Britain, in 1924, there were 31,370 applications for patents, and 16,839 were granted. In the United States the numbers were 76,855 and 42,594. At the Imperial Economic Conference held in London at the end of 1923, proposals were made and considered for an 'empire patent,' valid throughout the British empire, but they have not yet materialised.

In some countries, such as the United States of America, Germany, and Austria, the Patent Office inquires strictly into the novelty and utility of every invention submitted to it for protection. A limited form of preliminary examination into novelty has now, as above explained, been established in England by recent legislation. In others, such as France and Turkey, there is no preliminary examination as to novelty or utility. Indeed, in France the patentee, if he refers to his title at all, is obliged to add the words *sans garantie du gouvernement* or their initial letters, S.G.D.G. In most European states a patentee is compelled to 'work' his invention within a certain time prescribed by law or limited in the grant; but this regulation or *exploitation* law, as it is called, is usually enforced in cases of voluntary and unjustifiable inaction alone.

See Carpmas, *Patent Laws of the World* (2d ed. 1889 *et seq.*); Edmunds, *Law of Patents* (2d ed. 1897); books by Robinson (1890), Fulton (1905), Terrell (1906), and for America, by Walker (1895), Phillips, Curtis, and others; the Reports of the Parliamentary Committees (1829-87); the Reports of the Commissioners of Patents (1852-84), and by the Comptroller-general since 1884. See also COPYRIGHT, MONOPOLY, TRADE-MARKS.

Pater, JEAN BAPTISTE JOSEPH (1695-1736), genre-painter, born at Valenciennes, was not only the pupil but the disciple of Watteau, and rivalled his master in grace and colour, though he was a less skilful draughtsman.

Pater, WALTER, was born in London, August 4, 1839, and educated at King's School, Canterbury, and at Queen's College, Oxford, taking a classical second-class in 1862. He was elected to an open fellowship at Brasenose; has travelled in Italy, France, and Germany; and, both by his subtle critical insight and the exquisite finish of his style, secured a rank among the best prose-writers of his time. With a wise reticence he husbanded his gift; hence all his work maintains the same high level of excellence. His books are *Studies in the History of the Renaissance* (1873), a series of essays on art and letters, on such men as Leonardo, Botticelli, Joachim du Bellay, and others, written in exquisitely modulated prose, with faint traces of a conscious daintiness, from which he soon shook himself free; *Marius the Epicurean: his Sensations and Ideas* (2 vols. 1885), an imaginary biography of a young man brought up in Roman paganism, who passes through varied spiritual experiences, meets Marcus Aurelius himself, and at last, shortly before his unexpected death, makes acquaintance with the mysterious new Eastern religion, yet without being profoundly influenced by it; *Imaginary Portraits* (1887) of Watteau, Denys l'Auxerrois, and others; *Appreciations* (1889) of Charles Lamb, Wordsworth, Coleridge, Rossetti, Sir Thomas Browne, Blake, and of Style itself; *Greek Studies* (1895); *Miscellaneous Studies* (1895) on Raphael, Pascal, North

Italian art, French cathedrals, with romantic tales; and *Gaston de Latour: An Unfinished Romance* (1896). From 1885 on Pater had divided his time between Oxford and London. He died 30th July.

See Gosse's *Critical Kit-Kats* (1896), a book by Greenslet (1904), and that by A. C. Benson ('Men of Letters,' 1906).

Paterculus, MARCUS VELLEIUS, lived from about 19 B.C. to 31 A.D., and served as legate in Germany. His *Historiæ Romanæ* is a compendium of universal, but more particularly of Roman history, in two books. The work, as we have it, is not complete, the beginning, and a portion following the 8th chapter, being wanting. The work is slovenly and superficial, marred moreover by inflated rhetoric as well as by ignorant errors, and by fulsome flatteries of Cæsar, Augustus, and Tiberius. The *editio princeps* appeared at Basel in 1520. Good editions are those of J. C. Orelli (1835), F. Kritz (1840-48), and C. Halm (1876).

Pateretors were small pieces of ordnance, now obsolete, worked on swivels; most commonly used on board ships, where they were mounted on the gunwale, and discharged showers of old nails, &c. into hostile boats.

Paterno, a town of Sicily, 11 miles NW. of Catania, at the southern base of Mount Etna. Pop. 15,230.

Pater-Noster (Lat., 'Our Father'), called also THE LORD'S PRAYER, a short form of prayer suggested or prescribed by our Lord to his disciples (Matt. vi. 9-13; Luke, xi. 2-4) as the model according to which, in contrast with the prayers of the Pharisees, their petitions ought to be framed. The Pater-Noster has been accepted as, by excellence, the form of Christian prayer. It formed part of all the ancient liturgies, usually introduced with a preface, and said between the consecration of the elements and the communion, except the so-called Clementine liturgy, in which it does not appear at all, and the Abyssinian, in which it is said, as in the English, after the communion. St Gregory finally settled its place in the Roman Mass, immediately after the Canon and before the fraction. Whereas in the East it was said by both priest and people, in the Roman use it was recited by the priest alone. The Catechism of the Council of Trent contains a detailed exposition and commentary on it, and in all the services, not only of the Roman Missal, Breviary, Ritual, Processional, and Ordinal, but in all the occasional services prescribed from time to time, it is invariably introduced. In the Mass it is said aloud, but in the Breviary secretly, or with at most the first and concluding words said audibly. In the Rosary of the Virgin Mary it is combined with the Hail Mary (whence the larger beads of the 'Rosary' are sometimes called *Pater-Nosters*), and perhaps the most usual of the shorter devotions among Roman Catholics is the recitation of the 'Pater,' with one or more 'Ave Marias,' concluding with the Doxology. The Pater-Noster as commonly used by Protestants concludes with the clause, 'for Thine is the kingdom, the power, and the glory for ever [or, for ever and ever]. Amen,' but this is wanting in the most ancient authorities. This embolism or intercalated prayer occurs in all the liturgies, Roman, Mozarabic, Gallican, Greek, Coptic, and Armenian. Of the two gospels—that of Matthew and that of Luke—in which the prayer is contained, that of Luke has not this clause; and even in the gospel of Matthew it is found only in the later MSS., in which it cannot be doubted that it is a modern interpolation. It was retained, however, in Luther's German translation, in the Prayer-book (original) version, and in the English authorised version. In the revised version it is

omitted both in Matthew and Luke; in Luke, 'which art in heaven,' the whole of the third petition, and 'deliver us from evil' are relegated to the margin; and in Matthew, 'deliver us from evil' is properly rendered 'deliver us from the evil one.'

Many polyglot collections of the Pater-Noster have been published from the 16th century downwards, the most remarkable of which are those of John Chamberlayne in 150 languages (1715), of Conrad Gesner in 200 (1748), and that of Padre Hervaz in 307 (1787). There are expositions of the Lord's Prayer by Origen, Chrysostom, Gregory Nyssa, Cyprian, Luther, Leighton, and Tholuck. See Moses Margoliouth, *The Lord's Prayer no Adaptation of existing Jewish Petitions* (Lond. 1876).

Paterson, capital of Passaic county, New Jersey, is on the Passaic River (which here has a perpendicular fall of 50 feet), and on the Morris Canal (connecting it with the Delaware River), 15 miles NW. of New York City. It contains several locomotive-works, dye-works, numerous factories of cotton, paper, and linen and woollen goods, &c.; but chiefly it is famous for its silk-factories, which have made Paterson 'the Lyons of America.' Pop. (1870) 33,579; (1890) 78,347; (1920) 135,875.

Paterson, ROBERT (1715-1801), 'Old Mortality,' was born near Hawick, and served his apprenticeship as a stone-mason to an elder brother near Lochmaben. He married soon after 1740, and, renting a quarry for himself, took to carrying gravestones into Galloway. From about 1758 he neglected to return to his wife and five children, and for upwards of forty years devoted himself to the task of repairing or erecting headstones to Covenanting martyrs, wherever such had been buried. So Joseph Train wrote to Scott, who tells how about 1800 he himself met 'Old Mortality' at Dunnottar, engaged 'in the usual business of his pilgrimage.' From the old man's son, however, Train got a different story, without a hint of Cameronian zeal.

See the Introduction (1830) to *Old Mortality*, and Dr Crawford Tait *Ramage's Drumlarnrig Castle and the Douglasses* (Dumfries, 1876).

Paterson, WILLIAM, the greatest commercial schemer of the 17th century, was, like Law, a Scotsman, and was born at Skipmire farm in Tinswald parish, Dumfriesshire, in April 1658. His early career is obscure, but it appears that he carried a pack through England, settled some time at Bristol, next lived in the Bahamas, whether as preacher or buccaneer, and there matured his famous Darien Scheme. Returning to Europe, he promoted his scheme in London, Hamburg, Amsterdam, and Berlin, made a fortune by commerce in London, founded the Hampstead Water Company in 1690, and projected the Bank of England, and was one of its first directors in 1694. Paterson next went to Edinburgh, and soon talked the whole nation into his Darien Scheme. He sailed with the expedition in a private capacity, shared all its troubles, and returned with its survivors a broken man, in December 1699. But his energy remained unabated. When in 1701 William resolved to carry the contest with Louis XIV. into the heart of Spanish America, Paterson was taken into the king's confidence, and but for his death might have seen his dreams of Darien realised. He had a considerable share in promoting the union of Scotland with England, and was elected to the first united parliament by the Dumfries burghs. By a special act of parliament in 1715, he was awarded £18,241 as indemnity for his losses by the Darien Scheme; but he did not live long to enjoy it, for he died on 22d January 1719. Paterson was no mere dreamer, but a far-seeing financier, and a free-trader before free-trade times.

See **DARIEN SCHEME**; the Life by S. Bannister (1858), editor of his *Works* (3 vols. 1859); Pagan's *Birthplace*

and *Parentage of W. Paterson* (1865); Barbour, *History of William Paterson and the Darien Company* (1907).

Pathans. See **AFGHANISTAN**.

Pathology (from Gr. *pathos*, 'disease,' and *logos*, a 'discourse') is that department of medicine which treats of the doctrine of diseases, their nature, causes, symptoms, and progress. General pathology deals with disease or morbid processes in general, and special pathology with particular diseases. Pathology is also divided into internal and external, and into medical and surgical. Pathology may be treated as falling into the departments of nosology, ætiology, morbid anatomy or pathological anatomy, symptomatology, and therapeutics. Humoral pathology was based on the theory that all diseases were due to the disordered condition of the humours and fluids of the body. Cellular pathology, associated with the name of Virchow, gives prominence to the action of cells in the healthy and diseased functions of the body. See **ANATOMY**, **DISEASE**, **MEDICINE**, **PHYSIOLOGY**, and the articles on the several diseases in this work.

Patiala, an Indian state in the Punjab, partly amongst the hills; area, about 5400 sq. m.; pop. 1,500,000. The capital, also called Patiala, has a pop. of 47,500, including 7500 Sikhs.

Patkul. See **CHARLES XII**.

Patmore, COVENTRY KERSEY DIGHTON, poet, was born at Woodford, Essex, July 23, 1823, the son of P. G. Patmore, author of *My Friends and Acquaintances*. He published a volume of *Poems* in 1844, and three years later joined the staff of librarians in the British Museum, where he remained till 1868, when he purchased a small estate in Sussex. Soon after he settled at Hastings, where he built a large Catholic church. His second volume of poems, *Tamerton Church-tower*, &c. (1853), prepared the way for his greatest work, *The Angel in the House*, an elaborate, exquisite, and sincere poem of love from the domestic side, which has had a great popularity, but not beyond its deserts. It consists of four parts, all included under the general title for the first time in the edition of 1866: *The Betrothal* (1854) *The Espousals* (1856), *Faithful for Ever* (1860), and *The Victories of Love* (1863). A carefully revised edition of this poem was issued in his collected poems (1878 and 1886), with an essay on *English Metrical Law*, and including *The Unknown Eros*, a mystical poem first published in 1877. *The Rod, the Root, and the Flower* (1895) contains religious poems. Patmore edited the anthology entitled *The Children's Garland* (1862), the *Autobiography* of Barry Cornwall (1877), and the poems of his son Henry (1884). *Florilegium Amantis* was a selection from his poems (ed. Garnett, 1888); another was *Poems of Pathos and Delight* (ed. Meynell, 1895). *Courage in Politics and other Essays* appeared in 1921. He died 26th November 1896. See *Lives* by Champneys (1900), and Gosse (1905).

Patmos, a rocky island in the Ægean Sea, one of the Sporades, lies to the south of Samos; area, 16 sq. m. In a cave here, it is said, the exiled apostle John saw the visions of the Book of Revelation. The famous monastery of 'John the Divine' was built in 1088. The island is under Italian rule, but is inhabited by about 2500 Greeks, mostly sponge-fishers.

Patna, called also **AZIMABAD**, the capital of Bihar and Orissa, 140 miles E. of Benares by rail, extends 9 miles along the Ganges and 2 miles back from the river; but the streets are narrow and crooked, and the houses mostly mean in appearance. Apart from the Gola or government granary (1786), the government opium-factories, Patna

College, the shrine of Shah Arzani, the mosque of Sher Shah, a Roman Catholic church, and a Mohammedan college, there are no buildings of moment. A university was founded in 1917. Its railway communication, and its central position at the junction of three great rivers, the Son, the Gandak, and the Ganges, avenues for the traffic of the United Provinces of Agra and Oudh, render Patna of great importance as a commercial centre. The chief imports are cotton goods, oil-seeds, salt, sugar, wheat, and other cereals. The exports are principally oil-seeds and salt, with cotton, spices, English piece-goods, coconuts, and tobacco. Patna, under its early name of *Pataliputra*, is supposed to have been founded about 600 B.C. It was visited by Megasthenes, the Greek historian, about 300 B.C., and called *Palibothra* by him. In modern times Patna is notable as the scene of a massacre of British prisoners by Mir Kasim in 1763, which led to war and annexation, and for the mutiny at Dinapur, the military station of Patna, in 1857. Pop. (1891) 165,192; (1911) 136,153; (1921) 129,429.

Patna, an Indian state of Bihar and Orissa, formerly of the Central Provinces; area, 2399 sq. m.; pop. about 500,000. It has been under the management of a British political agent since 1871. Bolangir is the chief town.

Patois, the French term for dialects of a language spoken especially by the uneducated. See DIALECT.

Paton, JOHN GIBSON, missionary to the New Hebrides, the son of a stocking-maker, was born in the parish of Kirkmahoe, Dumfriesshire, 24th May 1824. He offered his services as a missionary to the Reformed Presbyterian Church, and settled down in 1858 amongst the cannibal natives of Tanna. Forced to leave in 1862 owing to the hostility of the natives, he worked for twenty years on the neighbouring island of Aniwa, the whole population of which became Christian. Both by voice and pen he afterwards attracted public attention and sympathy towards this field of mission labour; and his brother published and edited his graphic and thrilling missionary narrative, 1st and 2d series (1890). He died in January 1907.

Paton, SIR JOSEPH NOEL, painter, was born in Dunfermline, 13th December 1821, and studied for a time at the Royal Academy, London. His cartoon sketch, 'The Spirit of Religion,' gained one of the three premiums at the Westminster Hall competition in 1845. Two years thereafter his oil-picture of 'Christ bearing the Cross' and his 'Reconciliation of Oberon and Titania' jointly gained the prize of £300. The latter and its companion-picture, the 'Quarrel of Oberon and Titania,' are now in the National Gallery at Edinburgh. 'Dante Meditating the Episode of Francesca' was exhibited in Edinburgh in 1852; the 'Dead Lady' in 1854; and 'The Pursuit of Pleasure' in 1855. Scenes from fairyland and from ancient legend, and religious and mystical allegory, painted with grace, tenderness, and something of over-refinement, have made his work familiar, and have been often engraved. Among his other pictures are 'Home from the Crimea'; 'In Memoriam,' a scene from the Indian Mutiny; a series of six picture-illustrations of the 'Dowie Dens o' Yarrow'; 'Luther at Erfurt'; 'The Fairy Raid'; 'Faith and Reason'; 'Gethsemane'; 'Christ and Mary at the Sepulchre'; 'The Man of Sorrows'; 'Mors Janna Vitæ'; 'The Spirit of Twilight'; 'Thy Will be Done' (1879); 'Beati Mundo Corde' (1891), &c. He illustrated Aytoun's *Lays of the Scottish Cavaliers*, and in 1864 he executed twenty illustrations of the *Ancient Mariner*. He published two volumes of poems. R.S.A., Queen's Limner for Scotland (1865), he died 26th December 1901.

Patras, or *PATRÆ*, a fortified seaport town and the most important in the west of Greece, climbs up a hillside and spreads out at its foot on the eastern shore of the Gulf of Patras, by rail 81 miles W. by N. of Corinth and 137 W. by N. of Athens. It is a handsome city, almost entirely rebuilt after the ravages of the war of liberation (1821). It is defended by a citadel, is the seat of an archbishop, and has a spacious harbour (1880) protected by a mole. It ships great quantities of currants, chiefly to Great Britain and France. Olive-oil, wine, valonia, &c. are also exported. Pop. 52,000. *Patra* is the only one of the 'twelve cities' of Achaia which still exists as a town; but most of its relics have been swept away by earthquake (551, 1820) and siege (by the Spaniards in 1532 and 1595, by the Knights of St John in 1603, and by the Greeks, 1822-28). It was an early seat of Christianity, having an archbishop before 347.

Patria Potestas. See FAMILY, PARENT AND CHILD.

Patriarch (Gr. *patriarchēs*, 'the head of a tribe') is the name given to the heads of the families in the antediluvian period of Old Testament narrative, and is still more familiar as the designation of the three progenitors of the Jewish people, Abraham, Isaac, and Jacob. In the later history of the Jews, too, after the destruction of Jerusalem, the Greek name was used to designate the heads of the college which was regarded as a continuation of the old Sanhedrin; one of whom, the patriarch of the west, resided at Tiberias, in Galilee, and the other, the patriarch of the Eastern Jews, at Babylon. The patriarch of Tiberias was also regarded by the Roman imperial government as municipal head of the Jews of Palestine. The most familiar use of the word, however, is in the history of the Christian church. It is the name given to the bishops of certain great metropolitan sees, who not only held rank beyond other metropolitans, but also enjoyed a jurisdiction over all the metropolitans included in their district almost identical with that of the metropolitan in his own province. It is certain that the name and the office were both recognised before the Council of Nice, at which time, as we learn from the sixth canon, the patriarchal sees, acknowledged by 'ancient custom,' were three in number, Rome, Antioch, and Alexandria. After the translation of the seat of empire to Byzantium, thenceforward called Constantinople, that see, originally subject to the metropolitan of Heraclea, obtained metropolitan and afterwards patriarchal rank, and eventually established a precedence over the patriarchs of Antioch and Alexandria, being second only to Rome. The contests between the patriarchs of Rome and Constantinople were among the chief causes of the Greek Schism. To these four patriarchates was added a fifth in the year 451, that of Jerusalem, which was formed out of the ancient patriarchate of Antioch. The limits of these five patriarchates can only be loosely assigned. After the Greek Schism, and particularly after the establishment of the Latin Kingdom of Jerusalem, Latin prelates were appointed with the title and rank of patriarch in the four great Eastern sees resident at Rome; in 1847 the Latin patriarch took up his residence in Jerusalem. The Catholic Church also recognises Maronite, Melchite, and Syrian patriarchs of Antioch, an Armenian patriarch of Cilicia, and a Chaldaic patriarch of Babylon. There are also minor patriarchs of Venice, of Lisbon, of the West and of the East Indies. For the patriarchs of the Eastern Church, see GREEK CHURCH. And see TWELVE PATRIARCHS.

Patrician (Lat. *patricius*, from *pater*, 'father'), a name given to the members of Roman *gentes* of whom the *populus Romanus* originally consisted, and to their descendants by blood and adoption. On the establishment of the plebeians as a distinct order, sharing certain rights with the patricians, the patriciate became an aristocracy of birth, in the exclusive possession of a number of important privileges. A long struggle between the two orders ended in the attainment by the plebeians of a political equality, and the establishment of a new aristocracy of *nobiles* based on wealth and office (see **NOBILITY, ROME**). Under Constantine the dignity of *patricius* became a personal title; not hereditary, but conferring very high honour and certain privileges. The popes in after times conferred the same title on eminent persons and princes; and elsewhere also the title of patrician was bestowed on distinguished subjects.

Patrick, St., a missionary of the 5th century, commonly known as the Apostle of Ireland. We have no certainty as to the place or date of his birth; and of late the scope of his labours has been much limited and his successful apostolate denied. Ussher put his birth in 372; Zimmer calculates it at 386. From his own Confession we learn that his father was a magistrate and had a small farm near 'Bannavem Taberniæ' (perhaps for *Bannaventa Berniæ*, or for *Bannaventa Haverniæ*, 'on Severn'). Arguing on these and all the other data, most modern authorities refer Patrick's birthplace to South Wales (perhaps one of three places now called *Baneven* in Glamorgan), not to Daventry (which was called *Bannaventa*) or the north of France, or Kilpatrick near Dumbarton. His father was a deacon named Calpornius, and his grandfather, Potitus, a priest. That his father was a *decurio* and a deacon seems conclusive against Dumbartonshire, which was neither Christianised nor in any way Romanised at the date in question. Patrick's original British name was Succat, Patricius (Hibernicised as *Cothrige*) being his Latin designation. In his sixteenth year he was seized, at his father's farm, by a band of pirates, and with a number of others was carried to Ireland and sold to a petty chief, in whose service he remained for six years. This chief's name was Miluic or Milchu. He lived in the valley of the Braid near Slémish Mountain, just outside the town of Broughshane, in the centre of the County Antrim, where a town-land called Bally-lig-patrick ('the town of Patrick's hollow') still preserves the memory of his residence. This district of Antrim was then famous for its piratical expeditions into Britain, as the vast finds of Roman coins all along the Antrim coast as far as Coleraine amply prove. After six years Patrick succeeded in effecting his escape, and, probably after a second captivity, went to France, where he became a monk, first at Tours, and afterwards in the celebrated monastery of Lérins, which was then the residence of John Cassian, the admirer of Egyptian monasticism, and of vast numbers of Egyptian monks; hence the numerous points of contact with Egyptian customs which have been noticed in the ancient Irish Church. He seems to have been ordained by an unknown Gallic bishop named Matorix or Amatorix, or else by Germanus of Auxerre. In the year 432, it is thought, he went as a missionary to Ireland; Palladius, who had been sent by Pope Celestine as missionary to that country a short time before, having died.

The leading facts of Patrick's life in Ireland as they are collected out of the various documents are these. He sailed from France to Wales or Ireland. The Welsh claim that he landed in Wales before he went to Ireland (see Giraldu Cambrensis, iii. 379, Rolls series). The communication, however, between Wales and the east coast of Ireland has

been very frequent from the earliest ages. He first landed as a missionary in Ireland at the town of Wicklow at the mouth of the river Vartry; thence he sailed north to convert his old master Milchu, who destroyed himself at his approach. Milchu was a chief of Northern Dalriada, a district which extended from the middle of Antrim to Newry. In the County Down, in the south of the same Dalriada, he converted another chief named Dichu, who bestowed upon him the first Christian church that St Patrick possessed. It was called Sabhall (Saul) or 'the barn,' and it is still a church called by exactly the same name. St Patrick then set out to Tara in the County Meath, which was at that period the central point of meeting for all the tribes of Ireland. There he preached to the king of Tara, Laoghaire, or Leary (as the name should be pronounced), where Patrick is said to have used the shamrock to illustrate the doctrine of the Trinity; this is, however, a mere modern legend. Thence he proceeded to Connaught, as far as Croagh-Patrick in Mayo, to Ulster, and as far as Cashel in the south. We can trace his footsteps in all these directions by the topography of the country as well as by the documents which are extant. His mission was eminently successful. He adopted the expedient of addressing himself first to the chiefs, and of improving, as far as possible, the spirit of clanship and other existing usages of the Irish for the furtherance of his preaching; nor can it be doubted that he had much success in Christianising the ancient Irish system of belief and of practice. According to the accounts of his Irish biographers, he founded 365 churches and baptised with his own hand 12,000 persons. He is said also to have consecrated 450 bishops, ordained a vast number of priests, and to have blessed very many monks and nuns. After he had been some twenty years engaged in his missionary enterprise, he is said to have fixed his see at Armagh about the year 454, where he held probably more than one synod, the decrees of which have been a subject of much controversy. He died at Saul, the spot which Dichu had given him on his first arrival, and was buried at Downpatrick, where his relics were preserved down to the period of the Reformation. The place is still venerated by the people. The date of his death is much disputed, the Bollandists placing it in 460, while Ussher holds it to have been 493. Dr Todd inclines strongly to the latter opinion, in which case Patrick's age would have been quite 120. The only certainly authentic literary remains of St Patrick are his 'Confession' and a letter, both of very rude Latinity, but of much historical interest. The letter is addressed to Coroticus, possibly Ceretic, the Welsh king of Strathclyde, who had made a descent on the Irish coast and slain or carried off some Irish neophytes. These are included in Wilkins's *Concilia*, and in Haddan and Stubbs's *Councils* (vol. ii. 1873).

The first good biography of St Patrick was that by Dr J. H. Todd (1863), which carefully gathered the materials; as did Dr Whitley Stokes in his edition of the *Tripartite Life of St Patrick* (Rolls Series, 2 vols. 1887). The great Celtic scholar, Professor Zimmer, in a contribution to the 4th edition of Herzog's *Real-encyklopädie* (separately translated as *The Celtic Church in Britain and Ireland*, 1902), has dealt somewhat trenchantly with the traditional story. By a brilliant piece of critical reconstruction, he has sought to prove that Patrick (unknown to Bede) was only another name for Palladius, the Briton who was sent to Ireland by Pope Celestine in 431 (see *IRELAND*, p. 212); that his mission was not well received in Ireland, and that he wrote his Confession to defend himself and explain his failure. Zimmer further argues that the legend of his having been a great apostle came up first in the 7th century, after the southern Irish had agreed to accept the Roman tonsure and the Roman Easter, and were trying to induce their northern brethren, and especially the Church of Armagh,

to come into the *Unitas Catholica*. Professor J. B. Bury, in his *Life of St Patrick* (1905), has endeavoured to rehabilitate the traditional view.

Patrick, SIMON, a learned English divine, born at Gainsborough in Lincolnshire, 8th September 1626, was educated at Queen's College, Cambridge, and was successively rector of St Paul's, Covent Garden (1662), where he laboured heroically through the horrors of the Great Plague, Dean of Peterborough (1678), Bishop of Chichester (1689) and of Ely (1691). He died 31st May 1707. A theologian no less devout than erudite, an ecclesiastic of wide sympathies and large sagacity, he established a solid reputation by his excellent sermons, his admirable if sometimes prolix devotional and expository treatises, and his paraphrases and commentaries on the historical and poetical books from Genesis to Canticles (10 vols. 1695-1710). His *Autobiography* was first printed at Oxford in 1839, and is included in the complete edition of his works, ed. Taylor (9 vols. 1858).

Patrick, THE MOST ILLUSTRIOUS ORDER OF ST., a national order of knighthood for Ireland, established by George III. in 1783, and enlarged

in 1833. The *Collar* (of gold) is composed of roses alternating with harps, tied together with a knot of gold, the roses enamelled alternately white within red, and red within white; and in the centre is an imperial crown surmounting a harp of gold, from which the badge is suspended. The *Badge or Jewel* is of gold, and oval; surrounding it is a wreath of shamrock proper on a gold field; within this is a band of sky-blue enamel charged with the motto of the order, *QUIS SEPARABIT* MDCCLXXXIII, in

Order of St Patrick.

gold letters; and within this band a saltire gules (the cross of St Patrick), surmounted by a shamrock or trefoil slipped vert, having on each of its leaves an imperial crown or. The field of the cross is either argent or pierced and left open. A sky-blue *Ribbon*, worn over the right shoulder, sustains the badge when the collar is not worn. The *Star*, worn on the left side, differs from the badge only in being circular in place of oval, and in substituting for the exterior wreath of shamrocks eight rays of silver, four of which are larger than the other four. The order is indicated by the initials K.P.

Patripassians (Lat. *pater*, 'father,' and *passus*, 'suffered'), a name given to one of the earliest classes of anti-Trinitarian sectaries (2d century), who, in maintaining the oneness of the Godhead, were said by their enemies to believe that, as it was true to say that Jesus, in whom dwelt the Logos, or the Son, suffered, therefore it would be true to say that the Father suffered. Their principles are in the main the same with those of the Sabellians (q.v.).

Patristic Literature. See FATHERS OF THE CHURCH, and separate articles.

Patroclus. See ACHILLES.

Patron (Lat. *patronus*, from *pater*, 'father'), among the Romans originally signified a citizen who had dependents, who were called *clients*, attached to him. Before the time of the Laws of the Twelve Tables, the most frequent use of the term *patronus* was in opposition to *libertus*, these two words being used to signify persons who stood to one another in the relation of master and manumitted slave. The original idea of a patron apart from the manumitter of slaves continued to exist. A Roman citizen, desirous of a protector, might attach himself to a patron, whose client he thenceforward became; the patron was the guardian of his client's interest, public and private; as his legal adviser he vindicated his rights before the courts of law. The client was bound on various occasions to assist the patron with money, as by paying the costs of his suits, contributing to the marriage portions of his daughters, and defraying in part the expenses incurred in the discharge of public functions (see ROME). As the patron was in the habit of appearing in support of his clients in courts of justice, the word *patronus* acquired in course of time the signification of advocate or legal adviser and defender, the client being the party defended. *Patron* in after times became a common designation of every protector or powerful promoter of the interests of another; and the saints who were believed to watch over the interests of particular persons, places, trades, &c. acquired in the middle ages the designation of their patron saints.

The term *Patron* has also been applied to those who endowed or supported churches and convents. The question of ecclesiastical patronage, or the right of the patron to present to livings, is dealt with in ADVOWSON, FREE CHURCH, INVESTITURE, SCOTLAND (CHURCH OF), STATE CHURCH.

Patterson-Bonaparte. See BONAPARTE.

Patteson, JOHN COLERIDGE, was born in London on 1st April 1827, the son of Sir John Patteson, judge in the King's Bench, and of a niece of Coleridge the poet. Educated at Eton and Balliol, he sailed in 1855 with Bishop Selwyn of New Zealand. The next sixteen years he spent in the New Hebrides, Banks, Solomon, and Loyalty Islands; and in 1861 he was consecrated Bishop of Melanesia. Greatly beloved by the islanders, whom he protected to his utmost against white kidnappers, he was killed by the natives of Nukapu, one of the Santa Cruz group, on 20th September 1871, it is believed in revenge for kidnapped relatives. See *Life* by Miss Yonge (2 vols. 1874).

Patti, ADELINA, prima-donna, was born at Madrid, 19th February 1843, the daughter of a Sicilian tenor and the 'Signora Barilli.' At seven she sang 'Casta Diva' in Tripler Hall, New York; and in the same city she made her operatic debut as 'Lucia' in 1859. In London she first appeared in 1861 as 'Amina' in *La Sonnambula*, when her success was as splendid as it had been in America, and as it was wherever she sang. Her voice was an unusually high soprano, reaching to F in alt, of rich bell-like tone and remarkable evenness; to these qualities she added purity of style and the highest artistic finish. Equally at home in the tenderness of deep passion and the sprightly vivacity of comedy, she also sang splendidly in oratorio. She married in 1866 the Marquis de Caux (divorced in 1885), in 1886 the tenor Ernesto Nicolini (who died in 1898), and in 1899 the Baron Rolf Cederström. She lived at Craig-y-Nos Castle, near Swansea, and was naturalised in 1898. She

died 27th September 1919. See *Life* by Klein (1920).—Her elder sister, CARLOTTA, born at Florence in 1840, was likewise a very fine vocalist, though a slight lameness prevented her from appearing much in opera. She made her début at New York as a concert-singer in 1861, married in 1879 the 'cellist Ernst de Munck, and died at Paris, 28th June 1889.

Pattison, MARK, scholar, was born in 1813 at Hornby in Yorkshire, but brought up mostly at Hauxwell, of which parish his father had become rector. The eldest of twelve children, of whom ten were daughters, he grew up amid the Yorkshire moors, with a close knowledge of nature and a love for field-sports, which in the one form of fishing lingered with him till the last. He was educated at home until he entered Oriel College at Oxford in 1832. A shy and awkward lad, diffident and hesitating, without the wholesome discipline of public school life, he suffered much in his first years as an undergraduate, but his sufferings were the fruit of his own lack of self-reliance, his morbid self-consciousness, and hyper-sensitiveness of temperament. He took his bachelor's degree in 1836 with a second-class in classics, and was elected Fellow of Lincoln College in 1839. Under the dominant influence of Newman he gave himself first to the study of theology, twice (1841-42) carried off the Denyer prize, wrote two *Lives of the Saints*, translated for the 'Library of the Fathers' the Matthew in the *Catena Aurea* of Aquinas, and almost followed his master into the fold of Rome, being saved only, as he himself explains, by his habits of study and a constitutional slowness to act. Fortunately we have his own account of his spiritual growth, out of the Puritanism of his home into the wider atmosphere of Anglicanism, and how that in its turn fell from him as the larger horizon of the Catholic Church opened itself up before his eyes, only to disappear before 'the highest development, when all religions appear in their historical light as efforts of the human spirit to come to an understanding with that Unseen Power whose presence it feels, but whose motives are a riddle.' His reaction from Newmanism reawakened within him all his zeal for pure scholarship, and, no less lofty in his ideal of the teacher than the student, he soon became a tutor of altogether exceptional devotion and influence, and acting head of the college as sub-rector, under the aged Dr Radford. On the death of the latter in 1851 Pattison was kept out of the headship which was his right by a discreditable obscurantist intrigue, which gave an almost paralysing blow to his sensitive nature. A further unsuccessful attempt was made to deprive him of his fellowship on the technical plea that he had not proceeded in time to the degree of B.D., and the result of his disappointment was that for ten years he took little real interest in the life of Oxford, while his ideas of university reform henceforth grew rather towards an increase of the professorial than the tutorial system. But his educational sympathies soon extended far beyond mere college life; he published an article on education in the *Oxford Essays*, acted as assistant-commissioner on the Duke of Newcastle's Commission of Inquiry into Elementary Education in Germany, rambled in the long vacations through England, Scotland, and Germany, visiting most of the universities of the latter country, and served for three months of 1858 as *Times* correspondent at Berlin. Meanwhile he gave himself with rare devotion to severe and unbroken study, and scholars soon came to recognise his Roman hand in the columns of the *Quarterly*, the *Westminster*, and the *Saturday Review*. His luminous and thoughtful *Report on Elementary Education in Protestant*

Germany appeared in 1859; his equally learned and temperate paper on 'Tendencies of Religious Thought in England, 1688-1750,' in *Essays and Reviews* (1860). At length in 1861 he was elected Rector, but, though he made an exemplary head, the spring and elasticity of earlier days were gone. In 1862 he married the accomplished Emilia Frances Strong, afterwards Lady Dilke, who helped him to make Lincoln a social and intellectual centre for a world much wider than the walls of Oxford. Down to his last illness and his death at Harrogate, 30th July 1884, he lived wholly for study, maintaining a mediæval rather than modern ideal of the life of the scholar as a sufficient end in itself.

Everything Mark Pattison wrote was characteristic; nowhere else among contemporaries could be found such fullness of knowledge and earnestness of thought, shaped ever into terse and vigorous English. Yet his standard of perfection was so high that his actual achievement is far more suggestive than demonstrative of his powers, and the greatest project of his life—the study of Scaliger—remains a fragment, printed by Professor Nettleship in vol. i. of Pattison's collected *Essays* (1889).

Besides the books already named he published *Suggestions on Academical Organisation* (1868); admirably annotated editions of Pope's *Essay on Man* (1869) and *Satires and Epistles* (1872); *Isaac Casaubon, 1559-1614* (1875), which grew out of his Scaliger studies; *Milton*, almost the best book in the 'English Men of Letters' series (1879); the *Sonnets of Milton* (1883); and *Sermons* (1885). His posthumous *Memoirs* (1885) was a strikingly frank judgment of himself and others—even his own father—and a remarkable revelation of a singular moral and intellectual personality, describing, 'without restraint, the whole current of his thoughts and feelings from 1832 to 1860.'

DORA WYNDLOW PATTISON, his sister, was born at Hauxwell, January 16, 1832, the youngest but one of her father's family. She grew up amid her native Yorkshire moors a handsome and healthy girl of remarkable humour, spirit, and vigour, and had her young enthusiasm kindled by the heroic devotion of Florence Nightingale. In October 1861, against the advice of all her family, she started a life of labour for others as schoolmistress at Little Woolston, near Bletchley, and in the autumn of 1864 joined the sisterhood of the Good Samaritans at Coatham, near Redcar. Here 'Sister Dora' underwent severe discipline, but found solace in devoted labours as a nurse, first at North Ormesby, near Middlesborough, and in 1865 at Walsall. Ere long she gave herself entirely to hospital work, and her absolute self-forgetfulness, patience, gentleness, and skill quickly brought her the adoration of the saint from the rough men and women for whom she spent her strength. In 1874 she left the Good Samaritan Community, and in 1877 took charge of the municipal epidemic hospital at Walsall, where the cases were mainly of smallpox. She also found time for exertions on behalf of unfortunate women, and did much for her poor neighbours in every way. But even her strength at last gave way, and she died a true martyr for Christ's sake at Walsall, December 24, 1878. The whole population of the town followed her body to the grave, and the working-men erected a monument to her memory in 1886.

See *Sister Dora: A Biography*, by Margaret Lonsdale (1880)—which Mark Pattison, with a characteristic touch, terms 'Miss Lonsdale's romance'; Tollemache's *Recollections of Pattison* (1895).

Pau, the chief town of the French department of Basses-Pyrénées, on the right bank of the Gave-de-Pau, 66 miles by rail ESE. of Bayonne and 143 SSE. of Bordeaux. It occupies a rocky height,

623 feet above sea-level, and commands towards the south most magnificent views of the serrated Pyrenees; indeed, for mountain scenery its situation is surpassed by no other town in France. The ancient capital of the kingdom of Béarn and French Navarre, it has a noble five-towered castle, rising to a height of 110 feet. Rebuilt about 1363 by Gaston Phoebus, Comte de Foix, and restored by Louis-Philippe and Napoleon III., this castle was the birthplace of Henri IV., as also of his mother Jeanne d'Albret; and Abd-el-Kader was a prisoner here in 1848. Bernadotte was likewise a native of Pau, which, beyond a statue of King Henri (1843), has nothing else calling for notice. Linen and chocolate are its chief manufactures; and in the vicinity Jurançon wine (good but strong) is grown, and many swine are fed, whose pork supplies the famous 'Jambons de Bayonne.' Pau is a great English resort, especially during the winter season (October to May), and is famous for its golf-links. Pop. (1872) 25,607; (1886) 28,864; (1921) 35,665.

Pauillac, a port on the left bank of the estuary of the Gironde in France, 30 miles N. by W. of Bordeaux, ships the best brands of Médoc (claret) to Bordeaux. Pop. 6000.

Paul, a Cornish town, 2½ miles SSW. of Penzance. Its ancient church is recorded as having been burnt by the Spaniards in 1595. Pop. 5400.

Paul. It is probable that no man ever swayed the religious opinions and destinies of mankind so powerfully as Paul of Tarsus, the Apostle of the Gentiles. He was greater than some of the greatest servants of Christ in many single capacities; a greater preacher than Chrysostom, a greater missionary than St Francis Xavier, a greater theologian than St Thomas of Aquinum, a greater reformer than Luther, a greater organiser than St Gregory the Great. Collectively he exercised over the world a mightier influence not only than all of these put together, but even than his fellow apostles St Peter and St John. The secrets of his unparalleled success were—regarded on their human side—the secrets of all success in the field of religious effort—burning zeal, absolute self-sacrifice, undaunted courage, and a strong conviction that he was fulfilling a ministry to which he had received a special call from God.

Our chief and all but exclusive authorities for his life are the Acts of the Apostles and his own epistles. The few particulars added by Christian tradition are highly dubious, and the calumnious inventions of Talmudic malice and Ebionite heresy may be dismissed with silent contempt. Paley in his *Horæ Paulinæ* has shown with wonderful skill and originality how remarkably the credibility of St Luke's history is supported by authentic touches of autobiography, even in cases where there is a seeming and superficial discrepancy. He shows us that even the undesigned coincidences can be counted by scores. From combination of the two sources we are able to arrive at a true picture and estimate, though both are entirely fragmentary. The life of St Paul is like a manuscript of which the beginning and end are irrecoverably lost. All that we really know of his life lies in the thirty years between 36 A.D. and 66 A.D., which form its central period. We can only form slight and uncertain conjectures respecting Paul's childhood, youth, and early manhood, and respecting all that befell him after St Luke drops the curtain upon his first Roman imprisonment with the words, 'teaching with all boldness unmolestedly. But even in this central period the records are quite fragmentary. In 2 Cor. xi. 24-33, written about 57 A.D., some ten years before his death, St Paul briefly alludes to the strange and severe diversity of his trials; and yet of those which he mentions

no less than eleven specific trials are not so much as alluded to in the Acts. St Luke does not mention one of the five scourgings with Jewish thongs; only one of the three flagellations with Roman rods; not one of the three shipwrecks, though he minutely describes a fourth. He makes no allusion to the 'night and day in the deep,' and only mentions two of what Clement of Rome tells us were seven imprisonments. Nor, again, does St Luke refer to any one of the perils of watercourses, perils of robbers, perils in the wilderness, perils among false brethren, hunger, thirst, fasting, cold, and nakedness, for which we can only find places in the travels of the apostle by reproducing in imagination the character of the countries through which he made his long and toilsome journeys.

St Jerome, perhaps following a true but confused and anachronistic tradition, says that St Paul was born at Giscala in Galilee, and taken by his parents to Tarsus of Cilicia in early infancy. The conjectural date of his birth is about 3 A.D. Tarsus was at that time 'no mean city.' It was beautifully situated on the river Cydnus, and was a centre not only of political power and commercial enterprise, but also of learning and philosophy. He grew up in the midst of paganism, but was trained 'a Hebrew of the Hebrews,' in profound acquaintance with the Jewish Scriptures, and with some slight knowledge of classical literature. Being of the tribe of Benjamin, he received the famous tribal name of Saul. Tarsus was only an *urbs libera*, but in some unknown way St Paul was a Roman citizen, and it has been conjectured that his father may have been one of the Tarsians carried by Cassius to Rome, and may there have obtained the *civitas*. He was sent, probably as a boy, to relatives at Jerusalem, where in after days he seems to have had a married sister. He there became an illustrious and learned Pharisee of the famous school of the Rabban Gamaliel (q.v.), a grandson of the sweet and noble Hillel. At the feet of this eminent doctor he sat for many years, endeavouring to attain to the legal blamelessness which was the ideal of Pharisaic virtue, but which could give little satisfaction to his deepest yearnings. It was hardly wonderful that he should have imbibed the spirit of fanatical hatred against that new and immeasurable force of the gospel, which to a Pharisee seemed to involve the overthrow of all his most cherished idols and formalities. If, as he seems to imply, he had a vote in the Sanhedrin (Acts, xxvi. 10), he must have been married; and from the context of 1 Cor. vii. 8 it has been inferred that he was a widower, and remained a widower by choice (1 Cor. ix. 5). Gamaliel approved of the wise policy of toleration; but Saul, less wise herein than his teacher, was hurried by what he himself afterwards and remorsefully described as a spirit of frenzied rage (Acts, xxvi. 11) into the attitude of a most violent persecutor. He haled men and even women to prison, hunted them out for punishment through every synagogue, scourged them (Acts, xxii. 4), voted for their execution, and did his best to make them blasphemers. The persecution culminated in the martyrdom of St Stephen by stoning, and on this occasion the executioners laid their garments at the feet of Saul. Fanaticism enabled him to witness that horrible death, but he was haunted long years afterwards by the memory of the angel face (Acts, vi. 15), the light of which he had seen quenched in blood (Acts, vii. 58-60, xxii. 20; 1 Cor. xv. 9; Gal. i. 13).

When he had finished his bad work as an inquisitor at Jerusalem, and had, as he hoped, extirpated the odious sect of Nazarenes, he obtained letters of authorisation from the high-priest, and went as

commissioner of the Sanhedrin to root them out from Damascus. On his journey he met the crisis of his fate. He was, as he regarded it, arrested—apprehended by Christ, dashed to the ground, taken captive, led in triumph, branded as a slave with the stigmata of the Lord Jesus, when the dazzling vision, which outshone the Syrian noon, wrapped him as in a blinding sheet of flame, and filled him with the unalterable conviction that he had both seen and heard his risen Lord. From that moment he was a changed man. He felt that the fire of God had melted the iron sinews, and the hammer of God had shattered the stony heart. What is certain is that from that time forth the proud man became utterly humble, and the fierce persecutor a tender-hearted evangelist. The hard and self-sufficient Rabbi, abandoning for ever his national arrogance, his rabbinic wisdom, his legal scrupulosity, became thenceforth the suffering and despised preacher of an execrated faith.

It is needless to follow in detail the further narrative of the Acts or the personal indications of the epistles. Healed by Ananias of his temporary blindness, he retired for about three years to Arabia, and then returning to Damascus began powerfully to preach the gospel which he had heretofore toiled to destroy. Driven from Damascus by Jewish animosity, he contrived to escape down the city wall in a basket, and made his way to Jerusalem, where, as was natural, he was received with coldness and suspicion, until Barnabas generously intervened to remove the prejudices of the brethren. After a trance and vision in the temple, in which his future destiny was foreshadowed to him, he was driven to Tarsus by a plot to murder him, and there he stayed with his family, waiting and preparing for his work. Meanwhile the capital of Christianity was being gradually transferred from Jerusalem to Antioch, and Barnabas, realising the importance of the vast sphere of labour which was there opening before him, set out to seek Paul as his fellow-labourer. At Antioch he laboured for a year with ever-widening influence, and went to Jerusalem with Barnabas in the year 44 to carry contributions to the necessitous mother-church. Soon after his return began the first stirring of the missionary spirit, and Barnabas and Saul were set apart by divine consecration to preach Christ to the Jew first and afterwards to the Gentile. They set forth accompanied by Mark, who was the cousin (Col. iv. 10) of Barnabas, and sailed to Cyprus, where they converted the proconsul Sergius Paulus, and confounded the false prophet Elymas, by whom he had been duped. From that time Saul assumes the Gentile name of Paul. Thence they sailed to Perga, and travelled through the passes of the Taurus to the Pisidian Antioch. Driven from thence, and afterwards from Iconium, by the jealous fury of the Jews at the success of their preaching among the Gentiles, they went to Lystra, where, healing a cripple, they were at first taken for gods; but a revulsion of feeling against them was again caused by the Jews, and Paul was stoned and left for dead. It is probable that he carried with him to the grave the marks of this cruel martyrdom; but at Lystra he had the happiness of winning a young convert named Timotheus, the beloved son and companion of many later trials and travels, even to the end of his life. From Lystra they fled secretly to Derbe, and thence retraced their steps to Antioch, appointing in each place elders over the infant churches. Such was the first flight of the eagle, the first journey of Christian missionaries. It confirmed Paul in his destined work as the Apostle of the Gentiles.

Shortly after their return to the Syrian Antioch the church began to be troubled by the Pharisaic

converts, who wished to reduce Christianity to the level of a local faction by forcing on Gentile converts the crushing yoke of Jewish circumcision. It is difficult after the lapse of ages to estimate the daring courage and originality which it then required to pronounce obsolete and abrogated, and to characterise as 'weak and beggarly elements,' what all Jews regarded as the infinitely sacred and eternally inspired institutions of that Mosaic ceremonialism which had covered religion with the scurf of petty obligations indefinitely multiplied by tradition and the oral law. But Paul took this part boldly and decisively from the first and at all costs—willingly facing the obloquy heaped upon him as a renegade and a seducer of the people—he carried out to the end the indignant battle which saved Christianity from being degraded into a narrow sect and made it the universal religion of spiritual freedom. It was necessary for Paul and Barnabas to visit Jerusalem to obtain from the first church synod the decision of this great question, and the victory gained in that synod, mainly by the genius of St Paul aided by the manly convictions of St Peter, is the most momentous in the history of early Christianity. It was indeed only a partial victory in the form of a local decision; but it practically conceded the main point of issue, and enabled St Paul to enforce on reluctant Judaists the emancipation of their Gentile brethren from a host of worrying restrictions, which, if unabolished, would have been justly fatal to the spread of Christianity. How strained were the relations between the two divisions of the church we see from the fact that shortly afterwards at Antioch Paul had to rebuke even the chief of the apostles publicly for something like tergiversation, into which he had been led for a moment by fear of his Jewish co-religionists. This was never forgotten, and we see from the Pseudo-Clementine writings that perhaps a century later there were Judaising heretics who because of it dared to indulge in malignant calumnies against St Paul.

It was shortly after this memorable scene that St Paul's missionary ardour led him to propose to Barnabas another evangelistic journey. The wish of Barnabas to take with him his cousin Mark, and Paul's disinclination to admit the companionship of one who in his judgment had put his hand to the plough and looked back in the first journey, led to a sad disagreement between the two friends. This ended in a life-long separation, though much later Paul desired the presence of Mark at Rome because he found him profitable for the ministry. Paul, with Silas as his companion, went through the Cilician Gates to Derbe and Lystra. At Lystra he circumcised and ordained Timothy, who continued to be his dearest companion for many years. Thence they went through Phrygia and Galatia, preaching and founding churches. In Galatia Paul had a severe illness, in which he was cheered by the bright enthusiasm of his Galatian converts. Thence, by providential intimation, they were led to Troas, and there St Paul was joined by St Luke, and saw the vision of the 'man of Macedonia,' which led to the momentous decision to carry the gospel into Europe. They sailed to Neapolis, and were received at Philippi by the generous hospitality of Lydia. The church here founded was the most beloved by St Paul of all his infant communities. The healing of the girl with 'a spirit of divination' led to an uproar, in which Paul and Silas were unjustly and illegally scourged and imprisoned. An earthquake in the night alarmed the Philippian prætors, and the two prisoners, who had converted their gaoler, were honourably dismissed. They went to Thessalonica, and founded another church, where Paul, who was

generally able to support himself by his trade of tent-maker, was aided by the generous Philippians. Another riot, stirred up by Jewish jealousy, compelled their flight to Beroea, from which St Paul was again driven by Jewish machinations, and made his way to Athens. He preached on the Areopagus amid the jeers of Stoics and Epicureans, but won some important converts, and proceeded to Corinth. There, with the aid of his fellow tent-makers, Aquila and Priscilla, he founded an important church; but another riot arose in which both Jews and Greeks were involved, which was treated with disdainful indifference by the proconsul Gallio, the brother of Seneca.

After a stay of some months at Corinth, he revisited Jerusalem (his fourth visit), touching at Ephesus on the way. After saluting the church at Jerusalem he went back to Antioch, whence, after a period of rest, he started on his third great missionary journey. He confirmed the churches of Galatia and Phrygia, and then went to Ephesus, where he made a full convert of the eloquent Apollos, and stayed for two years. The immense success of his preaching led to the riot of the silver-smiths in the theatre. Compelled to fly, he made his way to Troas and retraced his steps through Macedonia as far as Illyricum, and thence to Corinth. It was during this period that he wrote his most important group of epistles. He was greatly occupied also in raising a contribution for the perennial destitution of the mother-church at Jerusalem, which was taken thither by chosen delegates of the contributing churches. A sudden plot of the Jews to murder him compelled him to return through Macedonia. He spent the Passover with Luke at Philippi, sailed to Troas, where he raised Eutychus from death, and then among the isles of Greece to Miletus, where he had an affecting parting with the elders of the Ephesian Church. A voyage past Coos, Rhodes, and Patara brought him to Tyre, where he was warmly welcomed by the church, and parted from them in prayer on the seashore. At Cæsarea he stayed in the house of Philip the Evangelist, and thence, in spite of the warnings of the prophet Agabus, went up to Jerusalem for his fifth visit. He was the guest of Mnason of Cyprus, and was received by James, the Lord's brother, and the elders, to whom he handed over the Gentile contributions, in accordance with the old instructions of the synod of Jerusalem, 'to be mindful of the poor.' Afraid that his presence in the Holy City might arouse tumults among the Jewish fanatics, St James suggested to him that he should take a share in the expenses of a Nazarite vow. The suggestion turned out unfortunately. He was recognised in the Court of the Women, and charged with having taken Trophimus, a Gentile Ephesian, into the temple. He was rescued from the brutal fury of the mob by the chief captain Lysias, who, taking him for an impostor, was on the point of having him scourged, when he discovered that he was a Roman citizen. Under the protection of the Romans he was tried before the Sanhedrin, but threw the assembly into a tumult by taking advantage of the rivalry between the Pharisees and Sadducees. Amid these perils a vision assured him that he should yet preach the word in Rome. Discovering that forty Jews had bound themselves under a curse to assassinate Paul, Lysias sent him to the procurator Felix at Cæsarea. He was tried before Felix, and made a deep impression; but, as he had no money to bribe the avaricious governor, he was left two years in prison. He was then tried afresh by the fair and energetic Festus, who also gave him an opportunity of pleading his cause before King Agrippa II. and Berenice. Weary, however, with the long and unjust detention, he had appealed to Cæsar, and

Festus sent him, in charge of the centurion Julius, to Rome. St Luke, who, with Aristarchus, was his companion, gives us a minute account of the voyage to Myra, and thence in an Alexandrian wheat-ship to Crete, where they lay windbound at Fair Havens. Continuing the voyage in spite of Paul's warning, the crew were caught in a cyclone called Euro-aquilo, and the ship, in spite of undergirding and every other precaution, became a complete wreck. Amid the despair and misery of all on board, St Paul, comforted by a vision, assured them of their safety, and though the vessel finally became a total wreck at Ras el Koura, in Malta, every life was saved. At Malta he waited three months for another ship. He was held in great honour by the barbarous natives because he had shaken a viper off his hand unhurt, and healed the father of Publius, the Protos of Malta. The prisoners were taken to Italy on board the *Castor and Pollux*, and landed at Puteoli, proceeding by land to Rome. Paul was met by Christian brethren at Appii Forum and the Three Taverns, and went along the Appian Road to the capital, where he was handed over to the *observatio* of Afranius Burrus, the prætorian prefect. For two years he continued a prisoner at Rome, and, as the Jews refused to accept his preaching, he did what he could to make the gospel known to the Gentiles, gaining converts even among the prætorian soldiers and the slaves of Cæsar's household, and being suffered to live in his own hired apartment, under the supervision of the soldiers. From the pastoral epistles we securely infer that his trial ended in a complete acquittal. His next movements are uncertain, but we find traces of his probable visits to Colossæ, Crete, and Nicopolis, and of his final arrest in the house of Carpus at Troas. He seems to have been tried and imprisoned at Ephesus, and again sent to Rome. Meanwhile the Neronian persecution had broken out, and his second imprisonment, in which nearly all deserted him, was far more imperilled and miserable than the first.

At his first trial—perhaps before Nero in person—he seems to have been remanded; but at a second trial we learn from unanimous Christian tradition that he was condemned to martyrdom, probably, as he was a Roman citizen, by decapitation. His 'trophy,' or martyr's memorial, was a familiar object in Rome in the 2d century, but his death was so lonely and unrecorded that not even tradition has preserved a single trustworthy detail respecting it. All that we can see from his last writings is that he remained heroic, indomitable, cheerful, faithful to the end, never doubting, amid an apparent failure which the world might well have regarded as absolute, that the hundredfold harvest of eternity would spring up from the grain which he had sown in tears. Yet it is unlikely that even he, on this side the grave, was at all able to estimate the far-reaching grandeur and many-sidedness of the work which it had been given him to do. He had set an example of lifelong zeal and devotion in the willing endurance of numberless perils and privations, such as has never been equalled, much less surpassed; and he had done this with a mind acutely sensitive to the blasts of hatred which came to him from every region of the Jewish and Gentile world, and with a body weakened by chronic disease. He had formulated the language and systematised the doctrines of theology. He had saved the gospel from dwindling into a Pharisaic Judaism, and had established for ever its freedom from the yoke of priestly and ceremonial bondage. He had carried the faith over a vast extent of Asia from Jerusalem to Antioch, to Ephesus, to Macedonia, to Athens and Corinth, to Rome, and perhaps even 'to the farthest limit of the west.' He had been the founder

of many flourishing churches. He had written epistles of various orders, of which even the most casual is 'weighty and powerful,' and which constitute him one of the greatest moral and spiritual teachers whom the human race has ever seen.

It only remains to glance at these epistles. They are thirteen in number, and fall into four well-marked chronological and doctrinal groups. The first group (1, 2 Thess., written 52-53 A.D., during the second missionary journey) are mainly eschatological, and represent St Paul's earliest stage of thought. The second group, written during the third missionary journey, may be called broadly epistles of Judaic controversy. 1 Corinthians (written at Ephesus in 57) is mainly polemical and ecclesiastical. 2 Corinthians (written at Philippi in 58?) is the apostle's *Apologia pro Vita Sud.* Galatians and Romans (written at Corinth in 58) are mainly doctrinal and soteriological. The third group are the epistles written during St Paul's first imprisonment at Rome. Philippians (62) is personal and ethical. Colossians and Ephesians (63) are Christological, Ephesians being especially the epistle of the ascension. Philemon is an exquisite personal epistle, the first charter of emancipation, and was written (63) as a sort of annex to the Epistle to the Colossians. The fourth group contains the pastoral epistles of St Paul's closing years. 1 Timothy and Titus may have been written in Macedonia about 66, 2 Tim. about 67 in Rome.

They may also be classified according to their forms, as (1) Circular letters to the churches (Eph. and Romans), which are rather treatises than letters; (2) Letters to special churches, or little groups of churches (1 and 2 Thess., 1 and 2 Cor., Philippians, Col., and Gal.); (3) Letters to friends (Philemon, Titus, 1 and 2 Tim.).

The genuineness of some of these epistles has been fiercely contested. Four (1 and 2 Cor., Gal., and Romans) are absolute *homologoumena*, of which not even the school of Tübingen questioned the genuineness; but they regarded 1 and 2 Thess., Philippians, Ephesians, Colossians, and Philemon as *antilegomena*, of uncertain authenticity, and the three pastoral epistles as spurious. The Christian church has amply met the arguments against the authenticity of all the epistles, and even Renan only rejects the pastoral epistles, and that mainly on historic and chronological grounds, because with many others he holds that St Paul perished in the Neronian persecution in 64 A.D.

The mission of St Paul was fourfold. Had he done nothing more than set the world an example of saintly self-sacrifice, his work would have been sufficiently memorable to make him immortal; but besides this he was a missionary, a moralist, a reformer, and a theologian.

(1) Of his missionary work we have spoken, and have shown that to him pre-eminently belongs the honour of having made known the gospel to the civilised world around the basin of the Mediterranean; so that before his death the Christians had grown from a little community of 120 Galileans in an upper room at Jerusalem into a number of flourishing Asiatic and European churches, and even in that early day Christ had His followers in the Prætorian camp at Rome, and in Cæsar's household.

(2) As a moralist St Paul laid down, with incomparable clearness, the relations of ethics to the gospel, and the secret of the loftiest moral standard as rendered possible by the new life. No moralist before him had more distinctly illustrated the eternal principles taught by Christ, by showing their bearing on the simplest concrete duties of life. To take but one example—no moralist ever dealt with the duty of purity, so universally

ignored in the ancient civilisations, with such unrivalled delicacy yet with such absolute precision. By insisting on the new truth, 'Know ye not that your bodies are the temples of the Holy Ghost, who dwelleth in you?' he placed chastity on a wholly new basis, and contributed indefinite force and meaning to Christ's elucidation of the duties implied in the seventh commandment as extending even to the thoughts of the heart.

(3) As a reformer St Paul not only relieved the world from that yoke of petty Levitic observances which even St Peter pronounced to have been intolerable, but he emancipated all true religion from the burden of external Pharisaic restrictions, from all oral laws and traditions of the elders, and ecclesiastical tyrannies of ceremonialism, and all terror of humanly-invented sins. He was the divinely-appointed champion of the principle 'Ye shall know the truth, and the truth shall make you free.' This is the keynote of one of his most important epistles—that to the Galatians—in which he alludes no less than eleven times to the privilege and duty of 'standing fast in the liberty wherewith Christ hath made us free' (Gal. ii. 4; iii. 28; iv. 22, 23, 26, 30, 31; v. 1, 13). Hence this epistle powerfully swayed Wyclif, Huss, Savonarola, Luther, Tyndale, Wesley, and all great religious reformers. The truths which Luther learned from it became in his hands the instrument for the deliverance of the church from the tyranny of Rome. 'The Epistle to the Galatians,' he said, 'is my epistle. I have betrothed myself to it. It is my wife.' Bengel calls this epistle 'the sum and marrow of Christianity,' and says of v. 1-6 'in these stands all Christianity.'

(4) In the Epistle to the Galatians we also find the germ of that great doctrinal system which makes St Paul the chief founder of Christian theology. In the doctrinal section of the epistle (iii. 1-iv. 30) he had proved the doctrine of our justification by faith. He had shown that justification is not attainable by outward ordinances. His proofs had been drawn from the Christian consciousness (iii. 1-5), from the Old Testament (iii. 6-18), and by establishing the secondary position of the law both objectively (iii. 19-29) and subjectively (iv. 1-18). In the Epistle to the Romans, which was probably a circular treatise, sent round with different appendices of personal greetings to various churches, the theme of justification is more systematically worked out. The keynote of that epistle is the recurrent word *all*, as illustrative of the spiritual universality of the gospel to meet the universality of man's need for the gospel. In this epistle the four main positions are (1) all are guilty before God; (2) all need a saviour; (3) Christ died for all; (4) we are all one body in Him. In Adam all are equally guilty (i. 18-iii. 20), in Christ all are equally redeemed (iii. 21-30). The grand fundamental theme of the epistle is given in Rom. i. 16, 17. It is stated not as a *doctrine* of sin, or a *theory* of imputations, or a theological shibboleth, but as a momentous practical truth. The elements of that great summary are (1) justification; the righteousness of God imputed to man; (2) faith; man's belief, rising first to self-surrender, then to mystic union with Christ, which becomes the germ of a new life in the heart; (3) this plan of salvation by free grace is offered gratuitously to all; (4) the object of this faith is Jesus Christ, whose life and death are for man a ransom and a propitiation; (5) Christ's sacrifice was necessary as a vindication of God's righteousness in the premission of past sins; (6) the end to be obtained was that God might justify every man whose root of life is faith in Christ.

St Paul dwelt therefore on three cardinal points—the Grace of God, the Redemption of Christ,

the Faith of Man. Luther rediscovered this truth theoretically by reading the epistles to the Romans and Galatians in the library of his monastery at Erfurt, experimentally by the facts of his own religious life. Wesley learned it, partly from the Moravians, and partly from Luther's commentary on the Galatians, after his return from Georgia. But this cardinal doctrine of justification by faith is ignorantly misunderstood and perilously misinterpreted when faith is confused with mere belief. Hooker (*Eccles. Pol.* I. xi. 6) long ago corrected this error; and of recent critics, both Baur (*Paul*, ii. 149) and Pfeiderer (*Paulinismus*, sect. 5) have given the true meaning of St Paul. Baur shows how faith, beginning in hearing, and becoming faith in *Christ* (Gal. ii. 16, iii. 26), and more especially in *Christ's blood* (i.e. the communication to man of His essential life, Rom. iii. 24-27), becomes more intense as it narrows from stage to stage, and passes from theoretic consent to dominant conviction. Pfeiderer shows that there are ascending degrees and qualities of faith, passing from *dead* faith, which produces no works, and theoretic persuasion, then into faithfulness and moral surrender, and then into *mystic union with Christ*, which does not remain receptive, but becomes the spirit of life—a living power and impulse (1 Cor. vi. 17), so that, in its true sense, as Luther says, 'Faith is a divine work in us, which changes us and creates us anew in God.' The modern sense of faith as a body of doctrines (the faith) may, in this connection, be left out of sight altogether, since the word is only thus used in the Pastoral Epistles.

(5) But complete as is St Paul's statement of this central doctrine, which he characterised as *his* gospel (Rom. ii. 16, xvi. 25; Gal. i. 7, ii. 2; 2 Tim. ii. 8)—complete, that is, so far as we can give such a title to truths which touch, on every side, upon insoluble mysteries—we are thankful that the same essential truths are represented in a less controversial and more directly spiritual form in the epistles of the captivity—those especially to the Ephesians and Colossians. The mind of St Paul—as we see at once when we read his epistles in chronological order—was not only intensely susceptible to surrounding conditions of life and controversy, but was also one which was constantly in a state of growth and progress. The theodicy which he had been led to formulate in the 'storm and stress' of Judaic controversy assumed larger, richer, less rigid and antagonistic forms when he had to wean the infant church from the dangerous glamour of incipient Gnostic heresies. Olshausen calls the epistles to the Romans and Galatians soteriological—i.e. they contain, so to speak, the philosophy of the plan of salvation; and the epistles to the Colossians and Ephesians Christological—i.e. they insist on the immediate relation of the soul and of the church to Christ. The epistles are closely connected, though that to the Colossians is less exquisite and gracious than that to the Ephesians, which may well be called the Epistle of the Ascension, the Epistle of 'the heavenlies.' The idea of the Epistle to the Colossians is 'Christ all in all,' and its moral is summed up in the words 'Walk in Him, in Him alone.' The idea of the Epistle to the Ephesians is Christ in the universal church. In the Epistle to the Romans the doctrine of salvation is set forth psychologically. It is built on the moral facts of the universality of sin, the insufficiency of man, the justification of the believer by union with Christ. In the later epistles the statement of the doctrine is theologic. Christ is set forth as the central being of the universe, and we see God's eternal plans realised by the unity of redeemed humanity in Christ with the family of heaven in the heavenlies.

Round these central truths all the other views of St Paul are crystallised. The fierce disputes in which rival dogmatists—St Augustine and Pelagius, the Jesuits and Jansenists, the Calvinists and Arminians, and many others—have combated over his opinions arise from the futile attempt to systematise exorbitant inferences drawn from isolated phrases, to build upon their apexes inverted pyramids of argument, to obscure the whole heaven of Christianity with smoke made to issue 'from the narrow aperture of single texts.' Such attempts must always fail. St Paul's letters were *écrits de circonstance*; they were fragmentary; they were the outcome of the special conditions with which they immediately dealt. St Paul 'never recoils before a paradox; he never cares to remove an apparent contradiction; he knew that truths which apparently contradict others are often complementary truths; he leaves side by side the apparent antinomies which arise from the contact of finite reason with infinite truth. He was well aware that when reason steps beyond the limits of experience it comes into collision with mysteries not only insoluble, but apparently opposite to each other.'

The preceding statement represents the orthodox Protestant view.

The literature bearing on St Paul is vast in extent; the following are merely the names of some of the more important books: (1) LIFE.—K. Schrader, *Der Apostel Paulus* (1830-36); Neander, *Gesch. der Pflanzung u. Leitung der christl. Kirche durch die Apostel* (vol. i. 1832; Eng. trans. 1851); F. C. Baur, *Paulus der Apostel Jesu Christi* (1845; 2d ed. by Zeller, 1866; Eng. trans. 1873-75); A. Hausrath, *Der Apostel Paulus* (1865; 2d ed. 1872); Ch. F. Trip, *Paulus nach der Apostelgeschichte* (1866); Renan, *Les Apôtres* (1866) and *Saint Paul* (1869); F. Bunge, *S. Paul, sa Vie, son Œuvre, ses Épîtres* (1867); M. Krenkel, *Paulus, der Apostel der Heiden* (1869); W. J. Conybeare and J. S. Howson, *The Life and Epistles of St Paul* (1852); F. W. Farrar, *The Life and Work of St Paul* (1879); Lewin, *The Life and Epistles of St Paul* (1851; new ed. 1874); and works by Stalker, Sir W. M. Ramsay, Bousset, Weinel, Wrede, Wernle, Cone (1898), Clemen (1904).

(2) THEOLOGY.—Ritschl, *Die Entstehung der altkatholischen Kirche* (2d ed. 1857); A. Sabatier, *L'Apôtre Paul* (1870; 2d ed. 1881); K. Holsten, *Zum Evangelium des Paulus u. Petrus* (1868), and *Das Evangelium des Paulus dargestellt* (1880 et seq.); R. Schmidt, *Die Paulinische Christologie* (1870); O. Pfeiderer, *Der Paulinismus* (1873; 2d ed. 1890; Eng. trans. 1877), and *Hibbert Lectures* (1885); Ernesti, *Die Ethik des Apostels Paulus* (1868; 3d ed. 1880); J. H. Scholten, *Das Paulinische Evangelium* (1881); A. B. Bruce, *St Paul's Conception of Christianity* (1894); G. B. Stevens, *The Pauline Theology* (1892); Garvie, *Studies of St Paul and his Gospel* (1912); W. Morgan, *The Religion and Theology of Paul* (1918); T. R. Glover, *Paul of Tarsus* (1925); also the general works on the theology of the New Testament by Schmid, Baur, Weiss, Oosterzee, and others.

The Tübingen theory of the sharp difference between the Pauline and Petrine parties was maintained by Baur (q.v.), Holsten, Zeller, and Scholten. Many modern expositors lay great stress on the apostle's confident (eschatological) expectations of the immediate second coming of Christ; Prof. Percy Gardner (*The Religious Experiences of St Paul*, 1911), and Prof. Kirsopp Lake (*The Earlier Epistles of St Paul*, 1911) are more concerned with the influence of the Greek mysteries on St Paul's doctrine of sacraments, and on St Paul's disciples.

At the beginning of the Christian era, the deities, whose worship was a power amongst the middle and lower classes of the empire were not the official gods of Rome or of Greek poetry, but those of the 'mystery' religions of Eastern origin now wide spread in the empire, deities like Mithras, Cybele, and Isis. The mystery religions widely differing in detail, agreed in holding out the offer of happiness in this world and salvation in the next to all who by initiation into their sacraments joined in the risen life of a Redeemer God, and thus secured a knowledge of the great secret which would guard the initiated when he passed through the gate of death, and bring him safe to the eternal life on which his faith was fixed.

Paul's Greek hearers would from his doctrine of the significance of Christ's death inevitably equate the Lord he preached with the Redeemer Gods of the mystery religions. Albert Schweitzer in *Paul and his Interpreters* denies *in toto* Pfleiderer's contention that Pauline teaching was a blend of the Old Testament with Hellenism: there is, he says, no Hellenism in Paul. He knew Greek and used the Septuagint, but cared nothing for the phraseology, the problems, the ethics of Hellenism. Schweitzer dismisses with great disrespect the views of Loman, Steck, and Van Manen, who refuse to acknowledge the Pauline authorship of any single epistle in the New Testament, because of the Hellenism that mark them. Schweitzer denies with equal energy the influence of the 'mystery-religions' on Paul; in the form in which we know them they are later than his time. There is a large element of mysticism in Paul, but it comes from Judaism, and in the shape it took before it became Rabbinitism and before it had been deeply affected, as it ultimately was, by the Oriental religions. Paul was the child of Jewish apocalyptic; his teaching is in line with the Jewish Son of Man Messiah. Paul's eschatology, like that of the Apocalypses of Ezra and Baruch, seems to represent a movement of Rabbinitism of which otherwise we have no record. Deissmann's *St Paul* (1912) insists that Paul should be treated as a religious, not as a theological genius, and that a key-note of his teaching is mysticism centred in Christ (the phrase 'in Christ' occurring 174 times in Paul's epistles). See also the relevant parts of the *Introductions* of Bleek, Weiss, S. Davidson, Salmon, Holtzmann, &c.; and especially the works devoted to the *Acts*; also McGiffert, *The Apostolic Age* (1897), and Weizsäcker, *Das apostol. Zeitalter der christl. Kirche* (1886). See also the countless Commentaries on the individual epistles of St Paul, the names of which will be found under the special articles thereon. Of these may here merely be mentioned, as masterpieces in their kind, those of Godet on *Romans* and *Corinthians*, and Lightfoot on *Philippians*, *Galatians*, *Colossians*, and *Philemon*.

Noteworthy articles on St Paul are those in the Hauck-Herzog *Realencyklopädie*, the *Encyclopædia Biblica*; Hastings's *Dictionary of the Bible*, and *Dictionary of Christ and the Gospels*; the *Encyclopædia Britannica*; the *Catholic Encyclopædia*; and (for contrast) the *Jewish Encyclopædia*. See the article CHRISTIANITY in the present work, and the several articles on the epistles of St Paul and those credited to him; as also BIBLE, JESUS, LORD'S SUPPER.

Paul was the name of five popes. PAUL I. (757-767) and PAUL II. (1464-71) were unimportant. PAUL III., Alessandro Farnese, reigned from 1534 to 1549, during a very critical period for the papacy. He was born at Carino in Tuscany in 1468, and was created cardinal-deacon in 1493 by Alexander VI., who had illicit relations with his sister. He showed great powers of diplomacy, and on the death of Clement VII. in 1534 was elected pope. One of his first acts was to give cardinals' hats to two of his boy-grandsons, and throughout his reign he laboured to advance his sons; but his ambitious schemes to secure Parma and Piacenza to the debauched Pietro Luigi were at length frustrated. Yet in other respects he was a wise pontiff, and he had the prudence to surround his throne with good cardinals like Contarini, Pole, and Sadolet. He convoked a general council to meet at Mantua in 1542, but it did not actually assemble (in Trent) until 1545. The bull of excommunication and deposition which he issued in 1538 against Henry VIII. of England is a late example of the exercise of the temporal power claimed by the mediæval popes. The bull instituting the order of the Jesuits (1540) is important as marking the beginning of the Roman counter-reformation. In the contest of Charles V. with the Protestant League in Germany Paul sent a large force to support the emperor, and he opposed the pacification proposed by him upon the basis of the Interim. And in the struggle between the emperor and Francis I. he tried to trim in order to save the peace of Italy and the interests of his bastards. He died suddenly, November 10, 1549.

PAUL IV., named Giovanni Pietro Caraffa, a member of the noble family of that name, was born in Naples in 1476. His early career was distinguished for ascetic rigour. He was appointed Bishop of Chieti, in which see he laboured most earnestly for the reformation of abuses, and for the revival of religion and morality. With this view he established, in conjunction with several congenial reformers, the congregation of secular clergy called Theatines, and was himself the first superior. He showed himself the most rigorous enemy of heresy, and it was under his influence that Paul III. organised the tribunal of the Inquisition in Rome. On the death of Marcellus II. in 1555, although in his seventy-ninth year, he was elected to succeed. He enforced vigorously upon the clergy the observance of all the clerical duties, and enacted laws for the maintenance of public morality. He established a censorship, was the first to issue a full official *Index librorum prohibitorum*, and completed the organisation of the Roman Inquisition; he took measures for the alleviation of the burdens of the poorer classes, and for the better administration of justice, not sparing even his own nephews, whom he banished from Rome on account of their corrupt conduct and profligate life. His foreign relations, too, involved him in much labour and perplexity. He was embroiled with the Emperor Ferdinand, with Philip II. of Spain, with Cosmo, grand-duke of Tuscany. Under the weight of so many cares his strength gave way, and he died, August 18, 1559. His severity had been hateful to the Roman citizens, who hailed the news of his death with delight.

PAUL V., originally named Camillo Borghese, was born in Rome in 1552. In his early life he was a distinguished canonist and theologian; and, after the ordinary prelatical career at Rome, he rose first to the post of nuncio at the Spanish court, and afterwards to the cardinalate under Clement VIII. On the death of Leo XI. in 1605 Cardinal Borghese was elected to succeed him. His pontificate is rendered memorable by the celebrated conflict with the republic of Venice, into which he was plunged at the very outset of his reign. The original ground of dispute was the question of the immunity from the jurisdiction of civil tribunals conceded to the clergy, who claimed to be tried by ecclesiastical tribunals alone. This claim the senate resisted; and further causes of dispute were added by a mortmain law, and a law prohibiting the establishment of new religious orders or associations unless with the sanction of the senate. Each party remaining inflexible in its determination, Paul issued a brief, directing a sentence of excommunication against the doge and senate, and placing the republic under an interdict, unless submission should be made within twenty-four days. The senate persisted, and an animated conflict, as well of acts as of writings, ensued, in the latter of which the celebrated Fra Paolo Sarpi, on the side of the republic, and on the papal side Bellarmine and Baronius were the leaders. By the intervention of Henry IV. of France the dispute was accommodated in 1607, but not until the pope had been compelled to abandon his claims. Paul's administration was vigorous on behalf of orthodoxy, and he did a great deal for the promotion of useful public works, for the embellishment of the city, the restoration and preservation of antiquities, the improvement of the museums and libraries, and, above all, for the pious and charitable institutions of Rome. Paul died January 28, 1621, and was succeeded by Gregory XV. See T. A. Trollope's *Paul the Pope*, and *Paul the Friar* (1860).

Paul, emperor of Russia, the second son of the unfortunate Peter III. and the Empress Catharine II., was born October 2, 1754, became

heir-apparent on the death of his elder brother in 1763, and succeeded his mother on the imperial throne in 1796. The tragical death of his father when he was still a child, and his mother's neglect, exerted a baneful influence on the character of Paul, who was kept in seclusion while Catharine and her favourites governed. His earliest measures were the exile of his father's murderers, and the pardon of Polish prisoners, including Kosciusko. But he soon revealed his capricious and violent temper, as well as his lack of capacity, and irritated all classes of his subjects by vexatious and imperious regulations. Not less unhappy and variable was his foreign policy. After beginning with an attitude of neutrality in the war between France and the rest of Europe, he suddenly declared in favour of the allied powers, and sent an army of 56,000 men under Suvorov into Italy. Encouraged by his success, he despatched a second army of equal strength to co-operate with the Austrians, but its defeat in 1799 induced him to recall Suvorov; whereupon he retired from the allied coalition without giving any reason, quarrelled with England, and entered into a close alliance with the First Consul Bonaparte. Paul now concluded a convention with Sweden and Denmark for the purpose of opposing the right insisted on by England of searching neutral vessels, with the result that the English government sent a fleet into the Baltic under Nelson to dissolve the coalition, at the close of March 1801. He was about to help the Danes, when a conspiracy was formed against him at St Petersburg. Among the conspirators were Count Pahlen, General Bennigsen, and other distinguished officers, and their aim was originally only to compel Paul to abdicate; but a scuffle arose in which the emperor was strangled, 24th March 1801. See life by Waliszewski (trans. 1913).

Paul, CANONS OF ST. See BARNABITES.

Paul OF SAMOSATA, the Socinus of the 3d century, was born at Samosata on the Euphrates, capital of a district of Syria, and in 260 became bishop or patriarch of Antioch, the most important see of the East. Antioch then belonged to the Palmyrene kingdom, and Paul was practically the vicegerent of Queen Zenobia, from whom he received support in the maintenance of his heresy. This was monarchianism—the doctrine that Father, Son, and Holy Ghost are the one God, and that the Father has from all eternity produced the Logos, who is his Son, but is rather an attribute than a person. Antioch being recaptured by Aurelian in 272, Paul's enemies procured his deposition by the heathen emperor; but his doctrines survived, and he had followers, Paulianists or Samosatenians, till the 4th century.

Paul, VINCENT DE. See VINCENT DE PAUL.

Paula. See FRANCESCO DI PAULA.

Paulding, JAMES KIRKE, an American author, was born in Dutchess county, New York, August 22, 1779. Self-educated, he early showed a tendency to literature, and, being a friend of Washington Irving, wrote a portion of *Salmagundi*. During the war of 1812 he published the *Diverting History of John Bull and Brother Jonathan*; and in 1814 a more serious work, *The United States and England*, a defence against articles in the *Quarterly Review*. This gained him an appointment on the Board of Naval Commissioners. He still continued to write minor satires and humorous sketches, and in 1831 published the very successful novel, *The Dutchman's Fireside*, and in 1832 *Westward Ho!* which attained to a similar popularity. These were followed by a popularly written *Life of Washington* (1835), and *Slavery in the United States* (1836), in which the institution is defended on social, economical, and physiological grounds. In 1837

Van Buren appointed him Secretary of the Navy. Four years later he retired to a country residence at Hyde Park, New York state, where he died, April 6, 1860. The well-known patter lines, 'Peter Piper picked a peck of pickled peppers,' &c., occur in his satirical novel *Koningsmarke* (1823). Four vols. of his *Select Works* were edited by his son (New York, 1867-68).

Pauli, REINHOLD, a no less learned than genial historian of England, was born in Berlin, 25th May 1823, studied at Bonn, next paid a long visit for purposes of study to England and Scotland, spent the year 1848 at Oxford, and acted from 1849 till 1852 as private secretary to Bunsen. In 1855 he returned to Germany and habilitated at Bonn, whence he was called to a chair at Rostock in 1857. He obeyed a call to Tübingen in 1859, but during the war of 1866 he was punished by being sent to the little seminar at Schönthal for an article on the policy of Württemberg in the *Preussische Jahrbücher*. But he soon left this place, and was appointed to a chair at Marburg in 1867, at Göttingen in 1870. He died at Bremen, 3d June 1882. Pauli's life-long studies were devoted to English history. His excellent book on Alfred (1851; Eng. trans. 1852) induced Lappenberg to commit to him the task of continuing the *Geschichte von England* in the great series of Heeren and Uckert. Pauli's part (vols. 3-5, Gotha, 1853-58) begins with Henry II., and comes down to the accession of Henry VIII., and remains one of the best histories of mediæval England.

Paulicians, a heretical Eastern sect, who owe their name to their peculiar reverence for the apostle Paul and his writings; but they called themselves 'Christians' only. Their founder was Constantine of Mananalis, near Samosata, who founded his first congregation at Cibossa in Armenia about 660. He was put to death by the emperor's order in 687, his successor, Titus, in 690; whereupon the adherents of the sect fled to Episcari under the Armenian Paul as leader. Later heads were Sergius, who carried them from the persecutions of Leo the Armenian to Argæum in Saracen Armenia; Karbeas, who built the cities of Amara and Tephrica for the remnant saved from the Empress Theodora's merciless severity, and Chrysocheres, on whose defeat by an army of the Emperor Basil they were utterly crushed. In 970 some of their remnants were transferred by the Emperor John Tzimiskes to Philippopolis in Thrace; a century later great efforts were made for the conversion of these, and the new city of Alexiopolis was built opposite for the converts. The sect, called *Popelicans* by Villehardouin, continued to exist in Thrace into the 13th century. And it has been affirmed that remnants survived at Philippopolis and in Bulgaria into the 19th century. The Cathari (q.v.) and Bogomili (q.v.) were similar or related sects.

The only Scriptures which they accepted were the four Gospels, fourteen Epistles of Paul, the three Epistles of John, James, Jude, and an Epistle to the Laodiceans. They rejected the title of *Theotokos*, refusing all worship to the Virgin, as well as any reverence to the symbol of the cross, and even the outward administration of the Lord's Supper and baptism. Photius, Petrus Siculus, and others identified them erroneously as a branch of the Manichæans; and the statement heretofore accepted that they maintained, like the Manichæans, a dualistic system (the Evil Spirit being the ruler of the visible universe) is denied by Conybeare, who affirms them to have been simply Unitarians, holding Christ to have been one with the Holy Ghost, and a creature. Gieseler and Neander connected them with the Gnostic Marcionites.

See the Church Histories of Gieseler and Neander F. Schmidt, *Hist. Paulic. Orientalium* (Copen. 1836); Lombard, *Pauliciens, Bulgares, et Bons-hommes* (Geneva, 1879); Ter-Mikrttschian, *Die Paulicianer* (Leip. 1893); and F. C. Conybeare's translation of *The Key of Truth: the Manual of the Paulician Church of Armenia* (1898).

Paulinus, missionary to Northumbria, counted as first Archbishop of York, was a native of Rome. He was sent on his mission by Gregory in 601, and first laboured under Augustine in the evangelisation of Kent. By the third of Augustine's successors, Justin, fourth Archbishop of Canterbury, he was consecrated bishop in 625, when he accompanied Ethelburga on her marriage to the still heathen Edwin, king of Northumbria. For a long time he made no progress in his mission beyond baptising the infant princess; but at length a great gathering was held at Goodmanham, near York, to consider the matter, and in consequence Edwin and his court submitted to baptism at York, in a wooden chapel dedicated to St Peter, the foundation of the Minster, Easter Sunday 627. Paulinus now carried the gospel over Northumbria, but after six years' constant labour the death of Edwin in battle at Hatfield put a sudden end to his work. He did not wait for the honour of martyrdom, but went back with the widowed queen to Kent. In the year 634 he received the *pallium* as Archbishop of York from Rome, but he never returned, dying in 644. See Hunt's *English Church*, vol. i. (1899), and Plummer's *Bede* (1896).

Paulinus, St, of Nola (353-431), born at Bordeaux, was *consul suffectus* there, was baptised in 389, and, settling at Nola, lived an ascetic life, becoming bishop in 409. He left epistles, *Carmina*, and other poems.

Paulownia, a genus of trees belonging to the Scrophulariaceæ, natives of China and Formosa, *P. tomentosa*, naturalised in Italy, &c., and cultivated in Europe, America, and Japan, has large panicles of purplish flowers. It is the badge of the imperial family of Japan. See ORDERS OF KNIGHTHOOD.

Paul's, St. See LONDON, and for the school ST PAUL'S.

Paulsen, FRIEDRICH (1849-1908), born at Langenhorn in Sleswick, became in 1878 professor at Berlin. He accepted and developed the psychophysik of Fechner, and wrote largely on the theory and history of education, on the development of the Kantian system, as well as an introduction to philosophy and an excellent manual of ethics.

Paulus, ÆMILIUS. See ÆMILIUS, GREECE.

Paulus, HEINRICH EBERHARD GOTTLÖB, one of the pioneers of German rationalism, was born at Leonberg near Stuttgart in 1761, studied at Tübingen, travelled in England, Holland, and France, and was called in 1789 to the chair of Oriental Languages at Jena, which he exchanged in 1793 for that of Theology. There he produced his laborious but little read *Philologisch-kritischer und historischer Commentar über das Neue Testament* (4 vols. 1800-4); *Clavis über die Psalmen* (1791); *Clavis über den Jesaias* (1793). In 1803 he accepted the chair of Theology at Würzburg, next filled scholastic offices at Bamberg, Nürnberg, and Ansbach, and in 1811 the chair of Church History at Heidelberg. There he died, 10th August 1851. Of his numerous works the most important were his *Leben Jesu, als Grundlage einer reinen Geschichte des Urchristenthums* (2 vols. 1828), and *Exegetisches Handbuch über die drei ersten Evangelien* (3 vols. 1830-33). His chief critical principle is an assertion of the impossibility of the supernatural, and the miracles of Christ he therefore explained as due to a variety of mistaken opinions and errors in narration. Paulus lived long enough to see his own rationalistic theory of Scripture give place to the more

scientific mythical theory of Strauss, and that in its turn shaken to its foundations on the one hand by the Tübingen school, on the other by Neander and his school.

See his own autobiographical *Skizzen* (1839), Reichlin-Meldeg's *Paulus* (1853), Pfeiderer's *Theology since Kant* (1890), and the article in Herzog-Hauck.

Paulus Ægineta, a celebrated Greek physician, was born in the island of Ægina, and flourished most probably during the conquests of the calif Omar in the 7th century. Of his life we know almost nothing more than that he pursued his medical studies first at Alexandria, and afterwards in Greece and other countries. He had much knowledge and skill in surgery and obstetrics, and his *Synopsis of the Medical Art* has gone through many editions both in its original Greek and in Latin, English, and other translations.

Paulus Diaconus, the greatest of the Lombard historians, was born at Friuli about 720. He instructed Adelperga, daughter of King Desiderius, and most probably resided at the court of her husband, Arichis, Duke of Beneventum. He became a monk, probably of Monte Cassino, about 774, but seems later to have spent some years at the court of Charles. He died before the coronation of Charles as emperor, therefore not later than 800. Of his works the earliest is the *Historia Romana*, an epitome of events based on Eutropius, with additions compiled from Orosius, Jerome, and Jordanes. This work was again extended with interpolations by Landolf the Wise (c. 1000), and the whole compilation has been known as the *Historia Miscella*; there are editions by Eyssenhardt (1869) and Droysen in *Mon. Germ. Hist., Auct. Ant. ii.* The *Historia Langobardorum* comes down to the death of King Liutprand (744), and is largely compiled from Gregory of Tours, the *Origo Gentis Langobardorum*, the short history (*De Gestis Langobardorum*) by Abbat Secundus of Trent (died 612), and other sources. His other works are a *Life of Gregory the Great*, compiled from Gregory's own writings and from Bede; *Gesta Episcoporum Mettensium*, written at the request of Bishop Angilram, containing an interesting account of the rise of the Carolingian house, the founder of which was Arnulf, Bishop of Metz (ed. in Pertz, *S.S. ii.*); an *Epitome*, or extracts from the *De Significatione Verborum* of Sextus Pompeius Festus (ed. by K. O. Müller); a *Book of Homilies*, consisting of 298 sermons selected from Ambrose, Augustine, Chrysostom, Gregory, Jerome, and Leo; *Poems*, in honour of St Benedict, in praise of the Lake of Como, &c. (ed. by Dümmler in the *Monumenta Germ. Historica, Poetarum Latinorum Medii Ævi*, i.); and *Letters*, to Adelperga, Adelhard, Charles, and others.

Paul Veronese. See VERONESE.

Paumota. See LOW ARCHIPELAGO.

Paupers. See POOR-LAWS, IMMIGRATION, MEDICANCY, VAGRANTS.

Pausanias, a famous Spartan regent and general, the son of Cleombrotus, and nephew of Leonidas. He commanded the confederate Greeks in the important battle of Platea (479 B.C.), in which the Persians were totally routed, and their leader, Mardonius, slain. He then marched his troops against Thebes, and compelled the inhabitants to give up the chiefs of the Persian party to him for punishment. Elated by this victory, however, he became in an extreme degree haughty and vainglorious, took all the credit to himself, and allowed none to the Athenian generals, Aristides and Cimon, who commanded under him, and treated all the other Greeks as if the Spartans were their lords. Nevertheless, he still continued his conquests, capturing Cyprus and Byzantium. It was he

first began to play false to Greece. He entered into secret negotiations with Xerxes, with the view of becoming ruler, under the Persian monarch, of the whole country, and, in his journey through Thrace, even adopted the dress and luxurious habits of a Persian satrap, and surrounded himself with a body-guard of Persians and Egyptians. He was recalled, on account of these things, by the Spartans, but his former services procured him acquittal. He then returned to Byzantium, where he renewed his traitorous intrigues, was expelled from the city for a criminal assault upon a Byzantine lady, withdrew to the Troad, and there continued his treachery. He was a second time called to account by the Spartan ephors, but again escaped, though with greater difficulty. Yet his passion for the sovereignty of Greece, even though at the expense of the national liberties, once more drove him to play the traitor. He tried to stir up the Helots, but was taken in his own net. A Helot betrayed him. When Pausanias found his position desperate he took sanctuary in a temple of Athena. Hereupon the people blocked up the gate of the temple with heaps of stones, and left him to die of hunger, his own mother depositing the first stone.

Pausanias, one of the most eminent of Greek geographers and historians, was probably a native of Lydia in Asia Minor, and flourished under Hadrian, Antoninus Pius, and Aurelius. He travelled through almost all Greece, Macedonia, and Italy, and also through part of Asia and Africa, and composed from his observations and researches an *Itinerary* of Greece (*Hellados Periēgēsis*) in ten books, describing the different parts of that country, and giving a particular account of the monuments of art and of the legends connected with them. His style is unpretentious and easy, although devoid of any special literary grace, but his *Itinerary* possesses the rare merit of being the work of an honest and accurate eye-witness. Pausanias was a man of marvellous industry, and is one of the earliest examples of the antiquary in the full modern sense of that word. Even in his treatment of works of art he is ever the antiquary rather than the critic, and his observations seldom rise out of the prosaic atmosphere proper to the catalogue. But he has the saving grace of accuracy, and his work, bare and meagre as it is, remains one of the most precious records of antiquity that we possess. He has not grasped the distinction between legend and history; or, more correctly, dominated by the instinct of the collector, he has recorded everything that he learned, historical fact and local legend alike. Hence his work is a mine of wealth to the student of mythology and folklore, no less than to the archæologist proper.

There are editions by Siebelis (5 vols. 1822-28), by Schubart and Walz (3 vols. 1838-40; reprinted in Teubner's series, 2 vols. 1862), Spiro (1903), and Hitzig and Bluemner (1896 *et seq.*); translations by A. R. Shilleto (1880) and J. G. Frazer (1898). See also Kalkmann, *Pausanias der Perieget* (1886); Margaret Verrall, *Mythology and Monuments of Ancient Athens* (1890); Frazer, *Pausanias and Other Sketches* (1900); and Robert, *Pausanias als Schriftsteller* (1909).

Pavan, in music, a very slow, stately dance-form in 4-4 time, much in vogue in the 16th century.

Pavement, flat stones or 'flags,' seldom exceeding 4 inches in thickness, used for covering footpaths, courtyards, kitchens, &c. (see FLAG-STONES). The name is also given to the stone covering of the carriage-way of streets. The Romans paved both their streets and their highways with stones in a most substantial manner, but until the 12th century mediæval cities were almost all unpaved. At Pompeii the stone pavement of the narrow streets remains as it was before the city was destroyed, and shows the ruts

made by the bigæ or carriages. It is formed of polygonal blocks of stone, like cyclopean masonry, the largest pieces being about 3 feet across the face. This kind of ancient Roman pavement, the remains of which are found at other places in Italy, is laid on a carefully prepared basis or foundation, sometimes in several layers.

Streets are still largely paved with hard stones of various kinds, roughly dressed into oblong blocks, say 12 in. by 4 in. and 6 in. deep, and smaller sizes. These are generally laid on a foundation of sand or very fine gravel, sand or pitch being used for filling up the joints. Granite and some varieties of Basalt (q.v.) are extensively quarried for these paving-stones.

Wooden pavement consists of pieces of wood (in northern Europe usually that of *Pinus sylvestris*) about the size of paving-stones, laid end up on boards, with asphalt or concrete below them, and with the joints of the wood blocks pitched. Vehicles make least noise on this kind of pavement, but it is expensive to maintain under heavy traffic. Asphalt (q.v.) is now very much used both for foot and carriage ways. Both this and wood pavement are apt to be slippery in wet, and the latter in frosty, weather.

For foot-pavement a Portland cement concrete has been much employed. Small stones, such as granite, crushed into small chips like beans, or not much larger, are mixed with the cement, which is laid on a bed of broken whinstone or 'road-metal.'

Pavia, a city of Northern Italy, on the left bank of the Ticino, 2 miles above its confluence with the Po, and 21 miles by rail S. of Milan. A covered brick bridge (1353) connects the city with the suburb of Ticino, on the right bank of the river. Pavia is still in great part surrounded by walls, and has an imposing appearance; in former times it was called the 'city of a hundred towers.' Its oldest church is the Lombard basilica of San Michele, which, although the date of its foundation is uncertain, is mentioned as early as 661. The early 'kings of Italy' were crowned within its walls; in 1863 it was granted the title of 'royal basilica,' and was restored 1863-76. The cathedral, containing some good paintings, was commenced in 1488, but was never finished. It shelters the tomb of Boëtius (brought from St Peter's) and Roland's lance; and in a beautiful chapel attached to it are the ashes of St Augustine, in a Gothic sarcophagus ornamented with a great number of bas-reliefs and figures. The Certosa, which lies 5 miles north of the city, is described in a separate article. The castle of the Visconti (begun in 1360), a massive square arcaded structure, once contained valuable collections of MSS., armour, and curiosities, but they were carried away by the French in 1500. The university is said to have been founded by Charlemagne, and was a famous seat of learning during the middle ages; but it was not formally constituted a university until 1361. Attached to it are two colleges—Borromeo (1563) and Ghislieri (1569)—for poor students, and a great library (1772), anatomical and natural history museums, a botanic garden, a school of the fine arts, &c. There is neither much industry nor much trade. Pop. (1881) 29,836; (1921) 42,043.

Pavia, the ancient *Ticinum* (afterwards *Papia*, whence the modern name), was founded by Gallic tribes, and was sacked by Attila (452) and by Odoacer (476); Theodoric selected it as his capital after 489. Later on the Lombards made it their capital, and then it became the chief city of the kingdom of Italy. Through jealousy of Milan it sided with the emperors (1056-1356); it was then conquered by the Visconti, and subsequently shared the fate of Milan. It was sacked by the French in 1500. Here in 1525 the French were defeated

by the imperialists, and Francis I. (q.v.) taken prisoner; but in 1527, and again in the following year, the city was taken and laid waste by the French. It was stormed and pillaged by Napoleon in 1796, and came into the possession of Austria by the peace of 1814. Since 1859 it has been included within the kingdom of Italy. Lanfranc and Pope John XIV. were natives.—The province of Pavia (1312 sq. m.) has a pop. (1921) of 492,520.

Paviland Cave, 11 miles SW. of Swansea, was excavated by Buckland about 1823 and yielded important human remains, notably the so-called Red Lady of Paviland, a male skeleton (thought at first to be female), covered with red ochre, now assigned to the Cro-Magnon race. See Sollas in *Jour. Roy. Anthropol. Inst.*, xliii. (1913).

Paving. See PAVEMENT.

Pavlograd, a town of Ukraine, 45 miles by rail ENE. of Ekaterinoslav, on an affluent of the Dnieper, was founded in 1780 by Zaporogian Cossacks. Pop. 20,000.

Pavlov, IVAN PETROVICH, a distinguished Russian physiologist, the son of a village priest, was born in 1849 near Riazan. After preliminary training at St Petersburg, where he graduated M.D. in 1883, he undertook research at Breslau and Leipzig, and thereafter became head of the physiological department of the new Institute of Experimental Medicine in St Petersburg, of which institute he became director in 1913. He was also a professor in the Military Medical Academy. Pavlov carried out exacting research chiefly into the physiology of the circulation and digestion. His *Work of the Digestive Glands* appeared in English in 1902. He was awarded the Nobel Prize in 1904 and the Copley Medal in 1915. He died in February 1916.

Pavlova, ANNA, Russian danseuse, was born in 1885 at St Petersburg, where, after training, she appeared in the Marianski Theatre and the Imperial Opera House. In 1910, at the Palace Theatre, London, she took part with great success in *Le Cygne*, *Les Papillons*, &c., appearing later in Paris in *Les Sylphides*, and in New York in *Coppélia*. A favourite the world over, Pavlova has danced regularly in London at the Palace Theatre, Drury Lane, Queen's Hall, and in 1923 with her own company at Covent Garden.

Pavonidae. See PEACOCK.

Pawnbroking. Pawn is a contract whereby the owner of a thing delivers it to a creditor as security for a debt contracted by himself or by a third party. This contract is of great antiquity, as may be seen on referring to the story of Judah and Tamar (Gen. xxxviii.) and the provisions of the Mosaic law (Exod. xxii.). In modern times the superior class of money-lenders have often advanced money on pledges of plate, &c.; this was the business carried on by the Lombard traders, from whom Lombard Street in London takes its name; and it is said that the three golden balls which figure over every pawnshop were taken from the armorial bearings of the Medici family. Property of considerable value is sometimes pawned with bankers and others; and an equitable Mortgage (q.v.) may be described as a kind of pawn. Among the poorer classes, clothes, tools, &c. are frequently pledged when money runs short; like other small money-lenders, the pawnbroker is regarded by his customers as an extortioner, though the profits of the trade are not particularly high. On the Continent efforts have been made to supersede the pawnshop by establishing what are called Monts de Piété. In England a quasi-charitable institution of the same kind was started in 1708, but it came to a disastrous end in 1731; another

scheme, started during the bubble mania of 1824–25, was equally unfortunate. In Ireland there were, in 1841, as many as eight Monts de Piété, but they had all disappeared by 1853. On comparing the rules and charges of the Mont de Piété (q.v.) at Paris (the largest establishment of the kind in the world) with those of English pawnbrokers, it does not appear that there is any striking superiority in the French system. It is understood that the Paris establishment is superior to the London pawnshop in two points—it charges a lower rate of interest, and it gives greater facilities for recovering stolen goods. On the other hand, it is said that officialism, which must prevail where a large staff is employed, makes it more difficult for the poor to obtain advances.

The rules of English common law which apply to a contract of pawn are founded in part upon the Roman law. The pawnbroker acquires what is sometimes called a special property in the goods deposited; he has a right to retain them, and, if the debt be not paid within the stipulated time, he has a right to sell; if the sale produces more than the amount of the debt, he must account for the surplus. The pawner has a right to redeem at any time before sale; interest is not due unless there is an express or implied contract to pay. These rules are considerably modified by the Pawnbrokers Act, 1872, which applies to all persons who make a business of taking chattels in pawn, including the keeping of what in England are called dolly-shops, and what in Scotland used to be called 'wee brokers.' Every pawnbroker is required to take out a license; unless in business before 1872 he must obtain a certificate of fitness from a magistrate or a petty sessions court before taking out a license. Pawnbrokers are required to keep books in a prescribed form; their shops are made liable to be searched under a magistrate's warrant. A ticket must be given on receiving goods in pawn; the pawnbroker may charge one halfpenny per month on each 2s. advanced; and there is also a small charge for the ticket. These charges are high, or rather would be high if the pawnbroker were in the same position as an ordinary money-lender; but it must be remembered that the risks of this business are considerable, and also that the borrower obtains a larger advance by reason of the high interest. Pledges are to be redeemable within twelve months and seven days; if a pledge over 10s. in value is sold for more than the loan and profit due, the pawnbroker must account for the surplus on demand. These rules apply to any loan not above £10; but in the case of a loan of more than £2 the rules of the act may be excluded by special contract. The act extends to Scotland. Special enactments have been made in regard to persons pawning or receiving in pawn property belonging to public authorities. A pawnbroker may not take in pawn a firearm or ammunition from any person.

The law of the United States is the English law, as altered by the legislation of each state; but the law of Louisiana, which is French in its origin, approximates more closely to the Roman, and is free from the peculiarities of the English system.

Pawnees, a tribe of American Indians (q.v.), who formerly lived in Nebraska, with branches extending into Kansas and Texas. They surrendered their lands south of the Platte by treaty in 1833; suffered much thereafter at the hands of their hereditary enemies, the Sioux; and in 1876 removed, only 2026 strong, to reservation of 283,020 acres in Oklahoma. Their numbers have shrunk.

Pawtucket, a city of Rhode Island, on the Pawtucket River, 4 miles by rail N. of Providence.

A fall of nearly 50 feet on the river, and its proximity to the sea, caused it to be selected by Samuel Slater, in 1790, as the site of the first cotton-factory in the United States. It now contains numerous large mills for cottons, woollens, and thread, besides bleach-works and dye-works, &c. Pawtucket was settled about 1655, and became a city in 1886. Pop. (1870) 6619; (1890) 27,633; (1920) 64,248.

Pax. See KISS.

Paxo, one of the Ionian Islands, lies south-east of Corfu, has with the smaller island of Antipaxo (1 sq. m.) an area of 8½ sq. m. and produces wine, olives and olive-oil, almonds, oranges, lemons, &c. Capital, Gaion, the seat of a bishop.

Paxton, SIR JOSEPH, English architect and horticulturist, was born at Milton-Bryant, near Woburn, Bedfordshire, on 3d August 1801. He began life as a working-gardener in the service of the Duke of Devonshire, at Chiswick, and was thence transferred to Chatsworth; there he was put in charge of the gardens, and entirely remodelled them, and was made manager of the duke's Derbyshire estates. The experience he obtained in designing capacious glass conservatories at Chatsworth (q.v.) found wider scope in his proposal for a palace of glass and iron for the Great Exhibition (q.v.) of 1851. It was the first time these materials had been employed on so extensive a scale, and visitors found an inexhaustible theme of admiration in a fairy palace so novel, beautiful, and magnificent. His design obtained for him the honour of knighthood. He then designed the Crystal Palace at Sydenham (q.v.), and superintended its construction from the materials of the exhibition in Hyde Park. He also laid out the terraces, and planned the gardens, with their fountains, cascades, &c. Besides publishing a very popular *Cottage Calendar*, he edited the *Botanical Magazine*, *Paxton's Flower-Garden*, *Pocket Botanical Dictionary*, and other works. He died at Sydenham, 8th June 1865, having represented Coventry since 1854.

Paymaster-general, an officer of the British ministry, but not of the cabinet, who is charged with superintending the issue of all moneys voted by parliament, but has no control over the sums issued, paying merely on the order of the department concerned. He is always either a peer or a member of the House of Commons, and changes with the ministry.

Paymasters. See ARMY (*Army Pay Department*).

The naval paymaster is for a ship what the military paymaster was for a regiment; but in addition he has charge of the provisions, clothing, and miscellaneous stores, and the cooking and breadmaking staff. Paymasters (till 1844 called *pursers*) are commissioned officers, ranking according to service with lieutenants, commanders, and captains. The paymaster is responsible for all the accountant and victualling duties of the ship, and under the authority of the captain makes now all disbursements for the naval service, the captain being held responsible that all accounts are sent in by the paymaster regularly, and that the balance of cash is correct.

Payn, JAMES, was born at Cheltenham in 1830, and educated at Eton, Woolwich Academy, and Trinity College, Cambridge. In 1855 he published a volume of poems, in 1858-74 was editor of *Chambers's Journal*, and in 1882 succeeded Leslie Stephen as editor of the *Cornhill*. Of his hundred novels may here be named *Lost Sir Massingberd* (1864), *A Woman's Vengeance*, *Carlyon's Year*, *Not Wooded but Won*, *By Proxy*, *Thicker than Water*, *The Talk of the Town*, *A Perfect Treasure*,

The Heir of the Ages, *Driffell*, and *Another's Burden* (1897). Some critics preferred his shorter stories, essays, and criticisms to his novels. See *Some Private Views* (1882), *Some Literary Recollections* (1884), *Gleanings of Memory, with Some Reflections* (1894). He died 25th March 1898.

Payne, EDWARD JOHN (1844-1904), born at High Wycombe, studied architecture and music, and at Oxford became a fellow of University College. He edited Ruskin's select works and the Elizabethan voyagers, wrote on the colonies and two volumes of a great history of America, and contributed to Grove's *Dictionary of Music* and to the *Cambridge Modern History*. A volume of essays with biographical introduction was edited by W. P. Ker in 1900.

Payne, JOHN HOWARD, born in New York 9th June 1791, had for thirty years a successful career as actor and author of plays, chiefly adaptations; *Clari* contains the song *Home, Sweet Home* (the music being by Sir Henry Bishop). Payne was appointed American consul at Tunis in 1841, and died there 10th April 1852. His remains were taken to Washington in 1883. See *Lives* by Harrison (1875) and Brainard (1885).

Payne, PETER (c. 1380-1455), English Hussite, was the son of a French father and an English mother, and was born near Grantham and educated at Oxford. He became principal of St Edmund Hall in 1410; but adopting Wycliffite opinions, he sought safety from persecution in flight to Bohemia. There he procured court favour, and in 1433 was sent as a Bohemian delegate to the Council of Basel, where his unconciliatory temper contributed to prevent the Bohemians from coming to terms with the council. During the civil war in Bohemia (see HUSS) he took the Taborite side, and after their collapse was persecuted and imprisoned. He wrote much, and at least six MSS. by 'Petrus Anglicus' are extant at Vienna, Prague, and elsewhere. See Baker's *A Forgotten Great Englishman* (1894), based on Palacky.

Payne, ROGER (1739-97), born at Windsor, became famous, after 1766, as the most artistic bookbinder in London.

Payne-Smith, ROBERT (1819-95), educated at Oxford, as sub-librarian of the Bodleian began his great *Thesaurus Syriacus* (1870-93). Sermons on *Isaiah* (1862) led to his appointment as regius professor of theology at Oxford (1865-70), whence he removed to the deanery of Canterbury. He gave the Bampton Lectures on Prophecy (1869), and published books on Daniel, Jeremiah, Samuel, and Genesis.

Paysandú, the chief town of an Uruguayan department (5000 sq. m.; 87,000 inhabitants), is built upon a hill gently sloping from the Uruguay River, 280 miles NW. of Montevideo. From its busy port tinned meat is exported. Pop. 26,000.

Paz, LA. See LA PAZ.

Pazardjik. See BAZARDJIK.

Pea (*Pisum*), a genus of plants of the family Leguminosæ, sub-family Papilionaceæ. Two species are very extensively cultivated for their seeds (peas)—the Common Pea or Garden Pea (*P. sativum*) in gardens, and the Field Pea (*P. arvense*) in fields; both of them climbing annuals, with pinnate leaves, ovate leaflets, and branching tendrils in place of a terminal leaflet; the garden pea distinguished by having two or several flowers on each flower-stalk, the flowers either red or white, more generally white, and the seeds subglobular; the field pea having one flower on each flower-stalk, the flowers always red, and the seeds angular from crowding and compression

in the pod. But it is not improbable that they are truly one species. Peas have been found in Swiss lake dwellings of the Bronze period, and are cultivated from warm climates, as India, to very cold latitudes, the plant being of rapid growth and short life. The seeds of the garden pea are used for culinary purposes both in a green and in a ripe state, as are also the green succulent pods of some varieties, known as Sugar Peas or Wyker Peas, in which the membrane lining the inside of the pod—parchment-like in most kinds—is much attenuated. Field peas are used both for feeding cattle and for human food; deprived of the membrane which covers them, in a kind of mill, they are sold as *Split Peas* as used for making *Pea Soup*. They are also ground into meal. Some of the kinds of garden peas—products of horticultural art—have long stems, and require for their support stakes 6 or 8 feet in height; others are of humbler growth; and certain dwarf kinds succeed very well without stakes. In Britain garden peas are sown at different times from January to the end of June in order to secure a supply of green peas in summer and autumn; in the south they are also sown in the end of autumn, a very little protection being sufficient for them during the winter. *Early Peas*, formerly preferred for the first sowings, have been supplanted by more productive, larger, and better-flavoured sorts, which combine the desirable quality of extreme earliness with the size and tenderness of the *wrinkled marrow* kinds. Chalky and other calcareous soils are particularly suitable for peas. Supplies received from France in May are inferior in quality to the English. Peas as a field-crop are best adapted to those districts in which the climate is least moist. The haulm or straw of peas is used for feeding cattle; and for its sake field peas are often reaped before they are quite ripe, great care being taken in stacking the straw to provide for ventilation, so that it may not *heat*. Pea haulm, when cut and dried green, is more nitrogenous and more nutritious than hay. Dried peas are largely imported into Britain. The chemical constituents of peas will be found in the table at DIET; and the high dietetic value is discussed at FOOD. Tinned peas have little of the delightful flavour of the fresh vegetable.

The Sea Pea (*Lathyrus maritimus*), the Sweet Pea, the Wood or Heath Pea (*L. montanus*), and the Everlasting Pea are species of *Lathyrus* (q.v.). The Chick Pea (q.v.) is a species of *Cicer*.—The pods of peas are often injured by the Pea-beetle (*Bruchus pisi*), a small coleopterous insect; by the Pea-maggot, the caterpillar of a moth (*Tortrix pisi*); and by the Pea-weevils (*Sitona crinita* and *S. lineata*), small coleopterous insects.

Peabody, GEORGE, philanthropist, born at South Danvers, Mass. (see PEABODY), 18th February 1795, of Leicestershire stock, became a partner in a Baltimore dry-goods store in 1829. He established himself in London in 1837 as a merchant and banker, and in his lifetime gave away a million and a half for philanthropic purposes, including \$500,000 towards building industrial homes in London. He refused a baronetcy. He died in London, 4th November 1869. See *Lives by Hanaford* (1882) and *Curry* (1898).

Peabody, a town of Massachusetts, 16 miles NNE. of Boston (formerly South Danvers), was so named in 1868 in honour of George Peabody (q.v.), who was born there; pop. 20,000.

Peace and International Arbitration.

Several times in the course of our era permanent peace has been a direct object of practical statesmanship. Thus the idea of the 'grand design' of Henry IV. of France (1603), as set out in the memoirs of his great

minister, Sully, was by diplomatic combination and negotiation 'to divide up all Europe proportionately among a certain number of States who would have nothing to envy each other as regards equality and nothing to fear as regards their equilibrium.' The number of states was to be reduced to fifteen, which were to be of three kinds—viz. six great hereditary monarchies, five elective monarchies, and four sovereign republics. The six hereditary monarchies were to be France, Spain, England, Denmark, Sweden, and Lombardy; the five elective monarchies were to be the Empire, Papacy, Poland, Hungary, and Bohemia; the four republics, Venice, Italy, Switzerland, and Belgium. The affairs of this community of states were to be administered by a senate composed of four representatives of each of the Great Powers and two of each of the smaller states—i.e. seventy persons in all, elected every three years (see *Memoirs of Duc de Sully*, vi. p. 129 *et seq.*). Thus also the Treaties of Ratisbon (15th August 1684) provided, after settlement of certain disputed points, for a suspension of warfare between Louis XIV. and the emperor on the one hand and King Charles of Spain on the other for twenty years. Territorial details were to be settled by commissioners, and certain differences, if they arose, by arbitration.

The Holy Alliance (September 1815) was another attempt to secure more or less permanent peace. It proclaimed the fraternity of nations in the spirit of Christianity, and bound the parties to respect each other's just rights and assist each other in maintaining them. Most of the sovereigns of Europe joined it, including the British Prince Regent, in so far as a constitutional sovereign could join in a personal undertaking by sovereigns.

Alongside these practical efforts to ensure durable peace, writers have elaborated many schemes for the same end. Among these the most notable have been William Penn (1693), the Abbé St Pierre (c. 1700), Jeremy Bentham (1786–89), Kant (1796), and in more recent times John Stuart Mill, Professor Seeley, Professor Bluntschli, David Dudley Field, Professor Leone Levi, Sir Edmund Hornby. But it was not till 1893 that statecraft came again to the front with a proposal to promote the world's peace by a deliberate effort. In his rescript of 24th August 1898 the Tsar Nicholas II., to whom the initiative of the movement was due, stated that he regarded the time as 'very favourable for seeking, by means of international discussion, the most effectual means of assuring to all peoples the benefits of a real and durable peace.' The financial charges necessitated by armaments were constantly increasing and paralysing economic prosperity at its source. The accumulation of war material was transforming armed peace into a crushing burden which peoples had more and more difficulty in bearing. The tsar, therefore, proposed that a diplomatic conference should meet and discuss whether an understanding could not be achieved under which the contracting states would agree not to increase for a fixed period the then military and naval effectives. Other objects were added, including the organisation of 'good offices,' 'mediation,' and 'arbitration,' as a means of settling international disputes. The first conference sat at The Hague from 18th May to 29th July 1899. The conference, however, confined itself to the pious expression of a wish for the restriction of military budgets and a recommendation to governments 'to examine the possibility of an understanding concerning the limitation of military and naval armaments and war budgets.' On the other hand, three conventions relating to the 'peaceful settlement of international disputes,' to the 'laws and customs of war on land,' and to the 'adaptation to maritime warfare of the principles of the Geneva Convention

of 22d August 1864,' and declarations prohibiting the use of asphyxiating projectiles and expanding bullets and the dropping of projectiles and explosives from balloons, were adopted. Although the main object was not achieved, this result was of the greatest importance to the development of law and order in the intercourse of states. Till then the only legislation enacted by international agreement had been the Declaration of Paris (q.v.).

The conference of 1899 also created an international Court of Arbitration, with a procedure for its use, for the purpose of trying cases between nations in the same way as cases between individuals are tried in national courts. Three years, however, elapsed before any state had the courage to put the new Hague court to the test of experience. The United States and Mexico were the first to submit a case to it. This was the Pious Fund case (decision 14th October 1902). Down to the beginning of the Great War eleven cases had been tried—the Preferential Treatment case: Germany, Great Britain, and Italy *v.* Venezuela, the United States of America, Belgium, France, Mexico, Netherlands, Sweden, and Norway (decision 22d February 1904); the Japanese House Tax case: France, Germany, and Great Britain *v.* Japan (decision 22d May 1905); the Muscat Dhows case: France *v.* Great Britain (decision 8th August 1905); the Casablanca case: Germany *v.* France (decision 2d May 1909); the Maritime Boundary case: Norway *v.* Sweden (decision 22d October 1909); the North Atlantic Fisheries case: Great Britain *v.* United States (decision 6th September 1910); the Orinoco Steamship Company case: United States *v.* Venezuela (decision 6th September 1910); the Savarkar case: France *v.* Great Britain (decision 24th February 1911); the Canevaro case: Italy *v.* Peru (decision 3d May 1912); claim for unpaid interest: Russia *v.* Turkey (decision 11th November 1912); and claims for illegal seizure of the *Carthage* and *Manouba*: France *v.* Italy (decision 6th May 1913).

Under the impulsion of the United States government the holding of a second conference to continue the work of that of 1899 became the subject of diplomatic negotiations, which ultimately led to the Russian government again issuing an invitation to a conference which was held at The Hague in 1907. The conference of 1899 had been attended by twenty-six states; at that of 1907 forty-four were represented—i.e. the whole world except Costa Rica, Honduras, and Abyssinia. The second conference sat from 15th June to 18th October. The conventions adopted dealt with international law on a much wider basis than that of 1899, embracing not only revised editions of the three adopted in 1899, but the following further subjects: limitation of the employment of force for the recovery of contract debts; the commencement of hostilities; the rights and duties of neutral powers and persons in war on land; the status of merchant ships at the outbreak of hostilities; the conversion of merchant into war ships; the laying of automatic submarine contact mines; bombardment by naval forces in time of war; restrictions on the right of capture in maritime war; the establishment of an international Prize Court; the rights and duties of neutral powers in maritime war; and a declaration forbidding the discharge of projectiles, &c., from balloons.

The British government took an active part in promoting the adoption of the proposed international Prize Court, and as there was no universally admitted international law of prize, it called a conference to establish such a law. The work of the conference, which sat from 4th December 1908 to 26th February 1909, is known as the Declaration of London. Though the

declaration was not ratified by any state, it was declared applicable in practice by Italy, Turkey, and Russia during the Turco-Italian war, and was frequently appealed to and 'tortured' to satisfy belligerent requirements in the Great War, a testimony to the usefulness of even an imperfect codification of international law. Again, at the conference of 1907 the question of the restriction of armaments and of military and naval budgets was eliminated by a pious wish; but the other work of the conference in the codification of international law was an immense further stride in the direction of establishing a uniform public law of Europe, a means in itself of diminishing the possibilities of international friction.

From 1899 to July 1914 the number of arbitration treaties concluded was some 170, of which about 140 since the first of the new series on which most of them are based—viz. the Anglo-French Convention of 14th October 1903. Nearly all these treaties except cases involving 'national honour' and 'vital interests' from their operation. The few cases in which the exception has not been inserted are between states which, generally speaking, are not likely to be exposed to difficulties arising out of bad faith or deliberate aggression, which seem to be the cases disguised under the name of 'national honour' and 'vital interests.' To the United States falls the merit of having entered into treaties with Great Britain and France dealing with all cases without any exception, though reserving matters of extreme gravity for a joint commission of the parties. If carried out in good faith, they would be a monument to the memory of the statesmen who devised such ingenious means for giving peace every possible chance of preservation. Though public opinion in all civilised countries seemed to be growing more pacific, international amity becoming in an ever higher degree a positive object of statesmanship, and 'pacificism' ceasing to be regarded as anti-patriotic among the influential classes, the Great War broke out like a volcanic eruption, or rather like an inundation sweeping all pacific methods before it. The only suggestion of arbitration came from Serbia on one of the points of the Austro-Hungarian ultimatum. Germany and England made feeble attempts to get mediation accepted, but when armed forces are mobilised the time for negotiation is passed. Following the war, however, the desire for permanent peace became more intense than ever before.

The terrible experience of the Great War and the awakening conscience of modern democracies may focus the many agencies now at work in different ways for the promotion of a better understanding of the true interests of the productive classes throughout the world. The *League of Nations* (q.v.) created by the victorious belligerents obviously can only be regarded as an effective instrument of peace when the United States and Russia have joined or been admitted to it, but its potentialities are great. The creation of a Permanent Court of International Justice, under Art. 14 of the Covenant of the League, had provided a useful agency for dealing with matters of right and wrong judicially as distinguished from settlement by arbitration.

If the United States stood aloof from the League of Nations their government has not been inactive in the cause of peace. In February 1922 under its auspices a conference was held at Washington for the reduction of naval armaments, and the protection of the lives of neutrals and non-combatants at sea in time of war, and to prevent the use in war of noxious gases and chemicals. On the first subject a treaty between the following powers, the United States of America, the British Empire, France, Italy,

and Japan, was signed at Washington on the 6th February 1922, and was duly ratified by the powers concerned. This convention provided for the limitation of naval armament in fixed proportions, according to the requirements of naval defence, and regulates the procedure of destruction of ships beyond such proportion and its upkeep. The other convention forbade the employment of submarines as commerce destroyers, and the use in war of asphyxiating, poisonous, and other gases, and all analogous liquids, materials, or devices. This also was ratified by the contracting powers except France. The naval convention has come into force, and its provisions have been or are being complied with.

See Darby, *International Tribunals* (London, 1900) and *Modern Pacific Settlements* (London, 1904); James B. Scott, *Hague Peace Conferences* (2 vols. Baltimore, 1909); Higgins, *Hague Peace Conferences* (London, 1909) and *War and the Private Citizen* (London, 1912); Oppenheim, *International Law* (2 vols. 2d ed. London, 1912); Barclay, *Problems of International Practice and Diplomacy* (London, 1907), *Turco-Italian War and its Problems* (London, 1912), *New Methods of Adjusting International Disputes and the Future* (London, 1917), *Collapse and Reconstruction* (Boston, 1919); Norman Angell, *The Great Illusion* (1909) and other works; W. L. Grane, *The Passing of War* (1912); *Annales of the Institute of International Law*; *Reports of the International Law Association*; *American Journal of International Law*; and the article INTERNATIONAL LAW.

Peace River, a large river of Canada (1100 miles), rises in two branches in the Rocky Mountains, in British Columbia, and flows north-east to the outlet of Lake Athabaska, where it joins the Slave River by five widely separate mouths. The delta thus formed is very fertile and rich in minerals, and is part of the province of Alberta (q.v.).

Peach (*Prunus Persica*, now believed to be of Chinese origin) belongs to the order of Rosaceae, and is of the drupaceous subdivision. This, the most delicious fruit that ripens in the open air of Britain, is nearly akin to the almond, resembling it closely in wood, leaves, and blossom, but differing widely in the character of the fruit. In the peach the stone is covered not with a brittle husk but a fleshy substance, juicy, melting, and of the finest flavour when matured and mellowed. The peach-tree is of moderate height, more or less spreading, deciduous (though some are called evergreen), and, when left to itself, deep-rooted. The leaves (which contain some prussic acid) are lanceolate, on short footstalks, differ much in size, have their edges serrate or crenate, and have glands near the stalk, or are glandless. The serrate leaves, as a rule, are glandless; the crenate have globular or reniform glands. Mildew (both of fruit and leaf) attacks the varieties with glandless leaves, while the glandulose have immunity. The many varieties of the peach pass into divisions and subdivisions, according to the point regarded. There is first the decisive difference in the clothing, flesh, and flavour of the fruit, which has established the broad distinction between peach and nectarine. A very close observer is the man who can pronounce in winter, unless the trees happen to be his own, which of twain is nectarine, and which is peach. In summer there is a certain difference, perceptible, but not easily described, in the tint and cast of foliage; while the fruit on the other hand leaves no doubt, even from its first appearance, as to its proper title. Peaches and nectarines, while distinguished as above, pass alike into the other three divisions which have been established concerning them—to wit: (a) those which have large and those which have small blossoms; (b) those which have glandless leaves and those whose leaves are glandular; (c) those that have fruit which adheres

to the stone and those whose fruit parts freely. Neither of these points affects the other two, and hence arise cross-divisions.

(a) As to size of bloom, it is hard to say why, but all known peaches and nectarines have blossom either very conspicuous or almost insignificant. Other fruit trees have blossom larger or middle-sized, or small, according to variety. Some gardeners fancy that the smaller bloom suffers less from the attacks of frost; the larger petals certainly show the nips more sadly, but the internal injury is received in either case. The colour of the blossom ranges from snowy-white to pink and rose (the latter being the most usual tint), and even to bright carmine.

(b) The leaves of the peach and nectarine, being as above described, furnish another classification according to the absence or presence of glands, and the form of glands when present. The gland is a small accretion or concretion upon the petiole, or at the base of the leaf itself; sometimes there is one gland at either edge, sometimes two, and at times even three. In form the glands vary from round to reniform; or even lenticular; but their function, if any, is not yet understood. Probably they take no active part, but are merely the tokens of a constitution adverse to fungoid overtures. However that may be, they afford one more division of the peach and nectarine, according as they are glandless or glandulose, the latter subdivided into those which have round and those which are gifted with long glands.

(c) Again, the peach and nectarine are palpably divided (according to the inner construction of the fruit) into *clingstones* (or *Pavies*) and *freestones*.



Fruit of the *clingstone* (a) and *freestone* (b) varieties, cut across to show the seed.

In the former the stone seems to radiate, as it were by tentacles, into the flesh, and the eatable part will not quit hold without great loss of the delicious juice. These peaches are therefore only fit to be sucked, for to quarter them fairly is impossible. And it is a sad indictment against the peaches of America that they belong mainly to the non-seccable section. But the freestones, chiefly grown in Europe, part from the stone with little rupture of tissue, and melt in the mouth instead of gushing on the plate. All the above being cross-divisions, the classes of the peach grow manifold; but the cultivation is the same with all. When grown on its own roots or on peach-stock the tree is short-lived, and being treated thus in America is worn out in some twenty-five years. In France it is worked upon the almond or the plum; in England the mussel-stock is the most approved; and upon this it attains the greatest age. But grow it as we may, it is impatient of the knife, and must receive its orders at a very early date. In the southern parts of England both nectarines and peaches ripen well upon the open wall, or even on dwarf standards in fine summers, and fruit so ripened is the best of all.

Though many good varieties have been added lately by the skill of nurserymen, the older kinds are not yet obsolete; and the chief gain, if any, is in the lengthening of the period when ripe

peaches of some sort can be gathered out of doors.

[In the United States peaches are grown profitably as far north as 40° N. lat. at least; enormous quantities are sent to the markets, and the fruit, in some form, is brought easily within the reach of all classes. The principal peach-growing states are Delaware, Maryland, Virginia, Pennsylvania, and New Jersey, in this order; but the fruit is also largely cultivated in Georgia, Florida, and Texas for the early market, from near the great lakes all down the Mississippi valley, and in California and Oregon. The canning of peaches is an important industry.]

For description of varieties, see André Leroy's *Dictionnaire de Pomologie*; R.H.S. *Catalogue of Fruits*, edited by Thompson; Dr Hogg's *Fruit Manual*; *The Orchardist*, by John Scott; *The Growth of Fruit under Glass*, by Thomson; the treatises of Thomas Rivers; and *The Book of the Peach*, by H. W. Ward (1903).

Peach, BENJAMIN NEEVE, geologist, born at Gorran Haven, Cornwall, in 1842, was educated at Peterhead and Wick Academies and the Royal School of Mines, London. On the Geological Survey he worked with Dr Horne on the elucidation of the very intricate geology of the north-west Highlands. He is author of *The Silurian Rocks of Scotland* (with Dr Horne, 1899) and *The Geological Structure of the North-west Highlands* (1907).

Peacham, EDMUND. See BACON (FRANCIS).

Peacock (*Pavo*), a genus allied to pheasants and other game-birds, including at least two species—the Indian and Singhalese *P. cristatus*, domesticated in Britain and other countries, and the Malayan *P. muticus*, inhabiting Java, Borneo, and similar regions. The Indian peafowls live in flocks, especially in mountainous and wooded districts, and are often accompanied by the tiger; though whether the tiger derives benefit from the wariness or flesh of the birds is uncertain. The birds roost in trees, and eat omnivorously—worms, insects, small snakes, seeds, &c. At the pairing season rival males display the well-known beauty of their tail-coverts before their desired mates, and strut about after the fashion of many game-birds. They sometimes fight fiercely with their rivals, and the females sometimes pay court to the males. Polygamy prevails, but there seems no truth in the old stories about the cruelty of the males to their mates. The usual cry is a shrill *Pao*, and strange noises are made by rattling the quills. The females lay, according to the climatic conditions, from April to October; the eggs, of a brownish colour, are numerous (eight to ten), and are laid without a nest in some concealed part of the jungle. At first both sexes are alike in plumage, but after a year or so the males gradually acquire their gorgeous feathers, which are perfected about the third year. It is not necessary to describe these colours, so delightfully familiar to all, but it may be noted that they are for the most part of a physical nature, being due not so much to pigment as to external markings, which produce iridescence. As to the evolution of the eye-like markings, which occur in varying degrees of perfection, we have on the one hand to recognise with Darwin that the more beautifully decorated males are selected by their mates, and on the other hand that we do not know to what precise conditions of feather-growth the marvellous beauty is due. The Javan peafowl is said to be even handsomer than the familiar species. Its 'crest, head, and neck are rich green, the breast bluish green margined with gold, the back bright copper-colour barred with green and light brown, and the upper tail-coverts rich green with gold and copper-colour reflections.' White or pied peacocks occasionally occur

as sports, and yet more remarkable is the 'jappanned' breed, which seems to have arisen quite abruptly.

The peacock seems to have been well known in Greece after Alexander's Indian expedition, but it was known in Judæa even in the time of Solomon. From Greece it spread to Rome and gradually westwards. In many ways it has touched human life and fancy: it was the bird of Hera or Juno to the Greeks and Romans, and emblematic of a glorified body to the early Christians; its feathers have adorned many a throne and shrine, and the perverted luxury of the later Roman empire made an entrée of the tongues or brains. The eggs and the young are edible, but domesticated peacocks are now kept almost solely for their beauty's sake, and that at some cost, for they are apt to do mischief both in garden and poultry-yard.

Peacock, THOMAS LOVE, satirist, was born at Weymouth on 18th October 1785, the only child of a London merchant, who died three years afterwards. His boyhood was passed at Chertsey, and for six and a half years he was sent to a private school on Englefield Green, but from thirteen he was self-educated, growing up an accomplished scholar. The chief events of his uneventful life were the loss of his first love (1808); his under-secretaryship to Sir Home Popham on a warship at Flushing (1808-9); his close friendship with Shelley, whom he first met in Wales in 1812, during one of his many walking tours; his employment from 1819 to 1856 in the office of the East India Company, as clerk, correspondent, and chief examiner; his marriage in 1820 to the 'Beauty of Carnarvonshire,' who bore him one son and three daughters, and died in 1852 after twenty-six years of ill-health; and the important part he bore in the introduction of iron steamships to Eastern waters (1832-40). In 1823 he had taken a cottage for his mother at Halliford on the Thames, and here he died, aged eighty, on 23d January 1866.

Peacock's literary activity extended over more than half a century. Of his half-dozen booklets of verse, published between 1804 and 1837, the best, *Rhododaphne*, offers nothing so good as some of the gay lyrics scattered throughout his seven 'novels'—*Headlong Hall* (1816), *Melincourt* (1817), *Nightmare Abbey* (1818; its hero is Shelley), *Maid Marian* (1822), *The Misfortunes of Elphin* (1829), *Crotchet Castle* (1831), and *Gryll Grange* (1860). And these 'novels' are interesting chiefly as a study of character—the author's own. A Rabelaisian pagan of the 18th century, egoistic, protean, such was Thomas Love Peacock, and in Thomas Love Peacock we have the Alpha and Omega of his writings. They mirror his likings (for nature, music, the classics, madeira, and good living generally), and his stronger, if exaggerated, dislikes (for field-sports, reviewers, political economy, all things Scotch and American, and, above all, Lord Brougham). They leave on one the impression that the little he did not know was to his mind not worth knowing, that because, for example, he had not been at a university and was not religious, therefore Oxbridge and heaven were beyond his microcosm. The steely wit and erudition of their dialogues still find admirers in the cultured few. The three plays by him first published in 1910—*The Dilettanti*, *The Circle of Loda*, and *The Three Doctors*—have much in common with the novels; especially the author's favourite plan of 'philosophical debate or conversation strung haphazard on a thread of irrelevant action.'

See editions by Sir H. Cole, with preface by Lord Houghton and memoir by his granddaughter (1875); by Dr Garnett (10 vols. 1891-92); and by Brett-Smith and Jones (1924 *et seq.*); his Plays (ed. A.B. Young, 1910); the Life by Carl Van Doren (1911); and the 'Critical Study' by A. Martin Freeman (1911).

Peacock-stone, the name under which the dry cartilaginous ligaments of some large lamelli-branchiate molluscs, as the pearl-oyster, have been sold by jewellers.

Peak, the hilly district of north-west Derbyshire, having Castleton for its capital, 10 miles N.E. of Buxton. Measuring some 30 by 22 miles, it is watered by the Dove, Derwent, and Wye, and culminates in Kinderscout (2082 feet), other eminences being Axe Edge (1810 feet), and Mam Tor (1710). The Peak Cavern or Devil's Hole near Castleton penetrates 750 yards; and crowning a rock above the village is Peveril Castle, so named from its first lord, a bastard of William the Conqueror's. The wonders of the Peak were celebrated early by Thomas Hobbes (1666) and Charles Cotton (1683).

Pea-nut. See GROUND-NUT.

Pear. The pear (*Pyrus communis*), a member of the Pomaceæ, a sub-order of Rosaceæ, is a tree very largely cultivated for the sake of its fruit, which contests with that of the peach the first place in the list of the British Pomona, and vastly exceeds it in endurance. The pear is a native of Europe and the more temperate parts of Asia, and is still found wild in Britain, but in that state is of lesser girth and stature, with thorny branches and small harsh fruit, and jagged and sometimes pinnate leaves. Under cultivation the tree attains a height of 40 to 60 feet, with a trunk of a yard or even more in diameter, while the thorns disappear, though in some kinds they linger for years after grafting; the leaves are simple, ovate, serrate, or crenate, and sometimes almost entire, glabrous on the upper surface, sometimes tomentose on the under side while young; the flowers are in corymbs of five to eight or nine or even more, each bloom having five petals, generally white, though in some varieties touched or striped with pink, differing also in size and curve according to variety. The stamens are numerous, and the styles distinct, generally five in number and enclosed within the calyx-tube. With the growth of the fruit the ovaries become united, and form what is called the core, consisting usually of five cells, and each cell has one or two seeds or pips, which in many of the best kinds are imperfect. The fleshy mass which is formed around these constitutes what we call the fruit, differing greatly in form, size, and substance, according to variety, health, climate, and other influences. But the normal form of the pear, when we use the word as one of description, is long and tapering to the stalk from the part just above the eye, where the diameter is the greatest.

The pear-tree is grown upon divers stocks, as well as in many shapes and manners, by English gardeners. (1) As to stock—which partly governs other treatment—gardeners use either pear or quince, (a) the pear (which is called the free stock) being raised for that purpose from seed or otherwise, and grafted when strong enough, or budded, with the sort required. This is the way to obtain large trees, lusty and enduring, but loth to give fruit until they have found long experience. *Infœcunda quidem, sed læta et fortia surgunt.* Whence the old distich—‘The man who plants pears is a-planting for his heirs.’ This has told much against the liberal stock, but in common with the race of proverbs is exaggerative. (b) The quince-stock, shallow-rooted, less vigorous in habit, and of briefer date. Upon this stock the pear, when congenial to it, begins to fruit even in the second year from working, gives larger, more beautiful, and sometimes better produce than it could afford upon its closer kindred, but does not grow to the bulk or stature which nature intended for it. It is a mistake, however, to suppose that the tree so wrought is cut short of life, unless of a

nature that spurns the union, as some of the finest pears have always done. Other pears, indeed the great majority, thrive upon the quince for from ten to twenty years; and some kinds there are which show every sign as yet of a life as long and almost as large as they could have attained without transmigration. (c) Other stocks whereupon the pear will grow are the hawthorn, the Sorbus, the *Cydonia japonica*, and several other members of the pyric race. Some kinds of pear will do well on some of these. But in spite of all local and paradoxical flourish, the stern fact remains that the success is fitful, comparatively brief, and scarcely worth the trouble.

(2) The shape and manner of growth are also manifold. In the northern parts of Great Britain and the bleaker portions of the south the pear—unless it be of an early kind—will not ripen well without the aid of glass or the shelter and warmth of a garden-wall. It is not largely grown under glass as yet, and for many good reasons, though very fine specimens are thus obtained. But as a wall-tree it is to be found in almost all fruit-gardens, and much of the finest fruit is thus produced. There are four modes of training now chiefly in vogue—viz. the old horizontal, the fan-shaped, the rectangular fork (with from two to twenty prongs), and the cordon, diagonal or horizontal, single, double, or treble, &c., and sometimes tortured into spirals. But, wherever the pear will ripen without the absorbed and reflected heat of a wall, the simplest and cheapest form of growth is that which our nurserymen call the dwarf pyramidal—more correctly termed the conical—or, with some few varieties which spurn that form, the less compact outline of the bush. Some diligence is needed at least twice a year to keep any of these in discipline.

(3) The varieties of pears are almost countless, as are those of apples, and nine-tenths are unworthy of the census. If this was so in the time of Virgil, we must not be surprised at the catalogue now. No year, however barren, lacks new kinds on paper, which are to supersede all previous issue. But the historical fact survives that pears were as well worth eating in the days of our ancestors as they are now.

Pear, PRICKLY. See PRICKLY PEAR,

Pearl, a peculiar product of certain marine and fresh-water molluscs. Most shell-bearing molluscs are provided with a secretion with which they line their shells, and give to the otherwise harsh granular material of which the shell is formed a beautifully smooth surface, which prevents any unpleasant friction upon the tender body of the animal. This secretion is laid in extremely thin semi-transparent films, which, in consequence of such an arrangement, have generally a beautiful Iridescence (q.v.), and form in some species a sufficient thickness to be cut into useful and ornamental articles. The material itself in its hardened condition is called *nacre* by zoologists, and by dealers mother of pearl. Besides the pearl lining of the shells, detached and generally spherical or rounded portions of the nacre are often found on opening the shells. In general, a pearl may be said to consist of concentric layers of nacre of extreme tenuity laid down around a centre. This centre may be an irritant sand-grain, which never results in more than an inferior pearl; or a minute spherule of nacre artificially introduced between the shell and the skin; or a microscopic parasite as in the mussel (*Mytilus*), where pearls are formed around a larval Trematode. It is believed by some authorities, but not proved, that ‘fine pearls’ in the Ceylon pearl-oyster are due to the larva of a tapeworm (*Tetrarhynchus unionifactor*). Others

maintain that a foreign nucleus is rather exceptional, and that the normal centre of a pearl is a variety of shell-substance which arises when the normal rhythm of secretion is disturbed.

Those who believe in the diffusion of culture from ancient Egypt over the world attach great importance to the search for pearls as 'givers of life' (see MAGIC). 'It went by sea,' says Mr Perry, 'from pearl-bed to pearl-bed, until it reached America, and there, again, it spread over the widespread pearl-beds of the American continent.'

The most famous pearls are those of the East; the ancients obtained theirs mainly from Ceylon (Taprobane) and the Persian Gulf, whence many of the best pearls still come. Other pearl-fisheries are in the Sulu Archipelago, off New Guinea, off some parts of the Australian coast, and amongst some of the Polynesian islands. In the Persian Gulf the most important pearl-yielding mollusc is the *Avicula* (*Meleagrina*) *fuscata*. It is specially fished for pearls, and yields them in greatest number and of the finest kinds. It has a much smaller shell than the species which has been long known as the pearl-oyster, *Avicula* (*Meleagrina*) *margaritifera*. This last and another species (*A. macroptera*) are also extensively fished for in the gulf; but, though pearls are found in both, they are much more valuable for their shells. Like *A. margaritifera*, *A. macroptera* has also a large shell. All three species are chiefly fished about Bahrein. The centre of the trade is the port of Lingah, but all the pearls that come thence are called Bombay pearls.

Of the Ceylon pearl-fishery, which, like the Indian ones on the Madras side of the Strait of Manaar, is under government supervision, and is only allowed at intervals, some account is given in the article CEYLON. The method of fishing may be thus described. The season of the fishery, when permitted, lasts from four to six weeks. For each diver there is provided a diving-stone, weighing about 40 lb., which is fastened to the end of a rope long enough to reach the bottom, and having a loop made for the man's foot. To each boat there is usually allotted a crew of thirteen men and ten divers, five of whom are descending whilst the others are resting. This work is done very rapidly; for, notwithstanding the stories of divers who can remain below for four minutes (see DIVING), the best divers cannot, as a rule, remain longer than eighty seconds below, and sixty is more usual. The greatest depth they descend is thirteen fathoms, and the usual depth about nine fathoms. When the diver gives the signal by pulling the rope he is quickly hauled up with his net and its contents. The oysters are allowed to putrefy, in order that the pearls may be easily found. The pearl-fishery in the Mergui Archipelago has become very important since 1890.

The pearls vary much in size; those as large as a pea, and of good colour and form, are the best, though unusually large specimens have the value of rarity—such as the extraordinary one in the Beresford Hope collection, which measures two inches in length, and four in circumference, and weighs 1800 grains. The smaller ones are sorted into sizes, the very smallest being called seed-pearls. A considerable quantity of these last are sent to China, where they are said to be calcined and used in Chinese pharmacy. Amongst the Romans the pearl was a great favourite, and enormous prices were paid for fine ones. The single pearl which Cleopatra is said to have dissolved and swallowed was valued at £80,729; and one of the same value was cut into two pieces for earrings for the statue of Venus in the Pantheon at Rome.

The finest pearls are found within the mantle of the mollusc, close to the lips of the shell, or in the

soft part of the oyster near the hinge of the shell; the worst pearls are those found within the close, coarse fibres of the adductor muscle. At intervals they are found loose in the shell outside the body of the oyster, and may when large get washed out of the shell and thus be lost. Lastly, pearls are often found embedded more or less deeply in the shell, having in some cases escaped from the soft tissues. It is notable that the adherent pearls occur almost invariably in the flat or lower valve; occasionally, it is true, they are found embedded in the rounded or upper valve, but in such cases it is observed that the shell has been found lying at the bottom in the reverse position. The pearls found embedded in or under the 'muscular impression' are always small, irregular, and worthless, similar to those found embedded in the adductor muscle itself. Pearls are found in infinite variety of form, and the consecutive layers vary in brightness, colour, and perfection. The most highly prized pearls are quite spherical, and it is evident from their shape that these must have been formed free in the mantle or in the soft tissues of the mollusc, and not cemented to the shell. Some pearls show defects caused apparently by the contact of new foreign substances, organic or inorganic, such as a grit or film of weed: and in some cases it requires a number of layers completely to hide these defects. Thus every new layer secreted changes the value of the pearl. When a pearl that has been cut from the shell presents a hemispherical surface, it is sometimes called a 'perle bouton'; such a pearl is flat on one side and rounded or convex on the other. If a solid pearl has an irregular shape, having grown over a rough object, it is known as a baroque pearl. Sometimes warty pearls are hollow, and pass under the name of 'coq de perle.'

Pearl-oysters are in the habit of burying such intruders as they cannot otherwise dispose of. Stones, mud, small shells, wood, and especially layers of weed are found thus embedded in shells forming unnatural excrescences on the surface. These protuberances are gradually removed by the oyster secreting thinner layers of nacre on the top of them than on the base until the surface becomes again level. Slowly, but steadily, the exterior surface of the shell decays and disappears, until the foreign substance, of whatever nature it may be, comes within the reach of advancing dissolution, and thus the oyster literally passes a stone or other intruder through its shell. The Chinese carefully slip little figures of the Buddha below the mantle of the oyster or mussel, and the process of deposition covers them with nacre. By such means the Japanese produced the earlier *Culture-pearls*. A bead of mother-of-pearl inserted between the body of the oyster and the shell became in the course of four years or so the centre of a more or less hemispherical 'blister' or excrescence on the shell, suitable for cheap jewellery. The problem of getting free spherical culture pearls was taken up by men of science. English and German zoologists proved that the presence of an irritating body was not enough to produce a pearl within the tissues. There must be present also a closed sac of that same shell-secreting epidermis which lines the shell. Such a sac, not continuous with that of the surface, may be introduced, or it may be produced by the irritation or by some unknown cause. Professor Mikimoto's method is to wrap up beads of mother of pearl in pieces of epidermis from another oyster and insert them in the sub-epidermal tissues. The oysters operated on are returned to the sea, and in some seven years the grafted sacs have secreted pearls big enough for the market.

The value of a pearl depends upon its size, shape, colour, brightness, and freedom from defects. The most valuable pearls at the present time are those

which are perfectly round; the button-shaped ranks next, and then comes the drop or pear-shaped pearl. Perfectly round pearls over 25 grains in weight are extremely scarce, and secure high prices. They are greatly sought after to form the centre of necklaces, and large pearls of this character are safe and very profitable investments. The varying tints and colours of pearls are less difficult to understand than some of their eccentricities of growth. The changing condition of the sea, both as regards purity and temperature, the health of the oyster, accidents, such as the discharge of the inky fluid of the cuttle-fish in the neighbourhood of the oyster, all will probably affect the colours of the successive growth-periods of the pearl. Pearls, when of extraordinary beauty, size, and brilliancy, will sell for sums which appear extravagant.

The chemical composition of the pearl is carbonate of lime associated with a small proportion of organic matter. It is easily affected by acids and fetid gases, and may be calcined by exposure to heat. Its sp. gr. is 2.5 to 2.7. Three varieties of pearls examined, British, Australian, and Singhalese, were found to have an identical composition, and consisted of water, organic matter, and calcium carbonate without any magnesia.

The most important marine pearl-fishery (for black pearls) on the American continent is that of Lower California, the central point being at La Paz. In Australian waters fisheries are carried on along the West Australian coast north of lat. 25° S., and in Queensland round about Torres Strait. In the Shark Bay district of Western Australia, which is outside the tropics, *A. imbricata* is the species fished.

River-pearls are produced by fresh-water mussels in Scotland, Wales, Ireland, various parts of Russia, Germany, Canada, and the United States. British pearls are spoken of by Tacitus and Pliny; and in the end of the 17th century the Scottish pearl-industry was of some importance. The Spey, Tay, South Esk, Doon, Dee, Don, Ythan, Forth, and other rivers yield pearls, and a little fishing is still done. In the United States the chief river-pearl fishery is in the Mississippi and its tributaries. China is the headquarters of the trade in river-pearls.

False Pearls are made by blowing very thin beads or bulbs of glass, and pouring into them a mixture of liquid ammonia and the white matter from the scales of the bleak, and sometimes of the roach and dace. The scales of the lower part of the fish are very carefully washed and put to soak in water, when the pearly film falls off and forms a sediment at the bottom of the vessel, which is removed and placed in liquid ammonia for future use. This pearl mixture is injected into the glass beads, so as to coat them thinly inside; afterwards the better kinds have melted white wax or mucilage of gum-arabic poured in, which renders them much more durable. In this way are produced imitations of the finest oriental pearls, such as only the practised eye can detect. The art of giving the irregular forms of large pearls to the glass bulbs increases the resemblance; and the glassy appearance caused by the exterior glass coating is removed by exposing it for a short period to the action of the vapour of hydrofluoric acid. *Roman pearls* are lighter, as they have the coating of pearly matter on the outside.

See Streeter's *Pearls and Pearling Life* (1886), Kunz's *Gems and Precious Stones of North America* (1890), and Herdman's Reports on Ceylon pearl-fisheries.

MOTHER OF PEARL. The shells of several species of molluscos animals are popularly known as mother of pearl, those, for instance, of *Avicula macroptera* and of some species of *Haliotis*. To the shells, however, of *Avicula* (*Meleagrina*) *margar-*

tifera the term mother of pearl is properly applied. This species has a wide distribution in tropical seas. Macassar mother of pearl, from white-edged shells, is the most highly prized; the Manila yellow-edged shells are not much inferior; and the shells from some parts of Australia are also of a high quality, but those from Auckland are generally of a gray texture. The poorest shells come from Panamá. By far the greatest supply of mother of pearl is now got from the north and north-west of Australia, but large quantities also are obtained from the Straits Settlements, the Persian Gulf, and the islands of the Pacific. In Britain and the Continent thousands of persons work it for inlaid-work, fans, buttons, cutlery handles, trays, &c. The shell of the large pearl-oyster is thick, of slow growth, and sometimes measures nearly a foot across. For its play of colour, see IRIDESCENCE.

Pearl Ashes. See POTASH.

Pearl Harbour. See HONOLULU.

Pearl Powder. See BISMUTH.

Pearson, CHARLES HENRY (1830-94), born at Islington, and educated at Rugby, King's College, London, and Oriel and Exeter Colleges, Oxford, was successively professor or lecturer on Modern History at King's College, London (1855-65), Trinity College, Cambridge (1869-71), and Melbourne University (1874). He went into the colonial parliament in 1878, and in 1886-90 was Minister of Education. He died in London. His chief work was *National Life and Character* (1893). Earlier was a *History of England in the Early and Middle Ages* (1867). See Sketch by Strong, prefixed to a volume of his articles (1896), and the final *Life* by Stebbing (1900).

Pearson, JOHN, a learned English divine, was born 28th February 1612, in the same year as Jeremy Taylor, at Great Snoring, Norfolk, the son of the rector of that parish and Archdeacon of Suffolk. He was educated at Eton and at Queen's and King's Colleges, Cambridge, and became Fellow of the last in 1634. Five years later he took orders, and was collated to a prebend in Salisbury Cathedral. In 1640 he was appointed chaplain to the lord-keeper Finch, and soon after was presented to the rectory of Thorington in Suffolk. In 1650 he was appointed preacher at St Clement's, Eastcheap, London, and here in 1659 he published his admirably learned and judicial *Exposition of the Creed*. It was dedicated to his flock, to whom the substance of it had been preached some years before in a series of discourses, and it is still esteemed one of the very ablest works produced in the greatest age of English theology. During the same year (1659) Pearson edited the *Golden Remains of the Ever Memorable Mr John Hales of Eton*, with an admirable preface; and next he had a share in editing the *Critici Sacri* (1660). At the Restoration honours and emoluments were lavishly showered upon him, and he was successively Master of Jesus and Master of Trinity, Cambridge, and in 1673 Bishop of Chester. He died 16th July 1686. Other works were on the epistles of Ignatius, Cyprian, and sacred chronology, besides sermons and *Determinationes Theologicæ*.

Pearson, KARL, born in London in 1857, studied at University College School, London, King's College, Cambridge (where he became fellow), Heidelberg, and Berlin, and in 1895 became professor of applied mathematics and mechanics, and afterwards of eugenics, in London. He has written *The Ethics of Free-thought*, *The Grammar of Science*, *The Chances of Death*, and on elasticity and strength of materials, evolution, eugenics, and edited *Biometrika* (1902-24). His *Life and Letters of Francis Galton* (1915 et seq.) is a new kind of biography, in which the head of the Eugenics

Laboratory applies the principles of his science to the study of its founder.

Peary, ROBERT EDWIN (1856-1920), admiral (1911), born at Cresson Springs, Pennsylvania, entered the U.S. Navy in 1881, and worked as engineer at the Nicaragua Ship Canal surveys and elsewhere. But he is known to the world by his many adventurous and successful Arctic journeys (1886-1909), in which he proved Greenland an island, outlined the NE. corner, and brought back Ross's meteorite (1818). In his sixth voyage (1905-6) he left his ship, the *Roosevelt*, in 82° 27' N. lat., and went north in sledges, reaching 87° 6'. On his final journey he wintered at Cape Sheridan, and on 1st March 1909 left the coast of Grant Land with sledges, reaching the North Pole on 6th April.

Peasant Proprietorship is a system of cultivation of small holdings of land by occupiers who own the land, or hold it on some secure or permanent tenure. Perhaps there are few questions on which there is a greater diversity of opinion. On the one hand the small cultivator is held up as a pattern of industry, thrift, and prosperity, and on the other as an example of unceasing toil and miserable failure.

Arthur Young (q.v.) held that the best system of agriculture was that which secured the largest amount of produce from the land. It is evident, however, that account must be taken of the numbers, quality, and condition of those engaged in tilling the soil. Even if it could be proved that vast areas of land could be cultivated at the greatest money profit, by means of machinery and a handful of labourers, yet such a method of cultivation would probably be adverse to the real interests of the nation as a whole.

There is substantial evidence, however, that small holdings of land are more productive in proportion than large farms for certain kinds of food. It has been calculated that the small holdings of countries like Belgium and Denmark show greater gross receipts per acre than do the large farms of Great Britain, and that in Great Britain itself the amount of stock per acre carried on small holdings is larger—with the exception of sheep—than that carried on a similar area of land in large farms. But the system of peasant proprietorship in its strict sense is much more characteristic of continental agriculture than of British. In France especially peasant owners have long been a numerous class. In Germany agrarian reforms were inaugurated by Stein and Hardenberg early in the 19th century. In that country to-day, of 5½ million separate holdings, 5¼ million are owned by the occupiers. The vast majority of holdings in the Netherlands are in the hands of cultivating owners, and the small and medium-sized farms are generally the best cultivated and managed. The great prosperity of agriculture in Denmark, and the large and increasing exports of butter, eggs, cattle, and pigs, are due to the fact that the great bulk of the land is cultivated by owners, mainly by peasant proprietors. The majority of the agricultural labourers in Denmark possess a cottage with a small piece of land. Belgium is rather a country of small cultivators than of peasant proprietors, but yet is a striking example of the advantages of *la petite culture*. In England and Wales, on the other hand, although the majority of agricultural holdings are under 300 acres in extent, over 80 per cent. of them are farmed by tenants; thus the peasant proprietor class is all but negligible.

Britain depends more and more on foreign countries for a supply of the smaller articles of food, such as dairy produce, fruit, vegetables, honey, &c. The system of farming which obtains in

Britain is not adapted to the supply of these articles. The large farmer who raises corn and cattle cannot successfully compete with the small grower who is accustomed to minute and intensive cultivation, whilst the tenant farmer, unless he feels himself absolutely secure, cannot be induced to take an owner's interest in the land which he cultivates. Peasant proprietorship is a business requiring close personal attention, hard work, and the strictest frugality. As owner of his little holding, the peasant proprietor has no restrictions as to cropping or methods of cultivation, no doubts about compensation for unexhausted manures and improvements, and no uncertainty as to tenure. The great secret of success of peasant proprietorship is summed up by Adam Smith in a striking passage in his *Wealth of Nations*: 'A small proprietor who knows every part of his little territory, who views it with all the affection which property, especially small property, naturally inspires, and who upon that account takes pleasure not only in cultivating but in adorning it, is generally of all improvers the most industrious, the most intelligent, and the most successful.' The two great drawbacks of peasant proprietorship are excessive subdivision and the unlimited power of mortgage. The land-hunger—especially in France—is so great that the proprietor of a few acres will submit to any privation to save money, and will borrow at any rate, in order to acquire more land. The money-lender on the Continent, like the 'gombeen' man in Ireland, has been a cause of trouble and difficulty to the small cultivator. The establishment of various forms of agricultural co-operative societies, however, has done much to better the position of the peasant proprietor (see CO-OPERATION).

Towards the end of the 19th century the creation of a peasant proprietorship in Great Britain began to be seriously entertained as a practical question. In 1889 a Select Committee on Small Holdings declared that the extension of small ownerships was a matter of national importance both in the interests of the rural population, and also as adding to the security of property generally. The Small Holdings Act, passed in 1892, empowered County Councils to purchase land and resell it on accommodating terms in small holdings, not exceeding fifty acres, to suitable persons who would themselves cultivate it. In 1907 a further Small Holdings Act was passed, the chief object of which was the creation of tenants rather than proprietors; whilst in 1908 the various acts relating to small holdings and allotments were consolidated in one measure known as the Small Holdings and Allotments Act, 1908. This measure, however, which empowered County Councils to acquire land and let it out to small holders, has not been as successful as was anticipated. These acts, together with those of 1919 and 1923, are discussed at ALLOTMENTS and LANDLORD AND TENANT. The Irish Land Acts of 1903 and 1909 practically provide for the establishment of peasant proprietorship in Ireland. See articles above mentioned, also that on CROFTERS.

See Laveleye's works on the rural economy of Belgium and the Netherlands (1864-75); Laveleye, *Économie Rurale de la France* (4th ed. 1877); Thornton, *Peasants for Peasant Proprietors* (new ed. 1874); Collings, *Land Reform* (1906); Turnor, *The Land and its Problems* (1921); and Fordham, *The Rebuilding of Rural England* (1924).

Peasant War (*Bauernkrieg*), a great insurrection of the German peasantry which broke out in the beginning of the year 1525. The oppression of the peasants had gradually increased in severity as the nobility became more extravagant and the clergy more sensual and degenerate. The example of Switzerland encouraged the hope of success, and

from 1431 to 1517 there were risings amongst the peasants of the south and west of Germany. A peasant rebellion took place in the Rhine countries in 1502, and another in Württemberg in 1514, both of which were put down without any abatement of grievances. The Reformation, by stirring up the desire of freedom, must be reckoned amongst the causes of the great insurrection itself; although Luther, Melancthon, and the other leading reformers, whilst urging the nobles to justice and humanity, strongly reprobated the violent proceedings of the peasants. The Anabaptists, however, encouraged them, and peasant insurrections, quickly suppressed, took place in 1522 and 1523. In January 1525 the peasantry of the abbacy of Kempten suddenly assailed and plundered the convent. This proved the signal for a rising of the peasants throughout the south of Germany. Many of the princes and nobles at first regarded the insurrection with complacency, because it was directed in the first instance chiefly against the ecclesiastical lords; some, too, because it seemed to set bounds to the increase of Austrian power. But the Archduke Ferdinand hastened to raise an army, and entrusted the command of it to Von Waldburg, a man of stern and unscrupulous character. Von Waldburg defeated and destroyed some large bodies of peasants, but was himself defeated by them on the 22d of April. Meanwhile the insurrection extended, and a number of towns took part in it, as Heilbronn, Mühlhausen, Fulda, Frankfurt, &c., but there was a total want of organisation and co-operation. On 25th March 1525 there appeared in Upper Swabia a manifesto, in which the insurgents demanded the free election of their parish clergy; the appropriation of the tithes, after maintenance of the parish clergy, to the support of the poor; the abolition of serfdom; the restoration to the community of forests, fields, and meadows which the secular and ecclesiastical lords had appropriated; release from arbitrary augmentation and multiplication of services, duties, and rents; the equal administration of justice; and the abolition of some of the most odious exactions of the clergy. The conduct of the insurgents was not, however, in accordance with the moderation of their demands. Their many separate bands destroyed convents and castles (more than 1000 in all), murdered, pillaged, and were guilty of the greatest excesses. A number of princes and knights concluded treaties with the peasants, conceding their principal demands. The siege of Marienberg, near Würzburg, gave time to their enemies to strengthen their forces: Götz von Berlichingen (q.v.) was one of the captains of the besieging peasants, who, he afterwards maintained, had forced him to lead them. In May and June 1525 the peasants sustained a number of severe defeats; and the Landgrave Philip of Hesse, the Saxon Dukes, the electors of the Palatinate and Treves, and Frundsberg were successful farther north. The peasants were everywhere treated with terrible cruelty; more than 130,000 were killed in Upper Germany alone. Multitudes were hanged in the streets, and many were put to death with the greatest tortures. Würzburg and other towns which had joined them suffered the terrible revenge of the victors. It is supposed that more than 150,000 persons lost their lives in the Peasant War. Flourishing and populous districts were desolated. The lot of the defeated insurgents became harder than ever, and many burdens of the peasantry originated at this period. The cause of the Reformation and of German national life also was very injuriously affected. Similar peasant insurrections in other countries are treated of under TYLER, CADE, KETT, JACQUERIE, SPARTACUS.

See works by Jörg (1851), Cornelius (1861), Baumann (1877), Fries (1883), Hartfelder (1884), Belfort Bax (1899); and works cited at GERMANY, LUTHER, &c.

Peastone, or **PISOLITE**, a coarse Oolite (q.v.).

Peat, a substance formed by the decomposition of plants amidst much moisture, as in marshes and morasses. The remains are often so well preserved in it that the species can be easily distinguished. Reeds, rushes, and other aquatic plants may usually be traced in peat, and stems of heath are often abundant in it; but it chiefly consists in the northern parts of the world of different species of *Sphagnum* or Bog-moss (see BOG-PLANTS). These mosses grow in very wet situations, and throw out new shoots in their upper parts whilst their lower parts are decaying and being converted into peat; so that shallow pools are gradually changed into bogs. Stools and trunks of trees often occur under peat in the British Islands and in north-western Europe generally. And not only so, but similar stools and trunks are frequently met with in a middle position—i.e. resting on peat and covered by a variable thickness of the same accumulation. It cannot be doubted that the overturning of trees, whether by natural causes or by man's hand, would in many cases impede surface drainage, and so eventually give rise to the formation of bogs. But there is reason to suspect that the succession of 'buried forests' and peat so frequently seen in the bogs of north-western Europe points to climatic changes (see POST-GLACIAL SYSTEM). Peat passes by insensible degrees into Lignite (q.v.). The less perfectly decomposed peat is generally of a brown colour; the more perfectly decomposed is often nearly black. Moist peat possesses a decided and powerful antiseptic property, which is attributed to the presence of gallic acid and tannin, and is manifested in the perfect preservation not only of ancient trees and of leaves, fruits, &c., but sometimes even of animal bodies. Thus in some instances human bodies have been found perfectly preserved in peat after the lapse of centuries.

The formation of peat takes place mainly in the colder parts of the world. In warmer regions decay is too rapid. The surface covered by peat in England is considerable; it is greater in Scotland, and very great in Ireland. Some large peat-bogs occur in the south of Europe, even near the sea, and farther north they are still more extensive; they occur also in the northern United States, but more extensively in Canada and Newfoundland. For their physical characters and reclamation, see BOG, WASTE LANDS.

Mere peat is not a good soil, even when sufficiently drained, but by the application of lime, marl, &c., it is soon converted into valuable land, yielding excellent crops. A mixture of peat is often of benefit to soils otherwise poor; and for many shrubs, as rhododendrons, kalmias, whortleberries, &c., no soil is so suitable as one largely composed of peat. Bacterised peat is peat used as a medium for application of nitrogen-fixing bacteria to land. It is peat treated with a mixed culture of *Bacillus radriicola* and *Azotobacter chroococcum*. See NITROGEN-FIXATION.

Peat is a fuel, of great future importance. Up to now, however, the vast amount of energy stored up in the world's peat-bogs has hardly been touched, owing to the fact that even a well-drained peat-bog contains some 80 to 90 per cent. of water, which may be reduced by 'air-drying' to about 15 to 25 per cent. The calorific value of *air-dried* peat averages about 3000 K.C.U.s. per kilogram (5400 B.Th.U.s. per lb.), which is less than half that of a good bituminous coal. Dry ashless peat contains 50 to 65 per cent. of carbon, 4.5 to 6.8 per cent. of hydrogen, 30 to 45 per cent. of oxygen, 0.5 to 2.5 per cent. of nitrogen, together with a

very small amount of sulphur. Its calorific value is between 5000 and 5500 K.C.U.s. per kilogram (9000 to 9900 B.Th.U.s. per lb.).

A great deal of inventive skill has been brought to bear on the problem of devising some method whereby the moisture in natural peat can be got rid of without resorting to 'air drying,' but as yet no complete solution has been disclosed, although promising attempts have been made along the lines of a combination of moderate heat and compression in specially designed presses.

In 1909 the late Dr Ekenberg published proposals for eliminating the water from peat-pulp by a so-called process of 'wet carbonisation,' whereby the pulp is forced at 200 to 300 lb. per square inch pressure through a series of tubes heated externally to 200° C., and subsequently dehydrated under mechanical pressure (*Journal of the Iron and Steel Institute*, 1909, vol. i. p. 313).

Inasmuch as peat containing up to 60 per cent. moisture can be gasified in gas-producers under ammonia recovery conditions, it is a valuable potential source of ammonia, owing to its usually large nitrogen content compared with other natural fuels. Also, on carbonisation it yields a valuable charcoal. That prepared from uncompressed peat is unsurpassed as regards its antiseptic and deodorising properties; whilst that made from compressed peat is denser than wood charcoal, and, on account of its low sulphur content, is highly valued in connection with the making and tempering of the finer kinds of cutlery steel. Other valuable products of the carbonisation of compressed peat are ammonia, pyroligneous acid, acetone, methyl alcohol, &c., the commercial recovery of which is still to a large extent an unsolved problem.

Pebble (probably allied to *bubble*, from the sound of water running among stones), a small, round, water-worn stone of any kind; but with jewellers sometimes an agate—agate being often found as loose pebbles in streams, and those of Scotland in particular being popularly designated *Scotch Pebbles*. Hence the name has come even to be extended to rock-crystal when not in the crystalline form. Deposits of pebbles (in the sense of water-worn stones) occur among the rocks of all periods, but the pebbles are seldom loose; they are generally cemented together by iron, lime, or silica, forming a pudding-stone of greater or less hardness (see CONGLOMERATE). Single pebbles are sometimes found in deposits which have been formed in perfectly still water, as in chalk and fine silt. They must have been floated to their places entangled in roots.—**BRAZILIAN PEBBLES** (so called from Brazil having been long famous for the purity of its rock-crystal) are very pure pieces of Rock-crystal (q.v.) used for lens-making.

Pebrine, the formidable silkworm disease, due to a Protozoon parasite, *Glugea* or *Nosema bombycis*, one of the Myxosporidia. See PASTEUR, SILK.

Peć (Turk. *Ipek*), a town of Yugoslavia, 73 m. ENE. of Scutari, contains the monastery founded by Archbishop Arsenius in the 13th century, which is the seat of the Patriarchs of the Serbian Church, and contains the famous marble throne on which they are crowned. There is a church dating from the 16th century.

Pecan. See HICKORY.

Peccary (*Dicotyles*), a genus of the family Suidæ, containing at least two species. They have fewer teeth (thirty-eight) than the ordinary swine (forty-four), and a very short tail. The name *Dicotyles* is derived from a gland upon the back, almost corresponding in position to the navel below. *D. torquatus* is found from Arkansas to Patagonia, and is about 3 feet long; but the larger and fiercer *D. labiatus* only ranges from

Central America to southern Brazil. The latter is exceptionally pugnacious, and, as it goes about commonly in herds, it is extremely dangerous to



Peccary (*Dicotyles labiatus*).

meet with. Even the jaguar is said to retire before several of these animals when banded together. The two species freely breed together.

Pe-chi-li, GULF OF, a land-locked extension of the Yellow Sea (q.v.), between the base of the Korean peninsula and the Chinese province of Shantung, into which the Pei-ho (q.v.) discharges.

Peck, a measure of capacity for dry goods, such as grain, fruit, &c., used in Britain, and equivalent to two imperial gallons, or 554.548 cubic inches. It is thus the fourth part of a Bushel (q.v.). The old Scots peck, the sixteenth part of a boll, when of wheat was slightly less than the imperial peck, but when of barley was equal to about 1.456 of it.

Pecock, REGINALD, prose-writer, was most probably born in Wales, about 1395; was a Fellow of Oriel College, Oxford, in 1417; and was ordained acolyte and sub-deacon in 1420, proceeding to deacon's and priest's orders in the two following years. His preferments were the mastership of Whittington College, London; the bishopric of St Asaph's, from Duke Humphrey of Gloucester in 1444, when he also received his degree of Doctor of Divinity, and of Chichester, through the patronage of the ill-fated William de la Pole, Duke of Suffolk, in 1450. A student of great learning and industry, he plunged eagerly into controversy, and compiled many treatises, including the *Reule of Crysten Religioyn* (unprinted; Morgan Library, New York), the *Donet* (ed. Miss Hitchcock, E.E.T.S., 1921), on the main truths of Christianity, the *Folwer* (sequel) to the *Donet* (ed. Miss Hitchcock, E.E.T.S., 1924), and his practical *Book of Feith* (c. 1456; ed. Morison, 1909), written for the Lollards. He gives up infallible authority in the church, makes faith a matter of probability rather than of knowledge, lays a broad foundation for a really rational piety, and makes a noble approximation to the doctrine of religious toleration. His *Repressor of Over Much Blaming of the Clergy* (c. 1455) seeks to promote the peace of the church by plain arguments against Lollardy, written in the mother-tongue. He maintained that bishops had higher duties than mere preaching, and strove with great patience and clear logic to demonstrate the reasonableness of those doctrines and ordinances of the church which the Lollards rejected as not founded on Scripture. Of a liberal and tolerant spirit far before his time, Pecock indicated with much point and originality the teaching of natural religion about man's moral duties, asserting that the judgment of reason must not be overruled and twisted into conformity with Scripture, which rather confirms than serves as the authority for the light of nature. In his argument that Scripture pre-supposes a knowledge of the moral virtues, and that its special object is

to make known those truths which reason could not have discovered, he is distinctly the forerunner of the great Hooker. His attack on the Donation of Constantine is an admirable piece of reasoning, and his argument that experience shows that there is no subject on which men are more likely to err than the interpretation of Scripture deals a deadly blow to the bibliolatriy of Lollardy and Protestantism. Peacock's philosophic breadth and independence of judgment brought upon him the suspicions of the church, and especially of the friars, whom he had stigmatised as 'pulpit bawlers.' The storm of opposition that had long been gathering burst upon his head at a council held at Westminster in 1457. He was hotly denounced for having written in English, and for making reason paramount even to the authority of the old doctors, while many slanderous and baseless charges besides were heaped upon his head. He was summoned before Archbishop Bouchier at Lambeth, where his writings were subjected to examination by twenty-four doctors. In the end he was condemned by the archbishop as a heretic whose doctrines were contrary to St Augustine, St Jerome, and St Gregory, and the cruel alternative was put before him, to abjure his errors or be burned. He elected to abjure, made confession of many errors and heresies of which he had never been guilty, and with his own hands delivered to the executioner his three folios and eleven quartos for the flames. Against the further sentence that he should be deprived of his see he appealed to Rome, and the pope indeed commanded him to be reinstated, but he was prevailed upon to resign his bishopric into the hands of the king. The rest of his days he spent in the abbey of Thorney in Cambridgeshire. Forty pounds a year was allowed for his maintenance; he was to have the service of an attendant, somewhat liberal diet, and a private chamber with a chimney and a passage leading from it which gave a sight of an altar and allowed him to hear mass. He was denied writing materials, and his books were but five—a breviary, a mass-book, a psalter, a legendary, and a Bible. He died about 1460.

See LOLLARDS; also James Gairdner's *Studies in English History* (1881); his monograph (1911) on *The Revue of Crysten Religoun* (1924); Churchill Babington's *Introduction to the Repressor in the Rolls series* (2 vols. 1860); the *Life* by John Lewis (1774; reprinted, Oxford, 1820); F. Schmidt, *Studies in the Language of Peacock* (Uppsala, 1900).

Pecos, a river of New Mexico and Texas, flows some 800 miles SSE. to the Rio Grande.

Pecten. See SCALLOP.

Pectic Acid, Pectin, Pectose. See FRUIT (*Chemical Composition*).

Peculiar. See BENEFICE, DEAN.

Peculiar People, a sect of Faith-healers founded in London in 1838. They reject medical aid in cases of disease, although not in surgical cases, and rely on anointing with oil by the elders, and on unceasing prayer, with patient nursing. They have their own collection of hymns, usually select their preachers from among the elders, and baptise their children when they are considered old enough to understand the ceremony and to express consent. Their communities are not numerous, and the members are nearly all very poor working-folk; but they bear a high character for morality, honesty, and Christian charity.

Pedaliaceæ, a family of 17 genera and 50 species, ranging over tropical Africa, Asia, Australia, and sub-tropical South Africa. It is closely allied to Bignoniaceæ, and distinguished by the peculiar fruits provided with strong and very acute spines or grappels, which are savagely developed on the Grapple-plant (q.v.). See SESAME.

Pedestrianism. See ATHLETIC SPORTS.

Pedicellariæ, very remarkable minute structures on the skin of sea-urchins and starfish, having the form of a stalk with a three-bladed or two-bladed snapping forceps at the summit. Some are poisonous; others keep the surface clear; others catch hold of small organisms.

Pedicularis, a genus of herbs of the Scrophulariaceæ, over 400 species, some with rather large and finely-coloured flowers. Two species *P. palustris* and *P. sylvatica*, are natives of Britain, common in wet grounds. Both have received the name of Lousewort. the English equivalent of 'Pedicularis,' from their supposed influence in producing the lousy disease in sheep—an influence purely imaginary. Their acridity renders them obnoxious to sheep; but cattle, goats, and swine eat them. Continental Europe and the northern parts of Asia produce many other species, and some are found in North America and elsewhere. *P. Sceptrum-Carolinum*, or King Charles's Sceptre, is one of the principal ornaments of marshy grounds in the most northerly countries of Europe.



Lousewort
(*Pedicularis palustris*).

Pedigree (possibly from *pied de grue*, 'crane's foot,' from the slender lines used in drawing pedigrees), a tabular view of the members of a particular family, with the relations in which they stand to each other, accompanied or unaccompanied by a notice of the chief events in the life of each, with their dates, and the evidence of the facts stated. Pedigrees are indispensable aids to the student of history. The materials to be used in the formation of a pedigree are notes of the facts to be set forth, and a recognised series of signs and abbreviations. These notes comprise the name of every person who is to appear in the pedigree, with such dates and circumstances as it may be considered desirable to record. Among the commonest abbreviations are *dau.*, for daughter of; *s. and h.*, son and heir of; *coh.*, coheir of; *w.*, wife of; *s. p.* (*sine prole*), without issue; *v. p.* (*vita patris*), in his father's lifetime; *b.*, born; *d.*, died; *dep.*, deposed; *K.*, king; *E.*, earl, &c. The sign = placed between two names indicates that they were husband and wife; † indicates that they had children; ↓ under a name signifies that the person had children. Men are frequently indicated by small squares, women by circles or lozenges. All persons of the same generation are to be kept in the same horizontal line; and the main line of descent is, wherever possible, to be indicated by keeping the successive names in a vertical column. Continuous lines indicate the succession of the different generations. The members of the same family are generally arranged in their order of birth in two groups—the sons first, and then the daughters; but where the same father or mother has children by more than one marriage, the children of each marriage ought to form distinct groups. The actual arrange-

ment, however, of a pedigree must always depend on the leading object which it is intended to illustrate. Specimens may be seen in the articles **BONAPARTE** and **BOURBON**.

Tabular genealogies, generally brief, and meant to illustrate some particular claim of right, are found among the records, public and private, of the early middle ages; but after the incorporation of the English Heralds' College far more attention was devoted to the compilation of pedigrees of families, more particularly with reference to their claims to dignities and heraldic insignia. In the course of the 16th century the heralds obtained copies of all such accounts of the English families of any distinction as could be supplied to them, and entered them in the books which contain the records of their official proceedings. Royal commissions were issued till 1704 to the two provincial kings-of-arms, empowering them to visit in turn the several counties of England, in order to collect from the principal persons of each county an account of the changes which had taken place in their respective families in the interval since the last preceding visitation, and to inquire what account could be given of themselves by families who had stepped into the rank of gentry, or had become settled in the county since that period. The register-books kept by the heralds and their assistants contain the pedigrees and arms collected in the course of the visitations, with the signatures of the heads of the families. See the article **HERALDRY**.

In Scotland, in the absence of the regular system of visitations which prevailed in England, there is a great deal of evidence regarding the pedigrees of the historical families of the country scattered here and there in public and private collections, including the Scottish National Library and the Lyon Office. A register of genealogies exists in the Lyon Office, in which the pedigrees of applicants, after being proved to the satisfaction of the heraldic authorities, are inserted with the accompanying evidence; and the Register of Arms contains much valuable information. To what extent the register of genealogies in the Lyon Office may be admitted as a probative document, conclusive of the facts which it sets forth, has not been ascertained by actual decision; but there can be no doubt that, in questions both as to property and honours, it would be regarded as a most important adminicle of proof.

The construction of pedigrees has proved scientifically valuable for the study of the kinship systems of primitive peoples, and for problems of heredity and Eugenics (q.v.).

See the works of Sir Bernard Burke (q.v.) and Sir Harris Nicolas (q.v.); Doyle, *Official Baronage* (1886); Foster, *Peerage, Baronetage, and Knightage* (1883), and *Collectanea Genealogica* (1882); Marshall, *The Genealogist's Guide* (1879; 2d ed. 1885); Roberts, *Calendarium Genealogicum* (1865); G. Burnett, *Popular Genealogist* (Edin. 1865); Rye, *Records and Record Searching* (1888); Whitmore, *The American Genealogist* (1862; 2d ed. 1875); Durrie, *Bibliographia Genealogica Americana* (1863); Douglas's *Scots Peerage* (1764; re-ed. Sir J. Balfour Paul, 1904-11); E. Round, *Peerage and Pedigree* (1910).

Pediment, the triangular space over the portico at the ends of the roof of classic buildings. It may be called the gable of classic buildings, and is frequently enriched with sculpture, for which it forms a fine setting. See **GREEK ARCHITECTURE**.

Pedlars. See **HAWKERS**.

Pedometer, an instrument for measuring walking distances. It has a dial which records revolutions of the mechanism; and the mechanism is generally actuated by the relative movement of a comparatively heavy suspended mass attendant on each step, though in some forms it is driven by

a cord connected with the foot. In all cases the thing measured is the number of steps rather than the distance walked; and the user must find the true meaning of the readings of the apparatus as applied to his own walking.—An instrument attached to the wheel of a carriage so as to mark the number of revolutions of the wheel and so the distance traversed is called *hodometer* or *odometer* (Gr. *hodos*, 'way,' and *metron*, 'measure'). This is usually a train of wheelwork attached to the axle of the carriage, and communicating motion to an index on a dial. A similar instrument, called a *cyclometer*, is attached to bicycles and tricycles. The name *odometer* is also given to a wheel used by surveyors, which records the distances in miles or rods.

Pedrell, FELIPE, Spanish composer, was born in 1841 at Tortosa. His knowledge of music was acquired mainly without a teacher. He became a member of the Spanish Academy in 1895, was professor in the Madrid Royal Conservatory and lecturer at the Ateneo; he removed to Barcelona in 1903, and died there in 1922. His works include a series of operas *El Último Abencerraje* (1874), *Barcelona*, *Quasimodo* (1875), *Cleopatra* (1881), a trilogy *Pineros* (1902), besides choral works, symphonic poems, and songs. Pedrell wrote on music and folk-lore, and edited, among other things, the *Hispanica Schola Musica Sacra*.

Pedro I. (1798-1834), emperor of Brazil (1822-31), second son of John VI. of Portugal, fled to Brazil with his parents on Napoleon's invasion of Portugal, and became prince-regent of Brazil on his father's return to Portugal. For the proclamation of Brazilian independence and subsequent history, see **BRAZIL**.—**PEDRO II.**, his son, born 2d December 1825, became king in 1831 on his father's abdication, was declared of age in 1840, and, distinguished by his love of learning and simple scholarly tastes, reigned over Brazil in peace until the sudden revolution of November 15, 1889, compelled him to withdraw to Europe, where he lived, mainly in France, Brazil becoming a republic under the name of 'United States of Brazil.' He died at Paris, 5th December 1891. See *Life* by Mossé (1889).

Pedro the Cruel, king of Castile and Leon, was the only legitimate son of Alfonso XI., and was born at Burgos, 30th August 1334. On his father's death (1350) Pedro succeeded to the throne without opposition, but left the whole exercise of power to his mother, Donna Maria of Portugal, and Albuquerque, his father's prime-minister and chancellor. But by the instigation of his mistress (afterwards his queen), Marie de Padilla, Pedro emancipated himself in 1353 from the guidance of the queen-mother. He now obtained exceeding popularity; but the strict justice with which he decided all causes between the rich and poor, the clergy and the laity, combined with a haughty and imperious carriage towards them, alienated from him the nobles and clergy. The plottings of Albuquerque, who had fled to Portugal, having culminated (1354) in a revolt in Estremadura, Pedro marched against the rebels, but was betrayed by his brother Henry and taken prisoner. Escaping, he found himself speedily at the head of a powerful army, with which, despite the excommunication of the pope, he speedily reduced his opponents to submission. But having been betrayed by his relatives, and even by his mother, he became suspicious of every one; and the rest of his reign was devoted to the destruction of the power of the great vassals, the establishment of his own authority on the ruins of their feudal tyranny, and long-continued and bloody wars with the kingdoms of Aragon and Granada. He owes the epithet Cruel mainly to the murder

of his brother Don Fadrique in 1358. But he is still often called in Spain 'the Justiciary,' from remembrance of his better qualities. The people were in general well and justly governed, but the heavy taxes imposed to maintain the cost of his long wars with Aragon and Granada dissipated his popularity. Henry, who had fled to France, now seizing the favourable opportunity, returned (1366) at the head of a body of exiles, backed by Bertrand du Guesclin (q.v.) with an army of mercenaries, and aided by Aragon, France, and the pope. Pedro, however, by great promises of territory and money, prevailed upon Edward the Black Prince to espouse his cause. Edward invaded Castile in the spring of 1367, totally defeated Henry and Du Guesclin at Navarrete (13th April), taking the latter prisoner. But the king disgusted his chivalrous ally by his cruelty to the vanquished, and paid no heed to his remonstrances; Edward accordingly repassed the Pyrenees, and left the misguided monarch to his fate. The whole kingdom groaned under his cruelties; rebellions broke out everywhere; and, in autumn 1367, Henry returned with 400 lances, the people immediately flocking to his standard. Pedro's scanty and ill-disciplined forces, including many Saracens, were routed at Montiel (14th March 1369). Captured by Du Guesclin, he was carried to a tent, where a single combat took place between him and Henry, in which Pedro, on the intervention of a follower of Henry's, was slain, 23rd March 1369. See Prosper Mérimée's book (1848; 2d ed. 1865; Eng. trans. 1849), and Storer's (1910).

Peduncle. See FLOWER.

Peeblesshire, or **TWEEDDALE**, a southern county of Scotland, bounded by Edinburgh, Selkirk, Dumfries, and Lanark shires. Irregular in outline, it has a maximum length and breadth of 29 and 21 miles, and an area of 347 sq. miles or 222,240 acres. The Tweed, rising in the extreme south, winds 40 miles north-north-eastward and eastward, descending therein from 1500 to 450 feet; and from it the surface rises into big, round, grassy hills—Windiestraw Law (2161 feet), Minchmoor (1856), Hartfell (2651), Broad Law (2754), &c. Among the Tweed's numberless affluents are Talla, Biggar, Lyne, Manor, Eddleston, Leithen, and Quair Waters, of which the Talla supplies Edinburgh with water. About one-eighth of the entire area is arable; but nearly 200,000 sheep graze on the hillsides. The antiquities include over fifty hill-forts, the 'Romano terraces,' a Roman camp at Lyne, the ruined castles of Neidpath and Drochil, and the old mansion of Traquair; whilst 4 miles SW. of Peebles is the cottage of Davie Ritchie, the 'Black Dwarf' (1740-1811). Peebles and Innerleithen are the only towns. The county unites with South Midlothian to return one member. Pop. (1801) 8735; (1841) 10,499; (1881) 13,822; (1921) 15,330.

PEEBLES, the pleasant county town, stands on the left bank of the Tweed, 22 miles S. of Edinburgh. It has a parish church (1887) and other modern churches; the Chambers Institution (1859-1912), with library, museum, &c., in the old house of the Yester and Queensberry families; a hydro-pathic; a cross; a public park (1887); tweed manufactures; the tower of St Andrew's Church (1196), restored in 1882 by Dr William Chambers (q.v.), who rests beneath its shadow; remains of the Cross Church, and of the town wall. Mungo Park was a surgeon here. Peebles was made a royal burgh in 1367, and till 1832 returned one member. Pop. (1861) 2045; (1881) 3495; (1921) 5537.

See Dr A. Pennicuik's *Description of Tweeddale* (3d ed. 1875), Dr John Brown's *Minchmoor* (1864), and *Charters of Peebles* (1873); and the histories of Dr W. Chambers (1864), Sir G. Douglas (1899), and John Buchan (1925).

Peel, a coast town of the Isle of Man, 11½ miles by rail NW. of Douglas. On Peel Hill (450 feet) is a tower called Corrin's Folly; and on an island sheltering the harbour stand the beautiful ruins of Peel Castle, celebrated by both Scott and Wordsworth. It dates from the 12th century, but was mainly rebuilt by the fourth Earl of Derby in 1593. St German's Cathedral, a cruciform ruin, with a crypt and low central tower, is included in its area. Fishing is Peel's chief industry, but as a watering-place attracts yearly more and more visitors. Pop. 2500.

Peel, **SIR ROBERT**, statesman, was born on 5th February 1788, near Bury in Lancashire. His father, Sir Robert Peel (1750-1830, created a baronet in 1800), was a wealthy cotton-spinner, from whom he inherited a great fortune. He was educated at Harrow, and at Christ Church, Oxford, where he took a double first in 1808, and entered the House of Commons in 1809 as member for Cashel, adopting the strong Tory politics of his father. Perceval was then prime-minister. Peel set quietly about the business-work of the House, feeling his way with that steady prudence and persevering diligence that were the conspicuous features of his character. In 1811 he was appointed Under-secretary for the Colonies; and from 1812 to 1818 he held the office of Secretary for Ireland. In this capacity he displayed a strong anti-Catholic spirit (whence the witty Irish gave him the nickname of 'Orange-Peel'), and was in consequence so fiercely attacked by O'Connell that even the cool and cautious Secretary was stung into sending the agitator a challenge. The police, however, prevented the duel from taking place. From 1818 till 1822 Peel remained out of office, but not out of parliament, where he sat for the university of Oxford. He now began to acquire a reputation as a financier and economist, and in 1819 was appointed chairman of the Bank Committee, and moved the resolutions which led to the resumption of cash-payments. He was still as averse as ever to anything like religious or political reform. No member of the Liverpool-Castlereagh cabinet could have been to appearance more resolute; he even vehemently defended the 'Peterloo Massacre' of 1819. In 1822 he re-entered the ministry as Home Secretary—Canning shortly after becoming Foreign Secretary, on the suicide of Lord Castlereagh. The two worked together pretty well for some time, as Peel devoted himself chiefly to financial matters, and especially to the currency; but 'Roman Catholic emancipation' was a question on which Canning was considerably in advance of his brother-secretary; and when the former was called upon by the king, after the resignation of Lord Liverpool, to form a sort of Whig-Tory ministry, Peel, along with the Duke of Wellington and others, withdrew from office. Yet it is singularly characteristic of this most honest statesman that even when he seceded (1827) his opinions were veering round to the liberal and generous view of the claims of Roman Catholics; and when the death of Canning, shortly after, led to the formation of the Wellington-Peel government, its great measure—actually introduced by 'Orange-Peel' himself—was the ever-memorable one for the 'relief' of the Roman Catholics (1829). As Home Secretary he also signalled himself by a reorganisation of the London police force (since popularly called 'Peelers' and 'Bobbies'), and by the introduction of several other important measures.

Meanwhile, the university of Oxford had rejected its apostate representative, and chosen in his stead Sir Harry Inglis. And now came on the great question of parliamentary reform, which Peel firmly but temperately opposed. In 1830 the Wellington-Peel ministry fell, and was succeeded

by a Whig ministry under Earl Grey, which, in 1832, carried the Reform Bill. Peel (now, by the death of his father, Sir Robert Peel), when he saw that reform was inevitable, accepted defeat and its results with great equanimity. He shrank from anything like factious opposition to the measure, and contented himself with presenting as forcibly as he could the political *per contra*. After it was passed he became the leader of the 'Conservative' opposition; and, as we have said, accepting reform itself as a *fait accompli* and irreversible, he only sought by a keen and vigilant criticism of Whig measures to retard the too rapid strides of liberalism. In 1833, when the first reformed parliament assembled, Peel took his seat as member for Tamworth, which he represented till the close of his life. On the retirement of the Melbourne ministry in November 1834 he accepted the office of prime-minister, but could not succeed in giving stability to his administration; he was compelled again to give place to Viscount Melbourne in April 1835, and resumed his place as leader of the opposition. Peel's conduct in opposition was always eminently patriotic. The Whigs, who were being pressed on the one side by the new Radical party and the Anti-corn-law League, and on the other by O'Connell and the Irish repealers, gradually lost ground, and, being all but defeated in 1841 on a motion of want of confidence, dissolved parliament. The general election that ensued was virtually a contest between Free Trade and Protection. Protection won; and, when the new parliament met, a vote of no confidence was carried by a majority of ninety-one.

The Conservative party, headed by Peel, now came into office. The great feature of the new government was the attitude it adopted on the corn-law question. The Whigs, while in office, and even after their expulsion, were bent upon a fixed but moderate duty on foreign corn; the Anti-corn-law League would hear of nothing short of an entire repeal, while Sir Robert was in favour of a modification of the sliding-scale of duty which had existed since 1828. He introduced and carried (1842), in spite of strong opposition, a measure based upon this principle. The deficit in the revenue, which had become quite alarming under the Melbourne administration, next engaged his attention, and led him to bring in a bill (1842) for the imposition of an 'income-tax' of 7d. in the pound, to be levied for three years. To alleviate the new burden Peel commenced a revision of the general tariff, and either abolished or lowered the duties on several very important articles of commerce, such as drugs, dye-woods, cattle, sheep, pigs, salted meat, butter, eggs, cheese, and lard. He also showed himself resolute in the repression of the malcontents of Ireland. O'Connell (q.v.) was tried for conspiracy, and, though the judgment against him was set aside on appeal to the House of Lords, the influence of the 'agitator' was broken. The first half of 1845 was marked by the allowance to Maynooth being increased and changed into a permanent endowment instead of an annual grant, and by the foundation of the Irish unsectarian colleges, and other important measures. But the potato-rot in Ireland during the autumn, followed by a frightful famine, rendered 'cheap corn' a necessity, if millions were not to starve. Cobden and the League redoubled their exertions. Lord John Russell announced the views of the Whig party on the crisis, and Peel again yielded. He told his ministerial colleagues that the corn laws were doomed, and that their repeal was inevitable. Some of them refusing to go along with him, he resigned, but after a few days was recalled, and resumed office. Lord Stanley (afterwards Earl of Derby) seceded, and,

with Lord George Bentinck, Disraeli (whose savage attacks goaded Peel into sending him a challenge), and others, formed a 'no-surrender' Tory party; but the Duke of Wellington, Graham, Aberdeen, Gladstone, and other eminent Conservatives stood by him, and the measure for the repeal was carried. He was, however, immediately afterwards defeated on an Irish Protection of Life Bill. Not so much upon this account as because he felt that the course which he had pursued had produced a dissolution of the old ties of party, and that he could not expect for some time to find himself at the head of a strong government, Peel retired from office in June 1846, giving place to a Whig administration under Lord John Russell, to which he gave an independent but general support as the leader of a middle party rather Whig than Tory. In the critical times of 1847-48 he was one of the most important props of the government, whose free-trade principles he had now completely accepted. His ecclesiastical policy had also undergone a remarkable change, and he now frankly supported the Whigs in the efforts to carry an act for the repeal of the Jewish disabilities. He was himself regarded by the working and middle classes generally with much grateful respect. He had a keen English interest in sport, and a cultivated taste in matters literary and artistic. An accident put an end to his career. On the 28th of June 1850 he had delivered a great speech against Lord Palmerston in the Don Pacifico matter; but on the following day he was thrown from his horse near Hyde Park Corner, and was so much injured that he died on the night of the 2d of July. He was buried in the church of Drayton Bassett, his Staffordshire home. Peel left five sons, the eldest of whom, SIR ROBERT (1822-95), and the second, SIR FREDERICK (1823-1906), held office as ministers; whilst ARTHUR WELLESLEY, the youngest (1829-1912), was Speaker of the House of Commons from 1884 to 1895, when he was created Viscount Peel.

See *Sir Robert Peel from his Private Papers*, ed. C. S. Parker (3 vols. 1891-99), his *Memoirs* (2 vols. 1857), his *Speeches* (5 vols. 1835-1853), his *Private Letters* (ed. G. Peel, 1920); monographs by Guizot (1851), Laurence Peel, Lord Dalling, Barnett Smith, F. C. Montague (1888), Justin McCarthy (1891), J. R. Thursfield (1891), Lord Rosebery (1899), Shaw Lefevre, *Peel and O'Connell* (1887); Greville's *Memoirs*; Beaconsfield's *Bentinck*; Morley's *Cobden*; Froude's *Beaconsfield* (1890); Croker's *Memoirs* (1884); also CORN LAWS, CATHOLIC EMANCIPATION.

Peel, or PEEL-TOWER, the name given to fortified towers or small castles of the type common on the Scottish border. Originally 'peel' denoted the earthen works, surmounted by palisades, which surrounded and defended the courtyard and tower; but later on the name was applied to the tower itself. See BORDERS, CASTLE; and a monograph by G. Neilson (1896).

Peele, GEORGE, an Elizabethan dramatist, was son of James Peele, Clerk of Christ's Hospital, and was born most probably about 1558. He had his education there, and went up to Oxford in 1571. Next year his name is found on the list of members of Broadgates Hall, now Pembroke College, and from December 1574 to 1579 he was a student of Christ Church. He took his bachelor's degree in 1577, his master's in 1579. He seems to have had a reputation at the university as a poet and arranger of dramatic pageants, but by 1581 he had removed to London, where for seventeen years he lived a roystering Bohemian life as actor, poet, and playwright, dying a discreditable death in 1598. 'As Anacreon died by the pot, so George Peele by the pox,' writes Meres. We know that he married in 1583, and was one of those warned to repentance by the miserable Greene in his *Groatsworth of Wit bought with a Million of Repentance*

(1592), Little confidence need be put in *The Merry Jest* of George Peele (1607), which are mostly ancient and borrowed witticisms, representing Peele as a shifty and disreputable trickster and vagabond haunter of taverns. His best work, *The Arraignment of Paris*, a dramatic pastoral containing some exquisite verse and ingenious flatteries of Elizabeth, was published anonymously in 1584. Another pastoral play, *The Hunting of Cupid* (1591), is lost. In 1585 he was employed to write the Lord Mayor Dixi's Pageant, and in 1591 he prepared another for the mayoralty of Sir William Webbe. His fine and spirited *Farewell* to Sir John Norris in his expedition to Portugal in 1589 (eked out by *A Tale of Troy*); his *Eclogue Gratulatory* (1589) to the Earl of Essex on his return; his *Polyhymnia* (1590), on the retirement of Sir Henry Lee from the office of queen's champion (closing with the exquisite song 'His golden locks time hath to silver turn'd,' quoted in *The Newcomes*); his *Speeches* for the reception of Queen Elizabeth on her visit (1591) to Burghley at Theobalds; and his *Honour of the Garter*, written on the occasion of the investiture of the Earls of Northumberland and Worcester (1593), are other examples of the occasional poems that flowed from his fluent pen, and helped him to make a shifty living.

The historical play of *Edward I.* (1593) has descended in a very corrupt text, and is grievously marred by its baseless slanders against the stainless Queen Eleanor, due to the anti-Spanish prejudice of the time. His bombastic and ranting play, *The Battle of Alcazar*, was published anonymously in 1594, and was followed by another now lost, which in the *Merry Jest* is named *The Turkish Mahomet and Hiren the Fair Greek*. It is doubtless this play that is alluded to in Pistol's 'Have we not Hiren here?' His charming play, *The Old Wives' Tale* (1595), which most probably gave Milton the subject for his *Comus*, is well defended by Mr Bullen from the contemptuous criticisms of Symonds and Saintsbury. The latter, however, finds much higher poetic merit in *David and Bethsabe* (1599) than either Mr Bullen or Charles Lamb. The last work assigned to Peele is *Sir Clyomon and Sir Clamyes* (1599), but its authorship is more than doubtful.

Peele's works were first collected by Dyce (2 vols. 1828; 2d ed. 1829; a supplementary 3d volume in 1839). A carefully revised re-issue was published, together with Greene, in 1861. The best edition is that by A. H. Bullen (2 vols. 1888). See Ward's *English Dramatic Literature* (1875), and J. A. Symonds' *Shakespeare's Predecessors* (1884).

Peep o' Day Boys, an Ulster Protestant association (1780-95).

Peepul, or **PIPAL** (*Ficus religiosa*), also known as the **SACRED FIG** of India, and in Ceylon called the **BO-TREE**, a species of Fig (q.v.), somewhat resembling the Banyan, but the branches not rooting like those of that tree, and the leaves heart-shaped with long attenuated points. The tree is held sacred by the Hindus, because Vishnu is said to have been born under it. It is generally planted near temples, and religious devotees spend their lives under its shade. It is also held sacred by the Buddhists of Ceylon (see **BO-TREE**). It attains a great size and age. The peepul is often planted near houses, and by the sides of walks, for the sake of its grateful shade. The juice contains a kind of caoutchouc, and is used by women as bandoline. Lac-insects feed upon this tree, and much lac is obtained from it. The fruit is not much larger than a grape, and although eatable is not valued.

Peerage. See **NOBILITY**, **PARLIAMENT**.

Peewit. See **LAPWING**.

Pegasus, in Greek Mythology, a winged horse which arose with Chrysaor from the blood of the Gorgon Medusa, when she was slain by Perseus. He is said to have received his name because he first made his appearance beside the springs (*pégai*) of Oceanus. He afterwards ascended to heaven to carry the thunder and lightning of Zeus. Some later authors make him the horse of Eos. Bellerophon had in vain sought to catch Pegasus for his combat with the Chimæra, but at length was advised by the seer Polydus of Corinth to sleep in the temple of Minerva. The goddess appeared to him in his sleep, and gave him a golden bridle with which he caught him, and by his aid overcame the Chimæra. Modern writers ignorant of mythology make Pegasus the horse of the Muses, with whom, however, he had nothing to do beyond having by a kick of his hoof made spring up the inspiring fountain of Hippocrene.

Pégasus, a genus of small bony fishes, related to the Sea-horses, remarkable for the prolongation



Sea-dragon (*Pegasus draconis*).

of the snout beyond the toothless mouth, the covering of bony plates arranged in rings, and the spinose character of the five anterior rays of the pectoral fins. The members of the genus and the allied *Parapegasus* are found on the coasts of China, Japan, Arabia, the Malay Archipelago, and Australia.

Pegmatite, a variety of Granite (q.v.).

Pegu, a town, division, and river of Lower Burma. The town stands on the river Pegu, 46 miles NE. of Rangoon. The old city was founded in 573 and was made the capital of a powerful independent kingdom. European travellers in the 16th century speak of its great size and magnificence. It was destroyed in the middle of the 18th century by Alompra; but was rebuilt. A celebrated pagoda still stands within part of the old walls. The place was handed over to the British by the inhabitants both in the first and the second Burmese war. Pop. 19,000.—The division has an area of 13,707 sq. m., and a pop. of 1,258,000.—The river rises in the Pegu Yoma Mountains, and flows generally south for 180 miles, joining the Rangoon or Hlaing River.

Péguy, **CHARLES-PIERRE**, French author and publisher, was born of peasant stock on 7th February 1873, at Orleans, and educated there and at Paris University. He intended to take up teaching as a profession, but devoted himself instead to social questions. For a time manager of a socialist publishing concern in Paris, he afterwards established a similar business of his own. In 1897 and 1898 he published several books and a drama *Jeanne d'Arc*. The *Cahiers de la Quinzaine* began to appear in 1900. In the course of his writings Péguy revealed himself as something of a mystic, animated by a profound love of country and humanity, and veneration for the saints. In 1905 appeared *Notre Patrie*, and in 1910 his *Mystère de la Charité de Jeanne d'Arc*. Other works of his are both religious and polemical: the *Mystère des Saints Innocents* (1912), *La Tapisserie de Sainte Geneviève et de Jeanne d'Arc* (1913), *Notre Jeunesse* (1910), &c. He was killed in action at Plessis-

l'Évêque on the 5th September 1914. See Daniel Halévy, *Charles Péguy et les Cahiers de la Quinzaine*.

Pehlevi, an ancient West-Iranian (Median and Persian) idiom, in use chiefly during the period of the Sassanides (235-640 A.D.). See PERSIA, ZEND.

Pei-ho, a river of China, rises near the borders of Mongolia, flows north-east and south-east, past Peking and Tien-tsin, and falls into the Gulf of Pe-chi-li after a course of more than 350 miles. The mouth of the river is defended by the powerful forts of Taku (q.v.). See CHINA.

Peine Forte et Dure, the 'strong and sore torture,' a species of torture formerly applied by the law of England to those who, on being arraigned for felony, refused to plead, and stood mute, or who were guilty of equivalent contumacy. In the reign of Henry IV. it had become the practice to load the offender with iron weights, and thus press him to death; and till nearly the middle of the 18th century pressing to death in this horrible manner was the regular and lawful mode of punishing persons who stood mute on their arraignment for felony. Latterly a practice prevailed, which had no sanction from the law, of first trying the effect of tying the thumbs tightly together with whipcord, that the pain might induce the offender to plead. Among instances of the infliction of the *peine forte et dure* are the following: Juliana Quick, in 1442, charged with high-treason in speaking contemptuously of Henry VI.; Margaret Clitheron, 'the martyr of York,' in 1586, for her constancy to the Catholic faith; Walter Calverly of Calverly, in Yorkshire, arraigned at the York assizes in 1605, for murdering his two children and stabbing his wife; and Major Strangways, in Newgate in 1657, for refusing to plead when charged with the murder of his brother-in-law. In 1720 a person of the name of Phillips was pressed in Newgate for a considerable time, till he was released on his submission; and the same is recorded in the following year of one Nathaniel Hawes, who lay under a weight of 250 lb. for seven minutes. As late as 1741 a person is said to have been pressed to death at the Cambridge assizes, the tying of his thumbs having been first tried without effect. A statute of 1772 virtually abolished the *peine forte et dure*, by enacting that any person who shall stand mute when arraigned for felony or piracy shall be convicted. A later statute (1828) made standing mute equal to a plea of 'not guilty.'

Peipus, LAKE, lies between Russia and Esthonia. On the south it is connected with Lake Pskoff by a long, narrow channel, the length of both lakes being 87 miles, the greatest breadth about 30, the area 1356 sq. m., and the depth from 14 to 49 feet. Their waters, which abound in fish, are carried to the Gulf of Finland by the Narova. The shores are marshy and flat.

Peirce, BENJAMIN, mathematician, was born at Salem, Massachusetts, 4th April 1809, and studied at Harvard, where in 1833 he became professor. In 1849 he became consulting astronomer to the American Nautical Almanac; and from 1867 to 1874 he was superintendent of the Coast Survey. In 1836-46 he issued an admirable series of mathematical text-books, and he contributed to various mathematical journals. His paper on the discovery of Neptune (1848) attracted universal attention; and his papers on the constitution of Saturn's rings (1851-55) were equally remarkable. His great *Treatise on Analytic Mechanics* appeared in 1857; and he left his mark on various departments of mathematical and astronomical investigation. He died at Cambridge, 6th October 1880.

Peishwa. See MAHRATTAS.

Pekan, or WOOD-SHOCK (*Martes pennanti*), an American species of Marten (q.v.), the largest of all the species, was formerly common in North America from Alaska and the Slave Lake into the central United States, but is now extinct in settled districts. There seems to be nothing in its habits to justify its common name of Fisher or Fisher Marten; by hunters it is called Black Fox.

Pekin, capital of Tazewell county, Illinois, on the Illinois River, 10 miles by rail S. of Peoria. It manufactures flour, ploughs, wagons, &c. Pop. 12,000.

Peking, or, as now often pronounced, PEKING (i.e. 'Northern Capital'), the capital of China, is in 39° 54' 36" N. lat. and 116° 27' E. long. It is situated in a sandy plain, and is surrounded by many-gated walls, with suburbs smaller than is usual with large Chinese cities. The visitor coming from T'ien-tsin is not prepared for his approach to it by villas and mansions with their parks and gardens, such as greet him in drawing near to the capitals of the West. At a turn in the road the city bursts at once on his view, standing up grand and grim, complete in itself with its lofty walls, and the loftier towers upon them. The city consists, in fact, of two cities—the Inner and the Outer—known also as the Manchu or Tatar and the Chinese, or, alternatively, as the Northern and the Southern. They are separated by a high wall common to them both, but properly belonging to the former, and giving it the appearance of nearly a square, on which the other partly rests in the form of a rectangle, its southern and northern walls longer than those of the square, but the other two shorter. The walls of the Manchu city average 50 feet in height, and are fully 60 feet wide at the bottom and 40 at the top; the dimensions of those of the Chinese city are less—30 feet in height, and 25 and 15 in width. Those of the former measure 14½ miles in circuit, including its part of the cross-wall, and those of the Chinese city 10. Not counting the cross-wall, the whole circuit measures about 21 miles, including altogether an area of nearly 26 sq. m. In all, Peking has sixteen gates. Over each is raised a tower about 100 feet high, and of very imposing appearance. All the gates of the Manchu city are guarded by semicircular enceintes, enclosing a yellow-tiled temple to Kwan Ti, a hero of our 2d century, now honoured as the 'god of war.'

When a stranger has entered by a gate of the Northern City, and rides or drives along the cross-wall to its central gate, he is greatly impressed by the magnificence of the walls and towers, and readily believes Peking is one of the grandest cities in the world. He sees a street about 200 feet across, lined with what seem to be brilliant shops on each side, with wide spaces for foot-passengers, and between them a carriage-way, raised about two feet, on which a constant stream of vehicles, with horses, mules, camels, and donkeys, is hurrying. But by-and-by this impression of the magnificence of the city is displaced by another of the dilapidation and decay, squalor and filth, which everywhere obtrude themselves. In republican times, however, an edile has been appointed, and municipal improvements of various kinds have been and are being introduced.

Peking is, at least as to part of the site it occupies, one of the most ancient cities of the world. Here stood the metropolis of the feudal state of Yen, whose obscure history is vaguely traceable back to the 8th century B.C. In our 10th and 12th centuries two Tatar tribes that successfully imposed their sovereignty on the northern half of the empire made the old metropolis of Yen their capital. The second of them, which had ab-

sorbed the other, fell before the invading Mongols in the 13th century, and Kublai, a grandson of Genghis Khan, enters the chronological line as sovereign of all China in 1280. He also made Peking his chief capital, and there he was found by Marco Polo, who styles the city *Khan-baligh*, 'the city of the Khan,' a name frequently corrupted in old narratives into *Cambaluc* and *Cambalu*. A century later the Mongols were driven out of the empire by the Chinese Ming dynasty, the founder of which at first fixed his capital at what we call Nanking (q.v.), meaning 'Southern Capital,' after the transfer to Peking by the founder's son; that is to say, the third Ming emperor, called from the name of his reign Yung-lo, on his accession in 1403, made preparations to transfer the seat of government back to the Kublai site. This movement was carried out in 1421, the idea being to concentrate defensive power against the restless Mongols. The south wall of the Inner City was carried half a mile beyond that of Kublai; and a later emperor built in 1552 the wall of the Outer City.

However, the Manchus, when they became masters of the empire in 1643, found this great city ready for them. They had only to maintain it in good condition, and for a time they did so; but for more than a century it was allowed to run very much to decay. As Dr Williams observed a generation ago, 'Peking stands to-day, like the capitals of the ancient Roman and Byzantine empires, upon the debris of centuries of buildings.' A new era in its history commenced in October 1860, when one of its gates was surrendered to the English and French allies, leading to the signing of a treaty within its walls, and the ultimate establishment of the various foreign legations in the Inner City; also over a decade later to the reception of the foreign ministers, though not in the Forbidden City, in June 1873 by the young emperor in person. After the 'Boxer' troubles of 1900, the foreign legations stipulated for small protecting garrisons of their own troops, and also insisted upon a reserved foreign quarter in which the Chinese had only limited rights.

The Inner City is divided into three portions, the largest of which by far may be called the General City. But at the heart of it are two enclosures, into the innermost of which entrance was almost to the end of the 19th century entirely forbidden to uninvited foreigners, and also to the Manchus and Chinese themselves, excepting such as had some official connection with the court. It was called the Purple Forbidden City, is very nearly 2½ miles in circuit, and constituted in fact the imperial residence. In it were the palaces of the emperor, his empress, and other members of the imperial family, most of which are now, of course, occupied by the president and other high republican officials. But there are also other palaces and buildings not a few—for instance, several reception-halls (*tien*). The one which a visitor, entering by the 'Meridian Gate,' would first approach is the *T'ai Ho*, or 'Hall of Grand Harmony,' built of marble on a terrace 20 feet high, and rising itself over 110 feet. Its principal apartment is about 200 feet long and 90 wide, and was furnished with a throne for the emperor, who held his levées here on New-year's Day, his birthday, and other great occasions. Here, too, is the 'Palace of Heavenly Purity,' where the emperor met his cabinet at dawn for the transaction of business. The president, of course, holds receptions of foreign envoys; but buildings in foreign style have been added, motor-cars, telephones, and other modernities introduced. In a word, a state of flux has succeeded to rigid antiquity.

Surrounding the Forbidden City is the 'Imperial'

or 'August' City, an oblong rectangle, about 6 miles in circuit, and encompassed by a wall 20 feet in height. In the space between the wall on the south and that of the Forbidden City, on the right or east of the avenue from the front gate of the cross-wall, stands the great temple in which the emperor and the members of the imperial clan worshipped their ancestors. Opposite to it, on the west or the left of the avenue, is the altar to 'the Spirits of the Land and Grain.' In the corresponding space on the north, between the two enclosures, there is an artificial mound 150 feet high, crowned at five different points with as many Buddhist temples, and well wooded all over. It is called the *King Shan*, loosely translated 'Prospect Hill,' and affords the finest view of the entire city. It is separated from the Forbidden City by a moat, which is crossed by more than one marble bridge. Among the people the common name for it is 'Coal Hill,' their belief being that it was formed by stores of coal, deposited there—when the last Ming emperor, who finally hanged himself here, was threatened by the rebels—by way of provision against a siege. The western portion of 'the August City' goes by the name of the Western Park. A principal attraction in it is an artificial lake more than a mile long, though not nearly so wide, fed by a stream brought from the hills to the west of the city, which used also to supply the moat all round the walls. The lake is crossed by a marble bridge of nine arches, and in the proper season its surface is beautiful with the large, brilliant flowers of the lotus. Certain names may have been changed so as to harmonise better with republican principles, but the external aspect has not altered much.

We now come to the General City. On either side of the avenue leading from the central gate of the cross-wall to the August City were in Manchu times the principal offices of the government—the Six Boards and the Censorate. In the same neighbourhood was the Observatory, whence the Germans in 1901 carried off the old Jesuit instruments, sent back under the Paris peace treaty. Here also were the Provincial Hall for literary examinations, the Colonial Office, and the *Han Lin Yüan*, which we call the 'National Academy,' and to belong to which was the highest literary distinction in China. All these are now things of the past, having left not a wrack behind.

In the north-east of the city is the *Yung Ho Kung*, a grand lamasery, where more than a thousand Mongol and Tibetan monks dwell, and are provided for, while they study their religion under the rule of a *Gegen*, or 'living Buddha.' This remarkable building, which is much visited by foreign travellers, used to be the residence of the third Manchu emperor before he came to the throne. At the north end is a lofty building containing a wooden image of Maitrêya, 70 feet high. A little farther to the west stands, amidst many cypresses, the temple of Confucius; in the lofty hall are the spirit-tablets of the sage and his most celebrated disciples and followers—nothing else. Close by these rises from a circlet of water the *Pi-yung Kung*, commonly called 'The Hall of the Classics,' from the most remarkable thing about it—182 pillared slabs of granite, reared up in two corridors, and having the text of all the classical books engraved on them, in front and behind, in large characters; here the emperor used to conduct the final literary examinations.

In the western side of the city are the headquarters of the general-in-chief, who has the control of the police and garrison of the city, and in some respects directs its civil administration. Here also are the Drum and Bell Towers, both conspicuous objects. Five great bells were cast in the Yung-lo

period, early in the 15th century. One of them is here, another about 2 miles in a north-west direction from the city, in 'The Great Bell Temple.' It is indeed a monster, 14 feet high, 34 feet in circumference at the rim, and 9 inches thick, and is said to weigh 120,000 lb. (see BELL). It is covered, inside and out, with myriads of Chinese characters, from the *Fah Hwa* and *Ling Yen*, two Buddhist sūtras.

Going towards the south wall, we note two great structures on our way. One is the *Ti Wang Miao*, or 'Temple of Emperors and Kings,' where the reigning emperor used to go to worship the spirits of nearly two hundred sovereigns, who are believed to have ruled from the mythical Fuh-hi (at least 3000 years B.C.) down to our own days; and with them are associated the spirits of the ablest and best of their ministers. The other structure is the great Tutelary (wall and moat) Temple of the capital; grimy, and full of fortune-tellers and other quacks, like the corresponding temples throughout the country. All the foreign legations and all the Christian missions are situated within the Inner City; conspicuous among the latter is the new Roman Catholic cathedral, a magnificent structure, completed in 1888.

The Chinese or Outer City is very sparsely populated in comparison with its area, most of the inhabitants being thickly gathered in the neighbourhood of the Inner City gates. Much of the ground is under cultivation, large tracts are wooded, green fields show themselves, and other open spaces are occupied with artificial lakes and tanks. Where it is built over, the streets are for the most part narrow, and the people are busy and bustling. There are club-houses not a few, various temples, and charitable institutions for the poor, the aged, and for children, the last mentioned being cared for in founding hospitals, as in the Inner City. The *T'ien T'an*, or 'Altar to Heaven,' with its adjunct the *Ch'i Ku T'an*, or 'Altar of Prayer for Grain,' and the 'Altar of Agriculture,' dedicated to the ancient sovereign, Shên Nung, to whom the first teaching of husbandry (about 2735 B.C.) is ascribed, are all near the southern wall, and are reached by a 'great street,' or avenue. The first two altars are enclosed by more than three miles of wall, the space within planted with forest trees. Within a second wall is a grove of fine cypresses encompassing the buildings. The 'Altar to Heaven' stands on a splendid triple circular terrace of white marble, with steps leading from one terrace to the next, each being surrounded by a balustrade of the same marble, richly carved. On the upper terrace, which is 30 feet in diameter and about 20 feet above the ground, the emperor appeared to greet the dawning sun on the day of the winter solstice, attended by his grandees and ministers. He had passed the night in the 'Fasting Palace,' which is not far off, in religious vigil. His own place at the altar, where he alternately stood and knelt, is a large circular slab, unflawed and unstained. In front of him is a pavilion containing the tablet for the spirit of *Shang-Ti*, or God, and on either side, in smaller pavilions, are the tablets of his own ancestral line. The religious service that is then celebrated has been performed from time immemorial. With trivial modifications, President Yüan Shi-k'ai went through the same ceremony at Christmas 1913. The 'Altar of Prayer for Grain,' a similar structure, but of less dimensions, was burned down on 18th September 1889; on its upper terrace there was a triple-roofed circular building, the imposing appearance of which, with the splendour of its blue tiles, made it be regarded as more important than the other altar, and to be commonly, though erroneously, styled by foreign visitors 'The Temple of Heaven.' To this altar the emperor

used to come in the early spring to pray for a blessing on the labours of the year. Here also he repaired in seasons of drought to pray for rain, but without any pomp of state. He had to plod his way on foot to the place of fasting, and there brood over his own sins and errors of government before he dared to ascend the altar. A short distance to the east stands the 'Altar of Agriculture,' in an enclosure about two miles in circumference. This contains four different altars—to the Spirits of the Sky, of the Earth, of the planet Jupiter, and of the old Shên Nung. But all these spirits were honoured and sacrificed to, not as independent powers, but as 'servants of *Shang-Ti*,' doing his will for the good of men. The planet has an altar because of the connection which the period of its revolution has with the sexagenary cycle, a complex subject which has been brilliantly elucidated by the Swiss *savant* Léopold de Saussure, and also by the late Professor Édouard Chavannes. The chief attraction of the spot is the ceremony of ploughing which used to take place there in the spring. The emperor came to it attended by certain of his great officials, and turned up a few furrows in a portion set apart for him, as an example of agricultural industry to all his people. Some of the provincial magistrates have portions assigned to them for the same purpose. The ceremony is copied and grotesquely performed by the authorities throughout the country—in latter-day republican times, no doubt, fitfully and with irregularity. The principal streets of the Chinese city are more than 100 feet wide, but the side streets are mere lanes. The streets are not usually paved, and according to the state of the weather are deep in mud or in dust. In the smaller streets the houses are miserable shanties; in the main streets both private houses and shops are one-story brick edifices, the shops being gay with paint and gilding. The shops are open in front, the goods being often piled up outside; and many trades are carried on in the streets or in tents and movable shops. Since the establishment of the republic, here, as in the Northern City, great improvements have been introduced into municipal affairs, a special *sedile* being appointed to look after such things as sewerage, lighting, water-supply, and Western amenities generally; but it is too soon to say that any part of Peking, Inner or Outer (with the exception, perhaps, of the Legation Quarter), has been brought up to the standards of Western capitals.

There are three Catholic cemeteries (Portuguese, French, and native), and a Russian one; and there are mission buildings, Russian and other, and hospitals. The climate of Peking is severe, the temperature in winter being from 25° to 10° F.; and in summer the heat is great, the thermometer rising to 105°, though the usual summer temperature is 75° to 90°.

As to the population of Peking, Du Halde estimated it at about three millions two hundred years ago. The general impression was that in the last quarter of the 19th century it was under a million. No doubt it fluctuated considerably with the fortunes of the dynasty. Dr Williams, after living in the city for years and being *chargé d'affaires* of the American legation, said half a century ago that the residents most likely to form a correct judgment put down the entire population at a million or somewhat less. 'No census returns,' he adds, 'are available to prove this figure, nor can it be stated what is the proportion of Manchus, Mongols, and Chinese, except that the last outnumber both the others.'

During the crisis in the history of the empire to which the Japanese war of 1894-95 led, Peking witnessed various *coups d'état*, and was, in the

years immediately following, a centre of intrigue on the part of the European powers, vast railway schemes being eagerly promoted in the various competing interests. The railway from Peking to T'ien-tsin (73 miles) was opened in 1897; and the lines for which, in the scramble of 1898-99, concessions were granted connect Peking with Hankow, Nanking, Shanghai, Hangchow, and Canton, and with the Manchurian and Siberian systems. The Chinese telegraphs were connected with Siberian lines, and so with Europe, in 1892. Since then there have been enormous developments. The events of 1900 have been recorded under the head of CHINA—the 'Boxer' troubles, the eight weeks' siege of the legations, the expedition of the European and other allies, the withdrawal of the court to Si-ngan Fu, the relief of the legations by the entry of the allies on 14th August, the occupation of the 'Forbidden City,' and the tedious and protracted peace negotiations.

Though great Asian trade routes to Kulja and Semiretchinsk start from Peking, the commerce of the city itself is inconsiderable; provisions are very dear, and many of the people are very poor and miserable. The manufactures are unimportant. The government of the city is distinct from that of the department, and is administered by a superintendent (a high functionary in imperial days called *fu-yin*, but now in republican times styled *king-chao*), a mayor, and officers in the several quarters. Since 1868 there had been an imperial university with American and European professors, and now the Peking Government University and the Peking University (the latter a missionary undertaking) are but two of numerous universities springing up all over China.

Pelagius, a celebrated heresiarch of the 5th century. He was probably born about the middle of the 4th century, in Britain, or, according to some, in Brittany, his name being supposed to be a Greek rendering (*Pelagios*) of the Celtic appellation *Morgan* ('sea-born'). He was a monk, but he never entered into holy orders. He settled in Rome about 400, where he seems to have been scandalised by the low tone and morals then obtaining. His views seem to have been early developed; and during his stay in Rome he seems to have given them full expression—especially in his commentaries on the Pauline Epistles, which were published at this time. It has been remarked that his doctrinal tendencies have something in common with those of the Eastern Church, and may therefore be taken as showing that Eastern influences were still alive in the British churches. But more probably his theology was the outcome of his own devout and earnest, but narrow and anti-speculative mind. Jerome and Orosius tell tales to his discredit; but these are refuted by the respect with which Augustine always speaks of his character and conduct. The controversy about Pelagianism was not started by Pelagius, but by a devoted disciple of his. In Rome he had attached to his views a follower of great energy named Cœlestius, probably an Irish Scot, originally a lawyer, who was practising in Rome when Pelagius came thither. He became a monk, and accompanied Pelagius wherever he went. In 410, after the sack of the city by the Goths, the two withdrew to Africa. After some time Pelagius made a pilgrimage to Jerusalem, where he met St Jerome. Cœlestius having remained at Carthage, and sought to be admitted to ordination, his doctrines became the subject of discussion, and in a synod several opinions ascribed to him were condemned—proceedings which introduced St Augustine into the controversy. Meanwhile Pelagius remained at Jerusalem, and news of the proceedings at Carthage having been carried to Palestine, in 415 he was accused of heresy before

the synod of Jerusalem. As adopted by Cœlestius, his doctrines seem to have been a reaction against Gnosticism, Manichæism, and Fatalism, in the interest as he conceived of a higher morality than he found in Rome. The Pelagian heresy was held to deny original sin; Adam's sin injured himself only; his posterity are born as innocent as he was before the fall. Adam would have died even if he had not sinned. Children are baptised that they may be united to Christ, not that they may be purged from original sin. It is possible to live without sin. Grace as understood by the Catholic Church was not required; free-will and the teaching of the law may suffice; Pelagius did not grant that the will must be moved by God before a man can take one step onwards towards life eternal. The essence of the doctrine is a view of the freedom of the will that may be called liberty of indifferences; the will is equally free to choose to do good and to do evil. This freedom is found also in heathens; and thus natural ability heightens human responsibility, while it seems to diminish the need of divine grace.

The impeachment failed, and in a synod subsequently held at Diospolis in the same year Pelagius evaded condemnation by accepting the decrees of the synod of Carthage. But a new synod of Carthage in 416 condemned Pelagius and Cœlestius, and wrote to Pope Innocent I. requesting his approval of the sentence, with which request Innocent complied. Zosimus, the successor of Innocent, wavered; but a council of 214 bishops was held in Carthage, in which the doctrines of Pelagius were formally condemned in nine canons; and on receipt of these Zosimus reopened the cause, cited and condemned Cœlestius and Pelagius, and published a decree adopting the canons of the African Council, and requiring that all bishops should subscribe them, under pain of deposition. Nineteen Italian bishops refused to accept these canons and were deposed. Their leader was Julian, Bishop of Eclanum, near Beneventum. Pelagius himself was banished from Rome in 418 by the Emperor Honorius, and he and Cœlestius were again condemned by the Council of Ephesus in 431. The date and place of the death of Pelagius are not known. The most important of the writings on the Pelagian side have been lost. Julian is chiefly known through the replies of Augustine, whose anti-Pelagian treatises are edited by the Rev. Dr W. Bright (1880). Pelagius's *Fourteen Books of a Commentary on St Paul's Epistles*, his *Epistle to Demetrius*, and his *Memorial to Pope Innocent*, included by collectors in the works of St Jerome, are much mutilated, but yet almost certainly genuine. All his other works have been lost, except some fragments.

SEMI-PELAGIANISM was a modification of the doctrine of the Pelagians as to the powers of the human will, and as to the effects to be attributed to the action of the supernatural grace of God, and of the divine decree for the predestination of the elect. The Pelagians, discarding altogether the doctrine of the fall of Adam, and the idea that the powers of the human will had been weakened through original sin, taught that man, without any supernatural gift from God, is able, by his own natural powers, to fulfil the entire law, and to do every act which is necessary for the attainment of eternal life. The condemnation of this doctrine by the several councils held in the early part of the 5th century is capable of various constructions, and has been urged by some to the extreme of denying altogether the liberty of man, and converting the human will into a merely passive instrument, whether of divine grace upon the one hand, or of sinful concupiscence upon the other. The writings of St Augustine on this controversy have been differently construed by the different

Christian communions, and the same diversity of opinion existed in his own day. Among those who, dissenting from the extreme view of Pelagius, at the same time did not go to the full length of the Augustinian writings in opposition to Pelagius, were some monks of the southern provinces of Gaul, and especially of Marseilles, whence their school was called Massilian, from the Latin name (*Massilia*) of that city. Of these leaders the chief was a priest named Cassian (Joannes Cassianus), who had been a deacon at Constantinople. Of the system which he propounded it may be enough to say that it upheld the sufficiency of man's natural powers only so far as regards the first act of conversion to God and the initial act of man's repentance for sin. Every man naturally possesses the capability of beginning the work of self-conversion; but for all ulterior acts, as well as for the completion of justification, the assistance of God's grace is indispensable. The Semi-Pelagian doctrine is often confounded with that of the Molinistic (see MOLINA) school of Roman Catholic theology; but there is one essential difference. The latter persistently maintain the necessity of grace for all supernatural acts, even for the beginning of conversion, although they are generally represented as agreeing with the Semi-Pelagians as to the mode of explaining the freedom of the human will acting under the influence of divine grace. The chief writers in the controversy were Prosper, Hilary, and Fulgentius; and the question was referred to Celestine, Bishop of Rome in 431. It continued, however, to be agitated in the West for a considerable time. Faustus, Bishop of Reji (Riez in the Basses Alpes), towards the end of the 5th century revived the error, and it was condemned in a council held at Arles in 475, and still later in a synod (the second) held at Arausio (Orange) in 525, and again in the third council of Valence in 530. The words of Augustine were formally accepted; but the tendency which produced Pelagianism and Semi-Pelagianism has often reappeared.

See works on Pelagius by Wiggers (1832; trans. by Emerson, Andover, 1840); Jacobi (1842); Wörter (1866); Klasen (1882); for Semi-Pelagianism, the monograph of Geffen (1826); also the articles AUGUSTINE, JANSEN, PREDESTINATION, SIN, WILL.

Pelargonium, a genus of plants of the family Geraniaceæ, including many of the most favourite greenhouse flowers, to which the old generic name *Geranium* is often popularly given. The characters which distinguish *Pelargonium* from *Geranium*, as now restricted by botanists, are given in the article GERANIUM. The species are numerous, and mostly natives of South Africa, and a few are natives of the Canary Islands. Some of them are herbaceous and some are stemless; most of them are half-shrubby. Some have tuberous rootstocks. The leaves exhibit great variety in form, division, &c. The flowers are always in stalked umbels, which arise from the axils of the leaves, or in the stemless kinds from the midst of the leaves. *Pelargonium inquinans* forms perfect thickets in Southern Spain and Morocco, whilst *P. zonale*, the kind with circular leaves marked with a brown stripe, is completely naturalised in Italy. The branches of this latter species, as well as those of *P. carnosum* and *P. crithmifolium*, are eaten, roasted in ashes, by the Hottentots. Some species not possessing much beauty of flower are cultivated for the grateful odour of their leaves, which in some resembles that of roses, in others that of apples, lemons, &c.; whilst that of many species is rather unpleasant. A few species endure the open air in the south of England; many are planted out in summer even in Scotland. Water must be liberally supplied during flowering; but no plants more strongly require a period of rest,

and water must then be very sparingly given. The shrubby and sub-shrubby kinds are easily increased by cuttings either of the branches or the roots, stout pieces of the latter being best. Sandy soil and very moderate supplies of water are requisite till the cuttings are rooted, when richer soil and more water are needed. The tuberous-rooted species are increased by cuttings of the roots and by seed.

Pelasgians, a term somewhat variously used for certain inhabitants of ancient Greece. In Homer the Pelasgi seem to have been an unimportant tribe living in Thessaly. Herodotus seems to regard the Pelasgi not as Hellenic, but as barbarians who had occupied Hellas or parts of it ere the Hellenes came thither (see GREECE, section on *History*). Modern students have also interpreted the term differently. Some regard the Pelasgians as the pre-Aryan occupants of Greece, others as the common ancestors of Greeks and Italians. Since the startling discoveries of Mycenaean culture in Crete (a phase of native Aegean culture), culminating in the Bronze Age, the name has been given to the non-Aryan Mediterranean race, which was gradually mixed with invaders of (Aryan) Achæan and, later, of Dorian stock. Then 'Cyclopean' (or less frequently 'Pelasgian') is a name applied to certain architectural works in Greece, which probably date from before 1000 B.C., and are wholly unconnected in point of evolution with any style of Greek architecture subsequently developed. The characteristic which distinguishes Cyclopean work from any other form of architecture is that it consists of huge polygonal stones, which may or may not be so arranged as to fit into one another without interstices requiring lesser stones to fill them up, but which are always hewn and are always kept in their places not by means of mortar or any other binding substance, but by their own great weight. On the other hand, work of this kind is not necessarily ancient: other considerations than the nature of the work itself are requisite to date it. Nor is it confined to Greece: similar remains are to be found in Egypt, Asia Minor, Sicily, Sardinia, Spain, and Crete, as well as in Greece and Italy. The most notable ancient Cyclopean works in Greece are the walls of Tiryns, Psophis, and Mycenæ, the Lion Gate and so-called Treasuries (graves) of the latter place, and a (probable) temple on Mount Ocha. These Cyclopean walls (especially at Tiryns) were so thick as to allow galleries to be run lengthwise through them. At Tiryns window-like openings look down from these galleries on to the town. That these galleries served the purposes of fortification in some way is clear, but in what way is not clear. The walls are broken by gates, of which the best known is the celebrated Lion Gate at Mycenæ. In this form of doorway, in order to relieve the pressure on the lintel (which rests horizontally on the perpendicular stone doorposts), a triangular space is left above the lintel, and this space is filled, in the case of the Lion Gate, with a slab, on which are sculptured the figures of two animals (not lions) rampant, one on either side of a pillar. This quasi-heraldic device is undoubtedly of oriental origin, or imitated from some Assyrian model, but proves nothing as to the origin of the architecture or its builders. The same means for relieving the pressure on the lintel is employed in ancient remains in Cornwall. The Treasuries or tombs are underground chambers in the shape of bee-hives, vaulted with overlapping stones, and approached by a narrow passage through the side of the hill in which they are situated. For the Pelasgian or Minoan architecture in Crete, uncovered since 1900, see CRETE. The term Cyclopean was applied by the Greeks to that kind of architecture on the strength of the

popular etymology of the term: *kylklôpes* = builders of a 'cycle' or ring-wall. See CYCLOPES.

Pelayo, said to have been the first Christian king of Spain (q.v.), seems to have made head against the Arabs in Asturias (q.v.) in the 8th century.

Pelee. See MARTINIQUE, ST PIERRE.

Pelesch, a royal castle of Rumania, built by Doderer of Vienna in 1873-84, in a romantic situation in the mountains, 70 miles N. of Bucharest.

Pelew Islands, also PALAU, a group in the Pacific, south-east of the Philippines, at the western extremity of the Caroline Archipelago, were, with the Caroline and Marianne Islands (except Guam), purchased by Germany from Spain in 1899, and in 1919 assigned to Japan as mandatory of the League of Nations. There are about twenty-five islands, mountainous, wooded, and surrounded with coral-reefs. Area, 170 sq. miles. The principal is Babelthouap or Babeltop. The soil is rich and fertile, and the climate healthy. Bread-fruit, coconuts, sugar-cane, palms, areca-nuts, yams, &c. are grown. Turtles, trepang, and fish abound on the coasts. The inhabitants, about 3000, are of the Malay race. The men go entirely naked, and the women nearly so. The islands were discovered by the Spaniards in 1543, and visited again in 1696.

See Semper, *Die Palauinseln* (1873); Kubary, *Die sozialen Einrichtungen der Palauer* (1885); Marche, *Lupon et Palouan* (Paris, 1887); F. W. Christian, *The Caroline Islands* (1899); Finsch, *Karoliner und Marianen* (1900).

Pelham, THE FAMILY OF, takes its name from a castle and lordship in the north-east of Hereford, and was elevated to the peerage in the person of Sir Thomas Pelham, who in 1706 was created Baron Pelham, and married Lady Grace Holles, sister of the Earl of Clare. His successor, THOMAS PELHAM HOLLES, Duke of Newcastle, and minister of the first two Georges, was born in 1693, and educated at Westminster and Clare Hall, Cambridge. In 1711 he succeeded to the vast estates of his maternal uncle the Duke of Newcastle, and next year to the peerage of his father, the first Lord Pelham. George I. rewarded his services by creating him Earl of Clare (1714) and Duke of Newcastle in Northumberland (1715). He was made Lord-lieutenant of Middlesex and Nottingham, and a Knight of the Garter in 1718, and in the same year he married Lady Henrietta Godolphin, granddaughter of the great Marlborough. In 1724 he succeeded Carteret as Secretary of State, and held the office continuously under Walpole and his successors for thirty years, although a man of no particular ability except in parliamentary tactics. In 1754 he succeeded his brother, Henry Pelham, as premier, but retired in November 1756 to give place to the Duke of Devonshire, himself being rewarded with the title of Duke of Newcastle-under-Lyme, with special remainder to the Earl of Lincoln, his niece's husband. In July 1757 he was again premier, and compelled to take the first William Pitt into his ministry and to give him the lead in the House of Commons, and the supreme direction of the war and of foreign affairs. A succession of brilliant victories followed—Newcastle being only nominal head of the administration—and the great commoner had almost brought the war to a successful termination, when the accession of George III. led to the resignation of Pitt, and the replacement of Newcastle, in May 1762, by Lord Bute, as head of the ministry. Newcastle declined a proffered pension, with the remark that if he could no longer serve he would not burden his country. In the Rockingham ministry, formed in 1765, he filled for a few months the office of Privy Seal. He died in August 1768.—His younger brother, HENRY PELHAM (1696-1754), took an active part in sup-

pressing the rebellion of 1715, became Secretary of State for War in 1724, and was a zealous supporter of Walpole. In 1743 he was made head of a ministry as First Commissioner of the Treasury and Chancellor of the Exchequer. Events during his ministry were the war of the Austrian succession, the Jacobite rebellion of the '45, the successful financial bill of 1750 (see GEORGE II.), the reform of the calendar, and Lord Hardwick's Marriage Act. His father's ducal title descended to Henry, ninth Earl of Lincoln, whose great-grandson,

HENRY PELHAM-CLINTON, fifth Duke of Newcastle, and twelfth Earl of Lincoln, was born 22d May 1811, and educated at Christ Church, Oxford. He represented South Notts in parliament from 1832 to 1846, when he was ousted by the influence of his father, the fourth duke, for supporting Sir Robert Peel in his free-trade measures. He was a Lord of the Treasury in the brief Conservative administration of 1834-35, and First Commissioner of Woods and Forests in the Peel administration, 1841-46. He was then made Irish Secretary, but went out of office with his chief a few months afterwards. He succeeded to the dukedom in 1851, and returned to office in 1852, filling the post of Secretary of State for the Colonies in the Aberdeen government. The war with Russia broke out, and in June 1854 it was found necessary to create a Secretary of State for War, and the new office was assigned to Newcastle. The terrible sufferings of the British army before Sebastopol in the winter months of 1854 raised a storm of popular discontent, and when the House of Commons determined to inquire into the conduct of the war the duke resigned. He was Colonial Secretary in the second administration of Lord Palmerston, and held the seals with general approval from 1859 till his death, 18th October 1864. See Life, by Martineau (1908).

Pelican (*Pelecanus*), a genus of birds comprising a family, *Pelecanidae*, having a very long, large, flattened bill, the upper mandible terminated by a strong hook, which curves over the tip of the lower one; beneath the lower mandible a great pouch of naked skin is appended; the tongue is very short, and almost rudimentary; the face and throat are naked, the wings of moderate length, the tail rounded. The species are widely distributed, frequenting the shores of the sea, lakes, and rivers, and feeding chiefly on fish. Although birds of powerful wing, they are seldom seen at a great distance from land. All of them are birds of large size. They take their prey by hovering over the water, and plunging upon it when it appears. They often fly in large flocks, and the sudden swoop of a flock of pelicans at a shoal of fish is a striking and beautiful sight. They store up their prey in their pouch, from which they bring it out at leisure, either for their own eating or to feed their young. The pouch is capable of being wrinkled up into small size, and of being greatly distended. The Common Pelican (*P. onocrotalus*) is as large as a swan, white, slightly tinged with flesh colour, and, in old birds, the breast golden yellow. The quill-feathers are black, but are scarcely seen except when the wings are expanded. It is a native of the eastern parts of Europe and of many parts of Asia and Africa, and frequents both the seacoast and also rivers and lakes. It makes a nest of grass on the ground in some retired spot near the water, often on an island, and lays two or three white eggs. The parents are said to carry water to their young, as well as food, in their pouch. During the night the pelican sits with its bill resting on its breast. The nail or hook which terminates the bill is red; and it has been supposed that the fable of the pelican feeding its young with blood from its own breast originated in its habit of pressing the

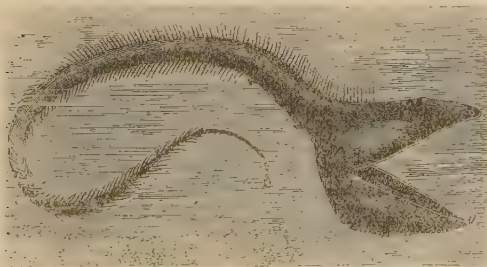
bill upon the breast in order the more easily to empty the pouch, when the red tip might be mistaken for blood. Another explanation is that the characteristic has been transferred to the pelican from the flamingo, which does discharge into the mouths of its young a bloody-looking secretion which it disgorges (see *Notes and Queries*, 1869, ii. p. 361). And long since Sir Thomas Browne in *Vulgar Errors* pointed out that the carvings



Pelican (*Pelecanus crispus*).

and pictures, ecclesiastical and heraldic, of the so-called pelican feeding its young with its own blood were by no means quite like a pelican, and noted that a like tale was told by the Egyptians of the vulture. The story, which was unknown to the classical writers, seems to have originated in Egypt; and the love of the vulture for its young was proverbial there (see *Academy*, 1884, i. p. 97). The Rufous-necked Pelican (*P. fuscus*) abounds in the West Indies and in many parts of America. Other species are found in other parts of the world, and in some places the number of pelicans is prodigious, particularly in some of the most southern parts of the world. See also **HERALDRY**.

Pelican-fish (*Eurypharynx pelecyanoides*), a remarkable deep-sea Teleostean fish, described by



Pelican-fish (*Eurypharynx pelecyanoides*).

Vaillant in 1882. The body is somewhat eel-like, and is fringed on the dorsal and ventral middle line with spinous rays. It is the region of the jaws, however, which is most remarkable, the gape

is so enormous. The fish probably engulfs small animals in whale-like fashion, but at the bottom of the sea instead of at the surface. Gill and Ryder discovered a similar form, *Gastrostomus bairdii*, in 1883, in which the mouth again suggests a pelican's pouch. The equally strange Saccopharyngidae are perhaps allied, but the jaws are less enormous, and the animals are notable for swallowing fishes larger than themselves.

Pelion, the ancient name of a wooded mountain-range in Thessaly, extending along the east coast. According to the myth, the Titans, in order to scale Olympus, the abode of the gods, placed Ossa (q.v.) on the summit of Pelion, the highest peak (5310 feet) of the range. Its sides and summit have always been clothed with forests of oak, chestnut, beech, elm, plane, and pine; it was of Pelion timber that the Argo (see ARGONAUTS) was built. The Centaur Chiron had his home on this mountain.

Pelissier, AMABLE JEAN JACQUES, Duc de Malakhoff, Marshal of France, was born 6th November 1794, at Maromme, near Rouen, and, having passed successfully through the colleges of La Flèche and St Cyr, entered the army. He served on the staff in Spain in 1823, made the campaign of the Morea in 1828, joined the first expedition to Algiers in 1830 as major of cavalry, and in 1839 returned to Algeria with the rank of lieutenant-colonel. In 1845 he acquired an unenviable notoriety by suffocating more than 500 Arabs who took refuge in caves in the Dahra. By 1850 he had attained the rank of General of Division. On the outbreak of the Crimean war in 1854 he was given the command of the first corps, and soon succeeded Marshal Canrobert in the chief command before Sebastopol. On 8th September he stormed the Malakhoff, the key of Sebastopol, for which exploit he was rewarded with a marshal's baton, and on his return to France was created Duc de Malakhoff and a senator, and received a grant of 100,000 francs. In 1858 he came to London as the French ambassador, but resigned his post in the following year, and died governor of Algeria, 22d May 1864. See Hamley, *The War in the Crimea* (1891).

Pelitic Structure, in Geology, applied to rocks which have a texture like that of dried mud.

Pelju. See PELEW.

Pella, the ancient capital of Macedonia, and the birthplace of Philip II. and Alexander the Great, was situated in the midst of marshes, a few miles NW. of Thessalonica, which stood half-way between it and the head of what is now the Gulf of Saloniki. Its royal castle had wall-paintings by Zeuxis.

Pellagra (Ital. *pelle agra*, 'rough skin'), a disease, unknown prior to the first half of the 18th century, which is common among the peasantry of northern Italy, and occurs also among the same class in Corfu, Rumania, the Landes and Gironde in France, in Spain, and more recently in America, in Syria, and occasionally in Britain. But the headquarters of the disease are in the northern and north central provinces of Italy. It is an error to describe pellagra as the result of poverty alone—to call it *il delirio della miseria*. Originally believed to be due to a dietary of diseased maize, it is now usually regarded as a malady brought on by 'deficiency diet,' and it tends to disappear when the food is augmented by fresh articles rich in protein, such as eggs, milk, and meat. The disease makes its appearance in spring, in the form of a reddish-brown rash, which smarts painfully where exposed to the sun and air, as on the bare hands and feet; towards autumn this disappears, leaving, however, hard, dry spots on the skin, and returning

with increased severity in the following spring, and again in each successive year, till the skin becomes shrivelled and yellow, or even black in certain spots, and the body is reduced to a mummified state. A burning feeling in the mouth and bowels is an accompanying symptom, and profuse diarrhoea, along with a rapid wasting and dropsy, is a frequent cause of death. As the disease progresses disorders relating to the nervous system gradually develop, and culminate in melancholy, dementia, or mania; death often ensues from weakness, or the patients drag out their life within the walls of an asylum. In 1817 one of every five or six of the population in some parts of Italy showed symptoms of the disease; in 1881 the deaths from it were nearly 5 per 1000 of the total population, in 1887 about 2; and since then it has steadily decreased, in part owing to the hospitals for special treatment.

Pellat, JOSEPH SOLANGE HENRI (1850-1909), born at Grenoble, was from 1874 lecturer and professor of Physics at Paris.

Pellegrini, CARLO, caricaturist, was born at Capua in 1839, came to London in 1864, and from 1868 till his death on 22d January 1889 was the 'Ape' of *Vanity Fair*, the delineator of its inimitable series of cartoons of celebrities. Especially good was his statuette in red plaster of Mr Lowe standing on a match-box (1871).

Pellico, SILVIO, an Italian poet, celebrated for his long and cruel imprisonment by the Austrians, was born 24th June 1788, at Saluzzo, in Piedmont, and was educated in Pignerol, where his father, Onorato Pellico, a lyric poet, had a silk-factory. In his sixteenth year he accompanied his sister Rosina (on her marriage) to Lyons, where he remained until Foscolo's *Sepolcri* awakened in him a strong patriotic feeling and an irresistible desire to return to Italy. Coming, about 1810, to Milan, he was warmly received by Ugo Foscolo and Vincenzo Monti, and became French tutor in the military school. His tragedies of *Laodamia* and *Franческа da Rimini* gained him an honourable name amongst Italian poets. He also translated the *Manfred* of Byron, with whom he had become acquainted. He lived in great intimacy with the most eminent patriots and authors of liberal views, and took an active part in a periodical called *Il Conciliatore*, which after a time was suppressed on account of its liberal tone. In 1820 he was arrested on a charge of Carbonarism, and sent to the prison of Sta Margherita, and afterwards to the Piombi at Venice. After two years' imprisonment he was condemned to death, but had his sentence commuted to fifteen years' imprisonment, and was carried to the fortress of Spielberg near Brünn; he was, however, liberated in August 1830. During his imprisonment he had written two other dramas; and afterwards he published an account of his sufferings during his ten years' imprisonment, under the title *Le mie Prigioni* (Paris, 1833), which has been translated into many languages, and has made his name familiar where it would not have been known on account of his poetry. Pellico's health, never robust, was permanently injured. The Marchioness of Barolo received him into her house at Turin as her secretary. Pellico subsequently published numerous tragedies and other poems, and a little catechism on the duties of man. He died January 31, 1854. See the *Life* by Chiala (Italian, 1852), and those by Bourdon (Paris, 8th ed. 1885) and Rivieri (1899-1901).

Pellitory, or WALL-PELLITORY (*Parietaria*), a genus of plants of the natural order Urticæ, having both unisexual and hermaphrodite flowers on the same plant, the perianth of both kinds 4-fid. The Common Pellitory (*P. officinalis*), which grows on old walls and heaps of rubbish in Britain and

many parts of Europe and Asia, is a perennial herb, with erect or prostrate stems, ovate leaves, and inconspicuous flowers. It sometimes attracts attention from the manner in which the pollen is copiously discharged in hot summer days by an elastic movement of the filaments. It is an old domestic remedy as a diuretic, owing to the nitre it contains. There is no quicker way of cleaning bottles and decanters than putting in a few fresh leaves of this plant and shaking them with a little water. It is on account of this use in cleaning glass that the Italians call the herb 'Erba vetriola.' The tooth-powder used

Pellitory (*Parietaria officinalis*).

by the empress Octavia consisted of burnt pellitory with some salt and perfume added.

PELLITORY OF SPAIN (*Anacyclus Pyrethrum*) is nearly allied to Camomile (q.v.), a native of the Levant and of Barbary.

Pelopidas, a celebrated Theban general, of noble descent, noted among his fellow-citizens for his disinterested patriotism. The inviolable friendship between himself—one of the richest men in Thebes—and Epaminondas—one of the poorest—is among the most beautiful things recorded in Greek history. In 382 B.C. he was driven from Thebes by the oligarchic party, who were supported by the Spartans, and was forced to seek refuge at Athens, whence he returned secretly with a few associates, 379 B.C., and recovered possession of the Cadmeia, or citadel, slaying the Spartan leader, Leontiades, with his own hand. Plutarch gives us a vivid picture of the adventurous exiles gliding quietly in disguise into the city on a winter afternoon, amid bitter wind and sleet. Having been elected Boeotarch, in conjunction with Melon and Charon, he set about training and disciplining his troops, so that they soon became as formidable as the Lacedæmonians, and were successful in several small encounters with the latter. His 'sacred band' of Theban youth largely contributed to the victory of Epaminondas at Leuctra (371 B.C.), but failed in a subsequent attack on Sparta itself. In the expedition of the Thebans against the cruel tyrant, Alexander of Phæræ (368 B.C.), Pelopidas was, after several important successes, treacherously taken prisoner, when in the character of an ambassador, but was rescued by Epaminondas in the expedition of the following year. He was then sent to Susa, as ambassador from Thebes, to counteract the Spartan and Athenian intrigues going on at the court of Persia, and bore himself very nobly whilst there. His diplomacy was successful. In 364 B.C. a third expedition was planned against Alexander of Phæræ, who, as usual, was threatening the Thessalian towns. The command was given to Pelopidas, and in the summer he marched into Thessaly, where he won the battle of Cynoscephalæ, but was himself killed while too eagerly pursuing the foe.



Peloponnesus ('the isle of Pelops'), now called the Morea (q.v.), a peninsula which formed the southern part of ancient Greece, Hellas Proper being situated to the northward of the isthmus on which stood the city of Corinth. See GREECE. The whole area is less than 9000 sq. m. Among its most important cities were Sparta and Argos. Sparta acquired after the Messenian war a decided supremacy over the other states, and disputed the supremacy with Athens in a war of almost thirty years' duration (431-404 B.C.)—the famous Peloponnesian war, of which the history has been written by Thucydides.

Pelops, in Greek Mythology, the grandson of Zeus, and the son of Tantalus, was slain by his father, and served up at an entertainment which he gave to the gods, in order to test their omniscience. They were not deceived, and would not touch the horrible food; but Demeter, absorbed with grief for the loss of her daughter, ate part of a shoulder without observing. The gods then commanded the members to be thrown into a cauldron, out of which Clotho brought the boy again alive, and the want of the shoulder was supplied by an ivory one. According to the legend most general in later times, Pelops was a Phrygian, who, being driven by Ilos from Sipylus, came with great treasures to the peninsula which derived from him the name of Peloponnesus, married Hippodamia, obtained her father's kingdom by conquering him in a chariot-race, and became the father of Atreus, Thyestes, and other sons. But in what appear to be the oldest traditions he is represented as a Greek, and not as a foreigner. He was said to have revived the Olympic games, and was particularly honoured at Olympia.

Peloria, abnormal regularity in a flower normally irregular, as in *Toadflax* (q.v.).

Pelota, a ball game played, especially by the Basques, against a wall with a wicker racket.

Pelotas, a thriving river-port of Rio Grande do Sul, on the São Gonçalo, near the Lagôa dos Patos, prepares jerked beef; pop. 70,000.

Pel's Fish-owl (*Scotopelia peli*), so named from its discoverer, is found in West Africa and the Zambesi region. It measures about 2 feet in length; its wing is 16½ inches long. Its colour above is a deep rufous bay crossed with numerous irregular bars of black; the wing is similarly barred; the under surface of the body is light bay with heart-shaped bars of black; the bill is of a dark-blue lead-colour, and the iris is dark brown. The birds from the Zambesi are a little larger than those from West Africa. The natives regard this owl as a fetish bird possessing the power of destroying whatever it looks on.

Peltier Effect. See ELECTRICITY.

Peltry, a general term applied to the trade in skins of wild animals, and to the skins themselves. It is understood to mean only skins undressed, except by drying, and chiefly those which, when dressed, are called furs. See FURS.

Pelusium, the Greek name of an ancient Egyptian city, situated at the north-eastern angle of the Delta, and important as the key of Egypt on the Asiatic side. The eastern mouth of the Nile derived from it the epithet Pelusiatic. Its identity with Sin of the Old Testament and the Greek Sais is doubtful. The *Ostrum Pelusiacum* was choked up with sand as long ago as the 1st century B.C., and the whole district is a wilderness of sand and marshes.

Pelvis. This term is used to indicate one of the chief divisions of the skeleton. It consists of the sacrum, coccyx, and the innominate or haunch bones. Each of the latter originally consisted of

three parts—ilium, ischium, pubis—which have become fused together. By the articulation of the pubic bones in the middle line anteriorly the innominate bones form the anterior and lateral aspects of the pelvis. Wedged in between them posteriorly are the sacrum and coccyx. Various powerful ligaments give support to and maintain the pelvic bones in position. Notwithstanding the importance of this part of the skeleton, the ancient Greek physician had no word whereby to designate it, and both Greek and Roman associated the sacrum and coccyx with the vertebral column, and the innominate bones with the lower extremities.

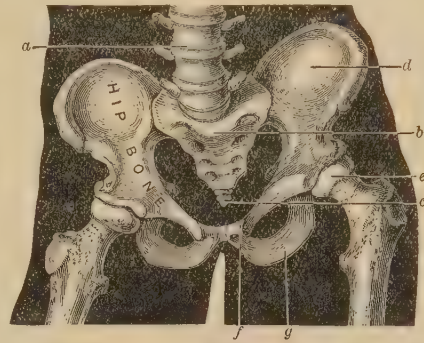


Fig. 1.—Adult Human Pelvis, *in situ* :

a, lumbar vertebra; b, sacrum; c, coccyx; d, ilium; e, head of femur in acetabulum; f, pubis; g, ischium.

The pelvis is divided into two parts by a plane which extends from the upper margin or promontory of the sacrum to the upper margin of the articulation between the two pubic bones—i.e. the symphysis pubis. On the inner surface of each innominate bone a line may be traced from the sacral promontory to the symphysis pubis. This is named the ilio-pectineal line, and it helps to complete the circumference of the plane which divides the pelvis into two parts. The space *above* this plane lies mostly between the expanded iliac bones. It belongs to the abdomen proper, and is named the *false pelvis*. The space below the level of the sacral promontory and ilio-pectineal lines is called the *true pelvis*, and certain descriptive terms are employed in connection with it. Thus the plane which separates it from the false pelvis is called the *inlet* or *brim* of the true pelvis. Its inferior circumference or *outlet* extends from the tip of the coccyx to the inferior border of the pubic symphysis, and from the one ischial tuberosity to the other. Between the ischial tuberosities in front and extending forwards to the symphysis there is the *subpubic arch*. The space between the *inlet* and the *outlet* is named the *cavity* of the true pelvis. The measurements of the true pelvis are made along certain definite lines which are applicable to the brim, the cavity, or the outlet. These are (1) the *antero-posterior* or conjugate diameter—i.e. from the mesial line in front to the mesial line behind; (2) the *transverse* or widest diameter; (3) the *oblique* diameters—right and left. These extend from the articulation between sacrum and ilium on one side to the farthest point on the opposite side of the mesial plane. In the erect attitude of the body the plane of the brim of the true pelvis forms an angle with the horizontal which varies from 60° to 65°. Thus the weight of the upper part of the body which is communicated to the sacrum is directed downwards and transmitted through the innominate bones to the heads of the femora, and so to the inferior extremities. In addition to the ligaments, muscles, blood-vessels, and nerves which constitute the soft parts of the pelvis, there are

certain special organs which are present in both sexes, and others which are peculiar to each sex.



Fig. 2.
a, adult male, and b, female pelvis.

Thus, of those common to both sexes, there are the urinary bladder and the rectum. The urinary bladder is placed behind the symphysis pubis, and only rises out of the pelvis into the abdomen when considerably distended. The rectum—a name applied to that part of the alimentary canal which passes through the pelvis—is placed on the front of the sacrum and coccyx, a short distance below which it terminates in the anus. The lower end of the rectum is supported by two muscles—the *levator ani*—which surround it so completely as to form a floor or diaphragm for the pelvis. In addition to these organs there are others which are characteristic of the sexes. In the male we have the *vesiculæ seminales* and the *prostate gland*—the latter surrounding the outlet of the urinary bladder. In the female we have the *uterus*, *ovaries*, and their various appendages. The diverse functions of these organs have led to corresponding and well-marked differences in the size and form of the osseous pelves of the sexes. In the female the bones are more slender, and the muscular impressions less distinct. The true pelvis has a greater breadth and capacity, but its perpendicular depth is less. The *inlet* is more nearly circular; the ischial tuberosities are wider apart, and the subpubic arch is much wider. All of these differences indicate special modifications in connection with the necessities of child-bearing. Although the depth of the cavity of the true pelvis steadily increases from childhood to puberty, yet the characteristics of the sexes are discernible even at birth.

But not only does the pelvis display features which are characteristic of sex; it also presents characters which are peculiar to individual races of mankind. In this field of study a great amount of valuable work has been contributed by Sir William Turner of Edinburgh University, and embodied in the reports of the *Challenger* expedition. In determining those features peculiar to race numerous measurements have been made, mostly in relation to the cavity of the true pelvis with its brim and outlet; but many of the external dimensions of the entire pelvis have also been noted, as well as the dimensions of individual bones. One of the most valuable of the external measurements is the comparison between the maximum height and breadth of the entire pelvis. A common result is obtained by the following formula, $\frac{\text{height} \times 100}{\text{breadth}}$, which establishes what is called a *breadth-height index*. Another index of great importance is the result of a comparison between the *conjugate* and *transverse* diameters at the brim of the pelvis. This is named the *pelvic or brim index*, and is obtained by the formula, $\frac{\text{conj. diam.} \times 100}{\text{transverse diam.}}$. The measurements are usually recorded in millimetres.

As the result of numerous measurements Sir William Turner has devised a classification of pelves based upon the relation of the conjugate and transverse diameters at the brim of the true pelvis—i.e. upon the *brim index*. Thus, those pelves in which the conjugate diameter of the brim is either longer than the transverse or closely approaches it are named *dolichopellic* (*pellis*, the Greek equivalent of the Latin *pelvis*, 'a basin'; and *dolichos*, 'long'), and in these the brim index is above 95. When the transverse diameter of the brim greatly exceeds the conjugate they are named *platypellic* (*platys*, 'wide'), and the brim index is below 90. In cases where the transverse diameter is not greatly in excess of the conjugate—i.e. where the brim index varies between 90 and 95, both inclusive—the term *mesatipellic* (*mesaitatos*, 'middlemost') is applied. Grouping the pelves under these headings we find that such races as Australians, Bushmen, Hottentots, Kaffirs, Malays, Andaman Islanders, &c. are *dolichopellic*. Negroes, Tasmanians, New Caledonians, &c. are *mesatipellic*. British, French, Germans, Europeans generally, natives of India, Chinese, American Indians, &c. are *platypellic*. These results are obtained from the examination of male pelves, since, as we have already seen, the female pelvis is modified in its diameters in relation to the special requirements of sex.

If now we compare the human pelvis with that of the lower mammalia, we shall find that the human pelvis is characterised by breadth and shallowness and the great capacity of the true pelvis. When, therefore, the conjugate diameter at the brim of the pelvis is longer than the transverse—i.e. when the pelvis is *dolichopellic*—an approach is made to the condition which prevails even to a greater extent among the lower animals, and it is 'a degraded or animalised arrangement' as compared with *platypellic* pelvis of Europeans.

We have seen that in man the weight of the trunk is transmitted to the lower limbs through the pelvis, whereas in quadrupeds the downward pressure of the weight of the trunk is differently disposed. Doubtless, therefore, the *attitude* has great influence in controlling the expansion of the pelvis in the transverse diameter when the parts are young and plastic. It may therefore be owing to the habits and mode of life of the black races in their aboriginal state that their pelves approach the lower type. Take, for example, the aboriginal Australian who sits on the ground embracing his knees with his arms, or any of the savages whose favourite attitude is 'squatting'—i.e. sitting down with the body bent forward and the buttocks resting on the heels; or again, when in pursuit of game a stooping or crouching attitude is adopted. In all these positions the pressure upon the sacrum and pelvis is diminished, and there is a tendency to approximate the conditions to those of the anthropoid apes, while the white man on the other hand preserves the erect attitude whether standing, sitting, or walking.

Pemba, a coral island off the east coast of Africa, 27 miles NE. of Zanzibar Island, measures 46 miles by $4\frac{1}{2}$; area, 380 sq. m.; pop. 100,000. On one of the numerous bays on the east coast stands the chief town, Chaka. Pemba produces three-fourths of the world's cloves. It is attached to Zanzibar. See a book by Craster (1913).

Pembroke, the county town of Pembrokeshire, on a navigable creek of Milford Haven, 9 miles W. of Tenby, and 80 W. by N. of Cardiff. On the extremity of the ridge on which the town is built stands Pembroke Castle, founded in 1094 by Arnulf de Montgomery, a very imposing ruin, with a Norman keep 75 feet high and 52 in diameter. Beneath is a huge natural cavern, 70 by 50 feet. The birthplace of Henry VII., this castle

in 1648 was taken by Cromwell after a six weeks' siege. Monkton Priory, with its roofless Decorated choir, is another interesting structure. The Pembroke boroughs were merged in the county in 1918. At Pembroke Dock, or Pater, 2 miles north-west, a naval dockyard and arsenal was established in 1814. It was decided in 1925 to close it. Pop. of Pembroke (1861) 15,071; (1921) 15,481.

Pembroke, a town of Ontario, on the Allumette Lake, 74 miles WNW. of Ottawa, has timber industries; pop. 8000.

Pembroke, EARLS OF. The earldom of Pembroke was first conferred by Stephen, in 1138, upon Gilbert de Clare (died 1148), whose family took its name from Clare in Suffolk. Gilbert's son, the second earl, RICHARD DE CLARE, surnamed Strongbow, went to Ireland to push his fortune in 1170 by permission of Henry II. (q.v.). He married the daughter of Dermot, king of Leinster, became governor of Ireland in 1173, and died at Dublin in 1176. For later Earls, see AYMER DE VALENCE, HERBERT. For the two Pembroke Colleges (unlike in origin), see CAMBRIDGE, OXFORD.

Pembrokeshire, a maritime county of South Wales, the westernmost of the Principality. Measuring 30 by 25 miles, it has an area of 611 sq. m., or 391,181 acres, of which three-fourths is arable. The coast-line is much of it rugged and precipitous; and inland the surface is undulating, green hills alternating with fertile valleys, and attaining a maximum altitude of 1754 feet in the Precelly range, which traverses the north of the county from east to west. Rivers are the Teifi, separating Pembrokeshire from Cardigan, and the East and the West Cleddau. The rocks are largely Silurian; the soil varies much in quality; and coal, slate, lead, and iron have been worked. St David's Cathedral and half-a-dozen mediæval castles make up the antiquities with Ogam inscriptions, neolithic implements, and Roman coins. At Haverfordwest and Tenby a colony of Flemings was established in 1107. They adopted the English tongue; and Pembrokeshire, or 'Little England beyond Wales,' is now over more than half its area inhabited by an English-speaking population, although it is the remotest of all the Welsh counties. It was harried by Owen Glendower in 1405; and on 22d February 1797 it witnessed the last French invasion, when 600 regulars and 800 gaol-birds landed near Fishguard, only to surrender unconditionally to some militia and yeomanry under Lord Cawdor. Pembrokeshire returns one member. Pop. 92,000. See Fenton's *Historical Tour through Pembrokeshire* (1811), and Phillips's *History of Pembrokeshire* (1909).

Pemmican, a North American Indian preparation, was introduced into British navy victuallings in order to supply arctic expeditions with an easily-preserved food, containing the largest amount of nutriment in the smallest space. As made by the Indians, it consists of the lean portions of venison, buffalo, or other meat, dried in the sun, or wind, and then pounded into a paste and tightly pressed into cakes; sometimes a few fruits of *Amelanchier canadensis* (June-berry or Service-berry) are added to improve the flavour. It will keep for a very long time uninjured. That made for the arctic voyagers was chiefly of beef.

Pemphigus, or POMPHOLYX, belongs to that order of skin diseases which is characterised by an eruption of large vesicles, filled with serous fluid, and known as *bullæ*. The disease occurs both in the acute and in the chronic form. In a mild case of acute pemphigus, bullæ, or blisters, from the size of a pea to that of a chestnut, appear in succession (chiefly on the extremities), and having continued three or four days break, form a thin

scab, and soon heal, unaccompanied with febrile or inflammatory symptoms. In severe cases there is considerable constitutional disturbance, the bullæ are larger, and the scabs heal with difficulty. The chronic form differs mainly from the acute by its prolonged continuance. The acute variety chiefly affects children, and has been ascribed to dentition, errors of diet, &c.; while the chronic form chiefly attacks aged persons, and is probably due to debility and impaired nutrition. The acute form usually requires nothing but cooling medicines and diet, and mild local dressings, like boric ointment, to protect the raw surfaces from exposure to the air. In the chronic form a nutritious diet, with tonics and change of air, is most commonly successful. In obstinate cases arsenic or a vaccine is sometimes of use.

Pen, an instrument for writing with a fluid ink. When the Egyptians, Greeks, Romans, and some other ancient nations wrote upon papyrus or parchment they used a reed pen (Lat. *calamus*), and when they used tablets of wood or stone covered with wax they wrote upon them with a pointed stylus of bronze, bone, or other material. Some of these ancient reed pens have been preserved. One, now at Naples, was found in a papyrus at Herculaneum. Reed pens are still the only kind used by the natives of Persia and some neighbouring countries. A metal pen does not suit their mode of writing. These reed pens are pointed much in the same way as quills, and are made from the reeds or stems of *Phragmites communis*, which is also a British plant, from *Saccharum Ravenneæ*, and probably other species. The Chinese and Japanese write with a small brush or hair-pencil. Quills are known to have been used for writing with as early as the 7th century of our era, but long after that reed pens also were employed in European countries.

Metal pens were in use, but probably only to a very limited extent, among the ancient Romans. In the museum at Naples there is a bronze pen, nibbed like a modern steel pen, which was found at Pompeii. Another of a somewhat different shape was discovered at Herculaneum. Bronze and silver writing pens appear to have been occasionally made in the middle ages, but there is little doubt these were more curiosities than articles in general use, and the same may be said of all metallic pens of more recent date, sometimes referred to in books, until we come to the beginning of the 19th century. For centuries before that quills were universally employed among western nations, and in schools steel pens were only very partially substituted for them till about 1840.

Perhaps the earliest English metallic pens of which we have any certain knowledge were some made in 1780 by Harrison, split-ring maker, Birmingham, for Dr Priestley. They were of sheet-steel, formed into a tube and filed into shape, the joining of the metal making the slit. Brass pens were also made in England before the end of the 18th century; one of these seems to have been in the Strawberry Hill collection of art objects and curiosities (Walpole's), which was sold in London in 1842. In the early part of the 19th century various plans were tried to produce pens more lasting than ordinary quills. The quills were pointed with metal, and pens constructed of horn and tortoise-shell had small pieces of diamond and other hard gems embedded in them by pressure. Another plan was to attach gold to their points. Such pens were, of course, too costly for general use. Barrel pens of steel made by one Wise were on sale in London in 1803, but these, too, were high in price, and did not take the market. The first English patent for the manufacture of steel pens is that of Bryan Donkin in 1803. A patent, the first of its kind in

America, was granted in 1810 to Peregrine Williamson of Baltimore for the manufacture of metallic pens. Steel pens of the barrel type were being made in 1815 by Sheldon of Sedgley, the price being 18s. per dozen. By 1820 the number of manufacturers had increased. To James Perry belongs the credit of bringing steel pens into general use. He began pen-making at Manchester in 1819, using the best Sheffield steel (from Swedish charcoal iron) for the purpose. Perry removed to Red Lion Square, London, and had developed the pen trade with remarkable energy before the prominent Birmingham makers, Mitchell, Gillott, and Mason, caused a revolution in the trade by machine-made pens. He took out a patent for a new method of making pens in 1830, from hard, thin, elastic metal, and a 'length of slitted or cleft space' scarcely exceeding that of quill-pens; and he made other improvements in 1832. The greatest improvement in the manufacture was the adoption of the screw handpress for the cutting out of pens, enabling the manufacturer to supply them cheaply and in quantities. At first the method of slitting pens by means of a press was kept a profound secret by Gillott and Mason. To John Mitchell, Birmingham, has been assigned priority in this invention. Sir Josiah Mason made barrel pens in 1828, and 'slip' pens for Perry in 1829. At the end of 1875, when Sir Josiah Mason retired from his business, his output exceeded 32,000 gross weekly. To Mitchell, Gillott (whose patent is dated 1831), and Sir Josiah Mason chiefly belongs the credit of first making steel pens by machinery, thus enabling them to be sold cheaply and to become articles of common use.

An ordinary pen looks a simple enough instrument, but before it assumes its present appearance it has to go through some sixteen different processes. Birmingham is the great seat of the steel-pen trade. The steel of which the pens are made comes from Sheffield, and is in sheets 6 feet long and 1 foot 5 inches wide. It is first cut into strips of convenient width; next it is annealed, and rolled to the requisite thickness, when it is found to have trebled its original length and to have acquired a bright surface from the action of the rollers. The 'blanks' or first shape of the pen are now cut out by means of a press; next comes the operation of *marking* or stamping the name on the pen, then *piercing*; but before they can be formed into the shape of a pen they require to be softened by *annealing*. They are freed from dust and grease, placed in round pots, which are again enclosed in larger ones, are covered with charcoal dust, put into a muffle or iron box, heated to a dull red, and then allowed to cool. The pens are next *raised* or formed into the required shape by a blow from a screw-press fitted with a punch and a die. Then they are *hardened*. This is done by arranging them in thin layers in covered iron pans of a round shape, which are heated to a bright redness in a muffle. The contents of the pans are next emptied into a bucket, immersed in a tank of oil, and transferred to a perforated cylinder, which, being quickly rotated, drains off the oil. The pens are still greasy and as brittle as glass, and in order to cleanse them they are again placed in perforated buckets and plunged into a tank of boiling soda-water. They are next tempered, or softened, by enclosure in an iron cylinder which is kept revolving over a charcoal fire until the requisite degree of softness is attained. The pens have been blackened by this operation; they are next *scoured* by being dipped into a tub of diluted sulphuric acid, and then put into iron barrels containing water and material made from broken and finely-ground annealing pots. The barrels are kept revolving for five, or sometimes eight, hours; then

the pens are subjected to a second process of scouring in barrels filled with dry material of the same kind; and then to a third process in which dry sawdust is the scouring or cleaning agent. The pens have now acquired a bright, silver tone, and the points have been rounded. They have then to be ground between the pierced portion and the point; this is done on a small revolving solid wheel or 'bob' made of wood, covered with leather, and coated with emery-powder. Next comes the operation of *slitting*, which is cleverly accomplished by a cutting-press, but, the edges of the slit being sharp, the pens are again polished in revolving barrels. They are now coloured and varnished; the colouring is done in a copper or iron cylinder over a coke fire; if to be lacquered they are placed in a solution of shellac. Afterwards the spirit is drained off, the pens are placed in wire cylinders, and kept revolving until the lacquer is dry. Next the pens are spread on iron trays and put into an oven, the heat of which spreads the lacquer evenly over the surface. Girls now look over the pens, throw aside the faulty ones, and the good ones are packed into boxes ready for sale.

How the trade grew may be seen from the fact that in 1839 steel pens were almost unknown; in 1849 the trade was a leading industry in Birmingham; there were twelve factories employing about 2000 men, women, and girls, the weekly output of pens being stated at 65,000 gross. The output has since gone on increasing year by year. Successful patents in connection with pens have been those dealing with points which are turned up or turned down, thickened or 'planished,' for smooth writing.

All the pen-makers now make pen-holders. Sir Josiah Mason related that he made the first stick pen-holders for Perry in 1832, and for Gillott in 1835.

Pens are also made of silver, platinum, and aluminium bronze. They have also been made of vulcanite. The gold pen, which is incorrodible with ink, was also made in Birmingham for Mordan and others. Made in the United States as early as 1836, it has become a speciality there. The gold pen goes through no less than forty-five different processes, from the gold-bar, which is alloyed, to the highly finished article of commerce. To give firmness to the point of the pen it is tipped with iridium. To avoid the troublesome necessity of dipping in an ink-bottle, many forms of reservoir pens have been devised, carrying ink within the holder. Early forms, dating back to 1835, were unsatisfactory. In the stylograph the nib is dispensed with, a finely tapered point connecting with the barrel containing the ink, and closing the aperture by a spring when the pen is not in use. Pressure on the paper opens the aperture. The more popular fountain pen has a reservoir of ink and an iridium-tipped gold nib. A feed-bar conveys the ink to the nib by capillarity, and also admits air to fill its place. There are many devices for filling and prevention of leaking.

See Bunce's *Josiah Mason* (1890), which contains a sketch of the history of the steel-pen trade.

Penæaceæ, a small family of shrubby xerophytic flowering-plants, of the archichlamydeous dicotyledons, found in South Africa. They are heath-like in habit. The flowers, which have no petals, are regular, tetramerous, axillary, with tubular receptacle. The bracts are often coloured. The chief genera are *Penæa* and *Sarcocolla*.

Penal Laws. See CATHOLIC EMANCIPATION, IRELAND.

Penal Servitude is a sentence for criminal offences which has been introduced in lieu of the sentence of transportation beyond the seas; see IMPRISONMENT, PRISONS.

Penance (Lat. *pœnitentia*), in Roman Catholic theology, means both the sorrow for sin and also the sacrament by which absolution is conveyed. It means also the voluntary or accepted self-inflicted punishment by which a repentant sinner manifests his sorrow for sin, and seeks to atone for the sin, and to avert the punishment which, even after the guilt has been remitted, may still remain due to the offence. Penance is believed in the Roman Catholic Church to be one of the sacraments of the New Law. It will be necessary to explain it briefly both under its relations as a sacrament and as a private personal exercise.

Penance as a state of mind is simply sorrow for evil-doing, accompanied with a purpose of amendment. Penance is the fruit or the manifestation of this sorrow, and it is commonly accompanied or expressed by some of those external acts which are the natural manifestations of any deep sorrow, either negative, as the neglect of ordinary attention to dress, to the care of the person, to the use of food, or positive, as the direct acts of personal mortification and self-inflicted pain, such as fasting, wearing haircloth, strewing the head with ashes, watching of nights, sleeping on hard boards, &c. Such manifestations of sorrow, whether from motives of religion or from merely natural causes, are common among the Eastern races, and are frequently alluded to in the Scriptures. In the personal practice of the early Christians penance found a prominent place, and the chief and acknowledged object of the stated Fasts (q.v.), and other works of mortification which prevailed, was that of penitential correction, or of the manifestation of sorrow for sin.

A still more striking use of penance, however, in the early church, was the disciplinary one; and this, in the Roman Catholic view, is connected with the sacramental character of penance. Any discussion of this purely theological question would be out of place here, and it will be enough to state briefly that Roman Catholics number penance among the Seven Sacraments, and believe it to be of direct divine institution (Matt. xviii. 18; John xx. 23; 1 Cor. v. 5). The matter of this sacrament consists, in their view, of the three acts of the penitent—contrition, or heartfelt sorrow for sin, as being an offence against God; confession, or detailed accusation of one's self to a priest approved for the purpose; and satisfaction, or the acceptance and accomplishment of certain penitential works, in atonement of the sin confessed. The form of the sacrament is the sentence of absolution from sin pronounced by the priest who has received the confession, and has been satisfied of the penitential disposition of the self-accusing sinner. In all these points, of course, they differ from Protestants. Even in the apostolic times the practice prevailed of excluding persons of scandalous life from the spiritual fellowship of the Christian community (see EXCOMMUNICATION); and, without attempting to fix the date, it may be stated as certain, from the authority of Tertullian and other writers, that from a very early time the persons so excluded were subjected to certain penitential regulations. The class of offenders so treated were those who had been notoriously guilty of the grievous crimes of idolatry or apostasy, murder, adultery, and other scandalous offences. The period of penitential probation differed in different times and places, but in general was graduated according to the enormity of the sin, some going so far in their rigour (see NOVATIAN) as, contrary to the clearly-expressed sense of the church, to carry it even beyond the grave. In the earlier ages much depended upon the spirit of each particular church or country; but about the 4th century the public

penitential discipline assumed a settled form, which, especially as established in the Greek Church, is so curious that it deserves to be briefly described. Sinners of the classes already referred to had their names enrolled, and were (in some churches, after having made a preliminary confession to a priest appointed for the purpose) admitted, with a blessing and other ceremonial, by the bishop to the rank of penitents. This enrolment appears to have commonly taken place on the first day of Lent. The penitents so enrolled were arranged in four grades, called—1. (Gr. *prosklaiontes*, Lat. *flentes*) 'Weepers'; 2. (Gr. *akroomenoi*, Lat. *audientes*) 'Hearers'; 3. (Gr. *hypopiptotes*, Lat. *prosternentes*) 'Prostraters'; 4. (Gr. *systantes*, Lat. *consistentes*) 'Standers.' Of these classes the first were obliged to remain outside of the church at the time of public worship, and to ask the prayers of the faithful as they entered. The second were permitted to enter and to remain in the place and during the time appointed for the Catechumens (q.v.), but, like them, were required to depart before the commencement of the solemn part of the Liturgy (q.v.). The third were permitted to pray with the rest, but kneeling or prostrate, and for them were prescribed many other acts of mortification. The fourth were permitted to pray with the rest in a standing posture, although apparently in a distinct part of the church; but they were excluded from making offerings with the rest, and still more from receiving the communion. The time to be spent in each of these grades at first differed very much according to times and circumstances, but was afterwards regulated by elaborate laws, called penitential canons. Still it was in the power of the bishop to abridge or to prolong it; a power the exercise of which is connected with the historical origin of the practice of Indulgence (q.v.). Of these four grades the first two hardly appear in the Western Church. It is a subject of controversy whether, and how far, this discipline was extended to other than public sinners; but it seems certain that individuals, not publicly known as sinners, voluntarily enrolled themselves among the penitents. All four grades wore a distinguishing penitential dress, in which they appeared on all occasions of public worship, and were obliged to observe certain rules of life, to renounce certain indulgences and luxuries, and to practise certain austerities. In some churches they were employed in the care of the sick, the burial of the dead, and other of the more laborious works of charity. The penitent, in ordinary cases, could only be restored to communion by the bishop who had excluded him, and this only at the expiration of the appointed time, unless the bishop himself had shortened it; but in case of dangerous illness he might be restored, with the condition, however, that if he recovered from the illness the whole course of penance should be completed. The reconciliation of penitents took place commonly in Holy Week, and was publicly performed by the bishop in the church, with prayer and imposition of hands. It was followed by the administration of communion. If any of the clergy were guilty of a crime to which public penance was annexed, they were first deposed from the rank of the clergy, and then subjected to the ordeal, like the laity themselves. This public discipline continued in force with greater or less exactness in the 5th, 6th, and 7th centuries, gradually, however, being replaced by semi-public, and ultimately by private penance. In the 11th and 12th centuries the public penance had entirely disappeared. The nature and origin of private penance is a subject of controversy between Catholics and Protestants; the former contending that it had existed from the first, and

that it held the same place even in the ages of public penance for *secret sins* which the public penance did for public offences. At all events, from the date of the cessation of the public discipline it has existed universally in the Roman Church. The priest, in absolving the penitent, imposes upon him the obligation of reciting certain prayers, undergoing certain works of mortification, or performing certain devotional exercises. These acts of the penitent are held to form an integral part of the sacrament of penance. See CONFESION; and Morinus, *De Pœnitentiâ* (1651).

By Protestant churches penance is not recognised; yet a confession was made and a penance inflicted publicly in a church at East Clevedon in Somersetshire in 1882; and there is a curious letter from Dr Pusey to Mr Hope-Scott, then abroad (1844), desiring him to procure a 'discipline' and 'send it by B. What was described to me was of a very sacred character: five cords each with five knots, in memory of the five wounds of our Lord. . . . I should be glad to know also whether there were any cases in which it is unsafe—e.g. in a nervous person.' An approach to the Roman Catholic polity on the subject was in use among the English Puritans of the 17th century, and more particularly in the Church of Scotland during that and the succeeding century, when it was common 'to make satisfaction publicly on the Stool of Repentance' (q.v.). In Ayrshire the kirk-sessions were accustomed regularly to provide sackcloth suits for ecclesiastical offenders as late as 1781; a heinous breach of the seventh commandment might involve the penitents' standing in the 'public place of repentance' in church, arrayed more or less completely in sackcloth, every successive Sunday for six months on end (see Edgar's *Old Church Life in Scotland*, 1885). It does not seem to have occurred to the Reformers or their more immediate successors in the Protestant churches that their system of discipline, with its public rebukes and enforced humiliations of various kinds, was liable to be interpreted in a sense very different from that of a mere expression of sorrow for sin; but the belief is now very general among the most zealous adherents of their doctrinal opinions that in all this they adopted practices incongruous with their creed, and in harmony rather with that of the Church of Rome. Nor do they seem to have perceived that Church Discipline (q.v.), in its proper sense, as relating to ecclesiastical rights and privileges, is wholly distinct from the imposition of penalties by churches or church courts. Penitential humiliations, imposed by ecclesiastical authority, are now no more in favour where church discipline is most strict than where the utmost laxity prevails. The commutation of penalties deemed shameful, for a fine to the poor of the parish, was an abuse once prevalent in Scotland, but never sanctioned by the higher ecclesiastical authorities. See Watkins, *History of Penance* (1920).

Penang (*Pulo P'enang*, 'Betel-nut Island'), the official but less used name of which is PRINCE OF WALES ISLAND, one of the British Straits Settlements (q.v.), lies at the northern extremity of the Strait of Malacca, 2 to 10 miles from the west coast of the Malay Peninsula, and 360 miles NNW. of Singapore. Length, 15 miles; breadth, 5 to 10 miles; area, 107 sq. m., three-fifths being hilly. A sanatorium crowns the highest point, 2920 feet above sea-level. The whole is covered with forest and vegetation, coconut and areca palms predominating. In the low lands the thermometer ranges from 70° to 95° Fahr., and at the sanatorium from 60° to 75°. The rainfall averages 111 inches a year. Penang is a great shipping centre for the products of the Malay States of the Peninsula. By far the most important exports

are rubber and tin, the next being spices, copra, sugar, and tobacco. Georgetown, the capital, is situated at the north-east extremity of the island, and is defended by forts; pop. about 100,000. Province Wellesley, on the peninsula opposite, forms part of the same settlement administratively. Forty-five miles in length by 4 to 11 in breadth, with an area of 270 sq. m., it produces tapioca, sugar, rice, and coconuts. Another dependency of the settlement is the Dindings, including the island of Pangkor, situated about 80 miles S. of Penang. The raja of Kedah ceded Penang to the English in 1785 in return for an annual pension of £1000. Thirteen years later Province Wellesley was acquired, in order to put down piracy. In 1805 the East India Company, the proprietors of the settlement, made Penang a presidency of equal rank with Bombay and Madras. From 1823 Singapore and Malacca were united with it, but in 1831 the seat of government was transferred from Penang to Singapore. Pop. of Penang, including Province Wellesley and the Dindings, (1881) 190,597, (1921) 310,781, one-half Chinese, nearly one-fourth Malays, with many Tamils and others from India. Many thousands of Chinese and Indians arrive every year, and the arrivals are not balanced by the departures.

PENANG LAWYERS is the commercial name for the stems of a species of palm imported from Penang for walking-sticks. They are small and hard, and have a portion of the root-stock attached, which is left to form the handle.

Penarth Beds. See TRIASSIC SYSTEM.

Penates. See LARES.

Pencils. A slender stick of black lead, slate, or coloured chalk, encased in a small round piece of wood, is called a pencil; but the term is also applied to small hair-brushes used by artists, and it was to these that the name was originally given. Some early manuscripts have lines upon them ruled with ordinary metallic lead. When pencils of Black Lead (q.v.), called also graphite and plumbago, were first used is uncertain, but Beckmann points out that they are distinctly mentioned in a book on fossils by Conrad Gesner, printed at Zurich in 1565. The discovery of the use of black lead as a material for writing or drawing with was an important one, since for work where words or lines may require to be frequently rubbed out no other substance has such valuable properties.

For a long time the plumbago from the Borrowdale mines in Cumberland furnished the 'leads' for the best pencils ever made. These mines have been exhausted since 1850; but when the graphite from them was available it had, in the case of the larger and purer pieces, only to be cut into square rods of the proper size for pencils. In order to work up the smaller bits, cuttings, and dust of this precious material, Mr W. Brockedon, in 1843, patented a method by which he first reduced these small pieces to powder, and then, by subjecting it to great pressure in dies from which air is exhausted, produced a cake as solid and compact as the natural graphite, and equally suitable for cutting into leads. For a considerable number of years past, owing to the Borrowdale plumbago being worked out, black-lead pencils, as well as coloured pencils or crayons, have been made by the process invented about the close of the 18th century by Conté of Paris, which consists in thoroughly mixing the black lead with clay, both being first reduced to a state of fine division and most carefully purified. The proportions of graphite and clay vary from two of the latter to one of the former (for light hard pencils) to equal parts of the two ingredients (for the dark soft kinds).

Water is added to the mixture, which is repeatedly ground, and then placed in canvas bags and squeezed in a hydraulic or steam press till it acquires the consistency of stiff dough. In this state it is placed in a strong metal cylinder, whose bottom is perforated with apertures of the proper size for the section of the pencil leads. The black-lead mixture, being in a plastic state, is then squeezed out through the apertures by a plunger into continuous strips or threads, which are arranged in straight lengths on a board to dry. After being exposed to a slight artificial heat, the strips are cut into the usual lengths for pencils, and placed in a covered crucible, which is raised to a red heat. When cooled they are ready for use.

An extensive mine of fine graphite was opened at Bogodolsk in eastern Siberia about 1850. Much of this black lead is scarcely if at all inferior in quality to that formerly obtained in Cumberland. Graphite is also mined at Schwarzbach in Bohemia; at Passau, Bavaria; in Norway, New Zealand, Mexico, various parts of the United States, and in Canada. The graphite found at Ticonderoga in New York State is of very pure quality; as its product is 99.9 per cent. pure carbon, it is the purest graphite known or likely to be discovered. Workable deposits of graphite are found at several places in Canada. A good deal of what occurs in the township of Buckingham, in the province of Quebec, is also very pure, and is made into pencils. For other localities, see **BLACK LEAD**.

The wood of the Virginian or Florida cedar (see **JUNIPER**), being straight grained and easily cut, is remarkably well suited for pencil-making. That of *J. procera* from Kenya competes successfully. Two rectangular pieces of the proper size, cut out by machinery, go to make a pencil, the one containing the groove for the lead being thicker than the other. After the lead is inserted the two pieces are glued together, and then cut to a round shape by revolving cutters. The operations of cutting out the square fillets of wood and rounding them after they are glued are very rapidly performed. Pencils are sometimes cut in a hexagonal shape. Besides the maker's name, letters indicating the character of the lead are stamped upon pencils. For Great Britain these are H, HH, HHH, B, BB, BBB, HB, and F. H signifies hard; once and twice repeated it means harder and very hard. B stands for black (and soft), and, when repeated, for still blacker. HB, the most generally useful, means hard and black; while F signifies firm. In the United States the letters used differ somewhat. They are H, hard; VH, very hard; VVH, still harder; S, soft; VS, very soft; VVS, still softer, for deep black shading; M, medium; MH, medium hard; MB, medium black.

Owing to the multiplicity of processes for reproducing pen-and-ink drawings (see **ILLUSTRATION**), and the cultivation of that method for book illustration, the black-lead pencil is much less used now than in the earlier half of the 19th century. Drawings in chalk or charcoal, since either material makes a much blacker line, have usually deeper and more effective shading than can be given with pencil. Still, a finished drawing in black lead by a skilled hand has charms of its own, and it is to be regretted that so few of these of any importance are now made by artists of high standing.

Coloured pencils are made with ordinary pigments—e.g. Prussian blue and chrome yellow for their respective colours—mixed with white wax and tallow or with gum and tallow, clay being sometimes added; but none of these coloured preparations are heated like those made of graphite and clay. Copying and ink pencils are made of a concentrated solution of an aniline violet added to

a mixture of graphite and China clay. For some kinds gum is added, and in such cases graphite is sometimes omitted.

The arrangement of a small rod of black lead, which is kept projecting as it wears away from a tube fitted to a metal pencil-case, was patented by Hawkins and Mordan in 1822. An alloy of lead, antimony, and a little mercury is made into ever-pointed pencils for writing on paper prepared with a suitable surface.

The manufacture of black-lead and coloured pencils is extensively carried on in England, Austria, Germany, and America. At Nürnberg in Bavaria there are many factories; the name of Faber there is famous.

Penda (circa 577–655), heathen king of Mercia (q.v.), was constantly at war with Northumbria. He defeated Oswald (q.v.) at Maserfelth (perhaps Oswestry) in 642, but was himself defeated and slain by Oswy on the Winwaed, either in Lothian or in Yorkshire.

Pendant, a hanging ornament, used in ceilings, vaults, staircases, timber-rooms, &c. It is sometimes a simple ball and sometimes elaborately ornamented, and is chiefly used in the later Gothic and Elizabethan styles.

Pendant. See **FLAG**.

Pendennis Castle. See **FALMOUTH**.

Pendle Hill. See **CLITHEROE**.

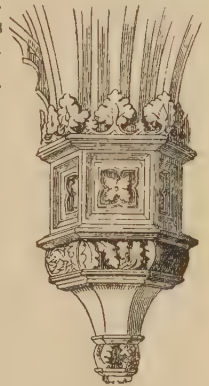
Pendleton, a north-western suburb of Manchester, wholly within the borough of Salford.

Pendragon. See **DRAGON**.

Pendulum. The two chief varieties are the *simple pendulum* and the *ordinary or complex pendulum*. Examples of the latter occur in all the forms of clockwork where a balance-wheel has been dispensed with (see **HOROLOGY**). A small leaden or golden bullet, when suspended from a fixed point by an extremely fine thread, may represent a simple pendulum, provided it vibrates in a small circular arc. Once set in motion, this instrument will move in the same arc for ever unless interfered with, because at each swing, when descending through the first half of its circular path, it acquires energy enough to raise it to an equal height on the opposite side. In ordinary experiments the bullet will perform many thousand oscillations by itself alone, before the resistance of the air and other interferences cause the movement to subside and at last cease, by imperceptibly diminishing the length of the arc.

This long-continued and self-sustaining action is manifestly due to the attraction of the earth, the force that causes a stone to fall to the ground, because at the end of each swing of the bullet its weight tends to pull it vertically downwards, and the string constrains it to repeat its course along the circular arc. A most interesting and valuable application of the pendulum, therefore, is for measuring the acceleration of velocities of falling bodies. For that purpose it is much superior to Atwood's Machine (q.v.) or any other method which has yet been devised.

If the circular path or swing is short—not exceeding, for example, that of a clock pendulum which beats seconds—there are two results to be remembered. First, that so long as the length of



Pendant.

thread is unchanged, it matters not how far the bullet may swing on each side, the time or duration of each oscillation is also unchanged. This 'pendulum-law' was discovered by Galileo in the church of Pisa, as he watched a lamp swinging by a chain. The quality that each swing occupies the same time is so important in horology that the introduction of the pendulum by Huygens as a time-measurer formed the principal epoch in the history of that science. The term *isochronism* ('equal-timeness') was invented to mark this property of the pendulum. The second law of the pendulum is that to make the bullet move faster we must shorten the thread in the following proportion: for twice as many oscillations take a quarter the length of string; for thrice as many take one-ninth the length; for four times as many take one-sixteenth the length. That law is otherwise expressed by saying the length of the thread is inversely as the square of the number of oscillations made in a given time (see CENTRE: *Centre of Oscillation*).

These and other properties of the pendulum are wrapped up in the formula: $t^2 : \pi^2 :: l : g$, which mathematicians have established: where t = time in seconds of one oscillation, l = length (in inches) of the thread, $\pi = 3.1415927$, a well-known ratio; and g = the accelerating force of gravity, or twice the space through which a heavy body falls in one second. When $t = 1$ in that formula—i.e. when our pendulum beats seconds, a result easily attained at any part of the world—then immediately we have $g = \pi^2 l = 9.8696$. In other words, multiply the length of the seconds pendulum in any latitude or longitude by the fixed number 9.8696 to find the value of g . By this valuable and simple result it has been shown that the force of gravity slightly and gradually increases as we travel from the equator towards either pole, the length of the seconds pendulum diminishing in the same proportion. The poles are therefore nearer to the centre than the equator is, which is an independent proof that our planet is spheroidal, and resembles in shape an orange rather than a lemon.

The following table readily gives the length of the seconds pendulum at any of the stations by dividing the corresponding number in the third column by the fixed number 9.8696. At London, for example, $32.191 \div 9.8696 = 3.262$ feet, length of seconds pendulum. Dent's clock in the tower of the House of Commons beats once in two seconds, and must therefore have a pendulum 13.046 feet long.

The table also shows the acceleration (feet per second) due to gravity, as ascertained from observations made by means of the seconds pendulum. The results are arranged in the order of their latitude.

Station.	Observer.	Force of Gravity. Feet.
Rawak (between Jilolo and New Guinea).....	Freycinet.	32.088
Sierra Leone.....	Sabine.	32.093
Ascension.....	Sabine.	32.096
Jamaica.....	Sabine.	32.105
Rio de Janeiro.....	Freycinet.	32.112
Cape of Good Hope.....	Freycinet.	32.140
Bordeaux.....	Biot, Mathieu.	32.169
Paris.....	Borda.	32.182
Dunkirk.....	Biot, Mathieu.	32.190
London.....	Sabine.	32.191
Edinburgh.....	Kater.	32.204
Unst, Shetland.....	Biot, Mathieu.	32.217
Spitsbergen.....	Sabine.	32.253

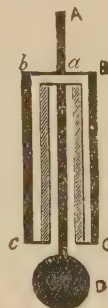
Since the length of the seconds pendulum is due entirely to natural causes, and can always be easily verified, it was chosen as a standard of the British measures of length. Experience has taught, however, that these are more easily known by preserving an artificial standard.

The universal application of the pendulum for

time-measurement and ascertaining the local value of g has been followed by some special uses of it which are of interest. Thus Sir George B. Airy, astronomer-royal, applied it to form an estimate of the earth's mean density by observations taken at a coal-pit, 1200 feet deep, near South Shields. One pendulum being stationed at the surface and another at the bottom of the pit, their oscillations were exactly compared by means of an electric wire, with the result that a clock at the mouth of the pit would gain $2\frac{1}{2}$ seconds per day if removed to the bottom. From these data (*Phil. Trans.* 1856) the density of the earth was estimated to be 6.565.

By the Foucault experiment the pendulum was utilised in a striking manner to prove the perpetual rotation of our planet round its axis. A globe of metal is suspended by a long wire to a lofty roof, the point of suspension being vertically over the centre of a round table; and after being drawn aside from the position of rest this pendulum is allowed to begin its vibrations, but so as to have no tendency to right or left. Students of dynamics know that it must continue swinging to and fro in the same plane unless interfered with from without. The table beneath the pendulum revolves very slowly in a direction contrary to the hands of a watch; but since the floor and whole building revolve with the table, the observers naturally refer the relative motion to the pendulum, still swinging in its original plane. By marking twenty-four equal divisions round the edge of the table the spectators, if the experiment took place at the pole, would be furnished with a good clock. The angle through which the earth rotates in a given time, multiplied by the sine of the latitude, gives the angle through which the plane of oscillation passes in that time.

The pendulum, in Horology, is absolutely accurate as a time-keeper, if only the proper length is preserved. That is mainly done by means of a screw turning on the rod, under the 'bob' or ball, so as to push it up and therefore shorten the pendulum, or let it fall lower down and lengthen the pendulum. It was found in winter that clocks went too fast, and at mid-summer too slow, because cold shortened the metallic rod and heat lengthened it. A further refinement was therefore devised to secure a uniform length without the screw adjustment, the result being what are known as 'compensation pendulums.' Both the common methods of these depend on the same principle. (A simple and practically accurate form of pendulum is made with a wooden rod, which is less liable to expansion and contraction than metal.) The 'mercurial pendulum' carries within it a glass cylinder nearly full of mercury, so proportioned in quantity to the weight of the pendulum that when the latter expands downwards by the heat the change is counterbalanced by the upward expansion of the liquid in its jar. In winter, of course, the pendulum and the quicksilver are similarly contracted in opposite directions, to secure a good average length and mark better time. The second form of compensation pendulum is called the 'gridiron,' because it consists of several upright bars, as in the diagram. If the black bars be, for example, steel, and those between be brass or copper, then by a proper adjustment of their lengths any change of temperature will not materially affect the time-keeping property of the pendulum. Brass is much more subject to extension and contraction than steel. It is obvious from the figure that when the heat



dilates the brass bars they must raise the bob D, and therefore counteract the downward extension of the steel bars, such as BC or *bc* and Aa. For accurate and uniform time-measurement the grid-iron has, in the experience of some astronomers, proved superior to the mercurial pendulum.

Penelope, in Homeric legend, the wife of Ulysses (Odysseus), and mother of Telemachus, who was still an infant when Ulysses went to the Trojan war. During his long wanderings after the fall of Troy he was generally regarded as dead, and Penelope was vexed by the urgent wooing of many suitors, whom she put off on the pretext that she must first weave a shroud for Laertes, her aged father-in-law. To protract the time she undid by night the portion of the web which she had woven by day. When the suitors had discovered this device her position became more difficult than before; but fortunately Ulysses returned in time to rescue his chaste spouse from their distasteful importunities. Later tradition represents Penelope in a very different light, asserting that by Hermes (Mercury), or by all her suitors together, she became the mother of Pan (q.v.), and that Ulysses, on his return, divorced her.

Penelope. See GUAN.

Peneus, the old name of the river Salambria in Thessaly. Fed by streams from the Pindus Mountains, the river flows sluggishly at first through the plain of Thessaly and the vale of Tempe to the Gulf of Salonika.

Penge, an urban district of Kent, in Bromley parliamentary borough, adjoining Lewisham and Croydon, a residential suburb of London; pop. 26,000.

Pengelly, WILLIAM, geologist and anthropologist, was born at East Looe, Cornwall, 12th January 1812. After a short experience of the sea, under his father, he educated himself, and opened a Pestalozzian school in Torquay, where he was afterwards a private tutor in mathematics and natural science. He was active in his support of local scientific societies, and was specially interested in the geology of Devonshire, and later in the antiquity of man. He is best remembered for his investigation of the Bovey Tracey beds and of the Brixham Cave and Kent's Hole. He died 16th March 1894. See the Memoir by his daughter (1897).

Penguins (*Sphenisciformes*), a peculiar order of flightless marine birds. They are mostly confined to the Far South, but some extend up to the Galápagos Islands in the Pacific. They breed in large numbers on islands and rocky coasts in the Southern Ocean. They have many peculiarities, such as the transformation of the wing into a swimming-paddle, covered with small narrow, flat, feathers. The legs are included in the skin of the body, and the large feet are placed very far back. There are about half-a-dozen genera—e.g. *Aptenodytes*, including the large King Penguin and still larger Emperor; *Spheniscus* or Jackass-penguins; the Rock-hoppers—*Catarrhaetes* and *Megadyptes*. Penguins stand apart from other birds; perhaps their nearest relatives are the divers and grebes. The nest is usually little more than a hole in the ground or a small heap of stones. Their alleged stupidity and callousness in man's presence probably means little more than inexperience. The plumage of the neck is valued by furriers; and large numbers of 'Johnnies,' as the sailors call them, are slaughtered annually. The flesh, though dark, is wholesome food, and makes excellent 'hare-soup'; the belly is loaded with fat. That the penguins are not altogether a modern race of birds is shown by the remains of a species—*Palaeudyptes antarcticus*—which existed in New Zealand in late Eocene or early Miocene times. This bird differed from existing penguins in having rather longer wings, and may therefore conceivably have possessed the power of flight; it was a large form like the King Penguin of to-day.

Penicillaria. See MILLET.

Penicillium, a well-known genus of Mould (q.v.), multiplying mainly by conidia, or asexual spores, chains of which form tufts at the ends of erect conidiophores. They belong to the Ascomycetes, but perithecia are seldom formed. See CHEESE, FUNGI.

Penicuik, a town of Midlothian, on the left bank of the North Esk, 10 miles S. of Edinburgh by road, has a Romanesque church-tower and large paper-mills, dating from 1709; whilst 2 miles NNE. are Glencorse barracks (1804-82), originally a depot for French prisoners. Pop. (1841) 907; (1921) 2673.

Peninsular and Oriental Company carries mails and passengers between Great Britain and India, China, Japan, and Australia. The company in its present form was incorporated by royal charter in 1840, although it had then had an existence of three years' duration as the Peninsular Company, which carried mails to Portugal and Spain, and afterwards to Egypt.

Peninsular War (1807-14). The dissensions between Charles IV., king of Spain, and his son Ferdinand gave the Emperor Napoleon I. an opportunity of interfering in the affairs of that country. In pursuance of a treaty ratified on 29th October 1807 with the Spanish king, he had sent an army into Portugal under Junot, by whom Lisbon was seized, and the members of the royal house of Braganza obliged to flee to the Brazils. Ostensibly with the object of supporting Junot's army, other French troops gradually occupied Salamanca, Valladolid, and other important positions in Spain, including Madrid, where Murat was in command. A popular outbreak against the king and his favourite, Manuel Godoy, caused the former to abdicate and his son Ferdinand to assume the crown. But the latter was induced to meet the French emperor at Bayonne, and by him held a prisoner, while his father was again proclaimed king. Riots at Madrid, Toledo, and other places during the spring of 1808 caused the feeble king such alarm that he surrendered his crown to Napoleon, by whom it was bestowed upon his brother Joseph Bonaparte, then king of Naples. He was proclaimed in Madrid on 24th July 1808.

Owing to the large powers of the local junta, and to a decentralised form of government, the action of the capital of Spain had little effect upon that of her provinces, which rose against the French and those who favoured them in all directions. The organised forces of Spain amounted at this time to about 127,000 of all arms, while the French army in the Peninsula, exclusive of Junot's troops in Portugal, consisted of some 80,000 conscripts of various nations, French, Swiss, Italians, Poles, and even Portuguese, soon reinforced by 23,000 fresh troops. Arms, clothing, and money were freely supplied by Great Britain to the patriots of Spain and Portugal, whose numbers rapidly increased. The first operations of the French under Marshal Bessières in the north were uniformly successful, except at Saragossa, which Palafox gallantly held against Lefebvre-Desnouettes. In Catalonia they suffered several defeats, and in Andalusia their general, Dupont, surrendered at Bailén with 18,000 men. The first armed interference of the British in the affairs of the Peninsula was the despatch on 12th July 1808 of Sir Arthur Wellesley with some 30,000 men to Portugal. Landing these troops in Mondego

River, he defeated Laborde at Rorica and Junot at Vimeiro, but then handed over the command to Sir Harry Burrard, who had been sent out to supersede him, to be himself superseded within a few hours by Sir Hew Dalrymple. The latter officer concluded the convention of Cintra with the French commander, who evacuated Portugal by 30th September 1808. The three English generals were examined before a court of inquiry as to this convention, but no further steps were taken.

Sir John Moore, appointed to the command of the British troops (some 30,000) in Portugal on 6th October, had moved to Valladolid by 22d December, effecting a junction with Sir David Baird's division from Coruña. But the Spanish troops had in the meantime suffered a succession of defeats. The French had received large reinforcements; Napoleon himself was in Madrid; and Soult with 60,000 men was in his front. Moore therefore executed a rapid and masterly retreat to Coruña, and there fought a successful battle to cover the embarkation, being mortally wounded himself at the moment of victory. For three months no further steps were taken by the British government, but in December Sir John Cradock was sent out to take command in Portugal, and he took up a position covering Lisbon from the French, now under Marshal Victor. In this position Sir Arthur Wellesley, who was again sent out, found matters on 22d April 1809. The French armies in Spain now numbered nearly 400,000 men, divided into eight corps d'armée, under six marshals and Generals Junot and St Cyr, and operating in the north, south, east, and west. So long as Napoleon himself was able to direct operations they were characterised by unity of purpose and consequent success. Saragossa, attacked for the third time, after a memorable defence of sixty-three days, surrendered to Marshal Lannes on 21st February 1809, and many victories were gained over the Spanish levies; but in Catalonia St Cyr effected comparatively little. The outbreak of war in Germany drew Napoleon to that country in April, and the operations in Spain were somewhat neglected in consequence. The jealousies of the French commanders too prevented any unity of action there.

Sir A. Wellesley first marched against Soult with 20,000 British and 40,000 Spanish under Cuesta, and drove him out of Portugal. King Joseph, with 80,000 men under Marshal Victor, attacked at Talavera on 26th July and suffered a severe defeat. For this victory Sir A. Wellesley was created Viscount Wellington, but, being left without reinforcements, he was obliged to retire to Almeida, while the defeat of the Spanish at Ocana (November 20) enabled the French to overrun the whole of Andalusia, except Cadiz, which still held out. Wellington, foreseeing the impossibility of taking the offensive at that time, prepared during the winter a triple line of earthworks, 29 miles long, from Torres Vedras on the Zizandra to Alhandra on the Tagus, thus covering his base at Lisbon. The French, 65,000 strong, under Masséna, moved against him in the spring of 1810, captured the fortress of Ciudad Rodrigo on the 11th July, and attacked him in the position of Busaco on 29th September. The attack was beaten off, and Wellington, carrying out his preconceived plan, retired slowly into the lines of Torres Vedras, carrying with him as much of the resources of the country as possible, and directing the Portuguese troops to harass the flanks and rear of the French. To avoid starvation Masséna, finding himself unable to attack Wellington's fortifications, and having lost 30,000 men, began to retire on 14th November. Reinforcements having reached Wellington early in 1811, he followed, defeated Masséna at Sabagal on 3d April 1811, and drove him out of Portugal.

Soult in the meantime had defeated the Spaniards at Gebora (February 19), and captured the fortress of Badajoz. He also invested Cadiz, but General Graham with a force of 12,000 men attacked and defeated Marshal Victor's covering force at Barrosa on 5th March, which checked his further movements. Wellington, now designing to march on Madrid and thence against the French line of communications with Bayonne, found it necessary to capture Badajoz and Almeida. Masséna, at the head of 50,000 men, marched to the relief of the latter place. He was checked at Fuentes de Oñoro on 5th May, where a hard-fought battle caused him to retreat and abandon Almeida to the British. Wellington then turned towards Badajoz, which Soult endeavoured to relieve with a force of 23,000 men. The British (7000) and Spaniards (25,000) engaged him on the 16th May in the bloody battle of Albuera, compelling him to retire, which he did in a southerly direction.

Matters were, however, in a very critical state for the British, for the whole of Valencia, Asturias, and Galicia was in the hands of the French, who still had nearly 300,000 men in Spain, and had received no other check except from General Hill in Estremadura and at Tarifa, which fortress repelled Soult. Napoleon, too, threatened to take the field again in person. But this was prevented by the outbreak of war between France and Russia, and early in 1812 Wellington commenced his well-matured plan for freeing Spain from the invader. He captured Ciudad Rodrigo on 19th January, stormed Badajoz on 6th April, and called in Hill's division from the south. Marmont, who had collected his troops about Salamanca, found his flank threatened, and had at first to retire; but on 22d July he turned upon the British, and fought the battle of Tormes, where he was wounded and his army defeated. Wellington entered Madrid on 12th August. King Joseph then withdrew Soult from Andalusia to Valencia, where they joined Suchet. But the Spanish army neglected to guard the British line of communications, and Clausel, who succeeded Marmont, proved so formidable a general that Wellington again found himself obliged to retire towards Salamanca and Portugal.

Events elsewhere, however, lessened the power of his enemies, reducing their numbers to 197,000 men. Jealousy existed between Joseph and his generals; and Wellington's position was strengthened by his appointment as commander-in-chief of the Spanish and Portuguese armies. These now amounted to 200,000 men, of which 70,000 Anglo-Portuguese had been brought into a good state of discipline. He again advanced eastward in the spring of 1813, obliging the French to evacuate Burgos and the line of the Ebro. They attempted to withstand him at Vitoria on 21st June, but sustained a crushing defeat, abandoning all their artillery, stores, and baggage. The blockades of Pampeluna and St Sebastian followed. Joseph, who had quarrelled with Soult, was superseded in the command, which was given to the latter. In spite, however, of great skill on his part, a series of terrible battles in the Pyrenees were uniformly disastrous to him. St Sebastian was taken on 7th October, the victory of Nivelle won on 10th November, and Wellington enabled to base himself on the northern ports. In February 1814 Bayonne was invested, on 27th Soult was defeated at Orthes, and again at Toulouse on 10th April, which city was occupied by the British. But Napoleon had already abdicated, having, after the disastrous Russian campaign, been overpowered by the allied forces of Russia, Prussia, and Austria, by whom France was invaded and Paris taken. See also articles on France, Spain, Portugal, Wellington, Napoleon, Soult, Masséna, Sir John Moore,

Vitoria, Badajoz, Torres Vedras, Coruña, Busaco, &c.; Napier's *History of the Peninsular War* (1828-40), and Oman's (1902 *et seq.*).

Penitential, a book of the codified Canon-law relative to penances and their imposition and relaxation; see CASUISTRY, PENANCE.

Penitential Psalms, seven Psalms, so called as being specially expressive of sorrow for sin, accepted by Christian devotion as forms of prayer suitable for the repentant sinner. They are Psalms vi., xxxii., xxxviii., li., cii., cxxx., and cxliii. of the Authorised Version (vi., xxxi., xxxvii., l., ci., cxxix., and cxlii. of the Vulgate). They were very early set apart, and have a special place in the Roman Breviary; more than one pope attached an indulgence to the recital of them. The most frequent in use is the 51st (50th), the *Miserere* (q.v.).

Penitentiary, the name given to one of the offices of the Papal court, and also to the dignitary (a cardinal, called *Penitentiarius*) who presides over it. The subjects which come under the notice of the penitentiary are all matters relating to the confessional, especially the absolution from sins and from canonical censures, reserved to the pope.—For Penitentiary in another sense, see PRISONS.

Penjdeh, or PANJDEH. See AFGHANISTAN, TURKESTAN.

Penkridge, a town of Staffordshire, on the Penk, 6 miles S. of Stafford by rail, in an agricultural district; pop. 2600.

Penmaenmawr, a watering-place of Carnarvonshire, 4 miles SW. of Conway by rail; pop. 4500. The urban district forms part of the Carnarvon boroughs parliamentary constituency. The mountain of Penmaenmawr, the northern extremity of the Snowdon group, is 1553 feet high; on its summit are the remains of a great British fort, Dinas Penmaen.

Penn, WILLIAM, the founder of the colony of Pennsylvania, was the son of Admiral William Penn, and was born at London, 14th October 1644. His early years were spent partly in Essex and partly in Ireland, where his father had several estates, the gift of Cromwell. Penn studied at Christ Church, Oxford, and while there was converted to Quakerism by the preaching of a disciple of George Fox, named Thomas Loe. He objected personally to attend the services of the Church of England, and to wear the surplice of a student—both of which he considered eminently papistical. A story which, however, cannot be proved, tells how Penn, along with some companions who had also become Quakers, attacked several of his fellow-students, and tore the obnoxious robes from their backs. At all events his persistent nonconformity caused him to be expelled from the university. His father was so excessively annoyed at his conduct that he gave him a thrashing, and turned him out of doors; but he soon afterwards relented, and sent his son to travel on the Continent, in the hope that change of scene and the gaiety of French life would alter the bent of his mind. They failed, however, to effect this, but the youth certainly acquired a grace and suavity of address that he did not before possess. In 1666 the admiral sent him to Ireland to manage his estate of Shangarry in the county of Cork, and act as clerk of the cheque at Kinsale Harbour. Penn acquitted himself to his father's complete satisfaction; for in matters of business he was as practical an Englishman as in religion he was an out-and-out mystic. In the city of Cork, however, he again fell in with Thomas Loe, and for attending a Quaker meeting was, along with others, imprisoned by the mayor, but was immediately afterwards released on appealing to the lord president of the Council of Munster, who was personally

acquainted with him. On his return to England, Penn and his father again quarrelled, because the 'conscience' of the former would not allow him to take off his hat to anybody—not even to the king, the Duke of York, or the admiral himself. Penn was again turned out of doors by his perhaps testy, but assuredly provoked parent. The mother, however, stepped in, and smoothed matters so far that Penn was allowed to return home, and the admiral even exerted his influence with the government to wink at his son's attendance at the illegal conventicles of the Quakers, which nothing would induce him to give up. In 1668, however, he was thrown into the Tower, on account of a publication entitled *The Sandy Foundation Shaken*, in which he attacked the ordinary doctrines of the Trinity, God's 'satisfaction' in the death of Christ, and justification by the imputation of Christ's righteousness. While in prison he wrote the most famous and popular of his books, *No Cross, no Crown*, and *Innocency with her Open Face*, a vindication of himself that contributed to his liberation, which was obtained through the interference of the Duke of York. In September 1670 Admiral Penn died, leaving his son an estate of £1500 a year, together with claims upon government for £16,000. In 1671 the upright but incorrigible sectary was again committed to the Tower for preaching; the Conventicle Act did not touch the case, but, as he refused to take the oath of allegiance, he was sent to Newgate for six months. Here he wrote, besides several manifestoes, three treatises; one of them, entitled *The Great Case of Liberty of Conscience*, is an admirable defence of the doctrine of toleration. After regaining his liberty he visited Holland and Germany for the advancement of Quakerism. The Princess-Palatine Elizabeth, the granddaughter of James I., showed him particular favour. On his return he married, in the beginning of 1672, Gulielma Maria Springett, daughter of Sir William Springett, and for some years thereafter continued to propagate, by preaching and writing, the doctrines of his sect.

Circumstances having turned his attention to the New World, he in 1681 obtained from the crown, in lieu of his monetary claim upon it, a grant of territory in North America. Penn wanted to call it Sylvania, on account of its forests, but the king (Charles II.) insisted on the prefix Penn in honour of his father. His great desire was to establish a home for his co-religionists in the distant West, where they might preach and practise their convictions in unmolested peace. Penn, with several friends, sailed for the Delaware in September 1682, was well received by the settlers, and in November held his famous interview with the Indian tribes, under a large elm-tree at Shackamaxon, afterwards Kensington, and now a part of Philadelphia. He planned and named the city of Philadelphia, and for two years governed the colony wisely and well, but on strictly Puritan principles. Not only Quakers, but persecuted members of other religious sects sought refuge in his new colony, where from the first the principle of toleration was established by law.

Towards the end of the reign of Charles II. Penn returned to England to exert himself in favour of his persecuted brethren at home. His influence with James II.—an old friend of his father's—was so great that many people have never felt quite satisfied about the nature of their relations. The suspicion, however, that Penn allowed himself to be used as a tool by the court is not justified by any known facts, and Macaulay—who with an ungracious animosity has urged the view of his complicity in some of the disgraceful incidents that followed Monmouth's rebellion—has been convicted of haste and inaccuracy in several important par-

ticulars. At anyrate, his exertions in favour of the Quakers were so far successful that in 1686 a proclamation was issued to release all persons imprisoned on account of their religious opinions, and more than 1300 Quakers were set free. In the April following James issued an edict for the repeal of all religious tests and penalties, but the mass of Non-conformists mistrusted his sincerity, and refused to avail themselves of it. After the accession of the Prince of Orange as William III. Penn was twice accused of treason, and of corresponding with the exiled monarch, but was acquitted. In 1690 he was charged with conspiracy, but was not arrested. Nevertheless, in the following year, the charge was renewed. Nothing appears to have been done for some time, but Penn at last, through the kindly offices of his friends, Locke, Tillotson, and others, had the matter thoroughly investigated, and he was finally and honourably acquitted in 1693. In 1692 he had been deprived of his government, but it was restored to him in 1694. In the latter year his wife died, and Penn published a memoir testifying to her great virtues; but in less than two years he married again, his second wife being Hannah Calowhill, of Bristol, a Quaker lady. In 1699 he paid a second visit to the New World, where Pennsylvania required his presence to restore peace and order after the arbitrary behaviour of his deputy. His stay, which lasted two years, was marked by many useful measures, and by efforts to ameliorate the condition of both the Indians and Negroes. He departed for England towards the end of 1701, leaving the management of his affairs to an agent named Ford, whose villainy virtually ruined Penn. When the rogue died he left false claims against his master, which Penn refused to pay, allowing himself to be thrown into the Fleet in 1708. His friends afterwards procured his release, but not till his constitution was fatally impaired; for the last five years of his life his memory and understanding were greatly weakened. He died at Ruscombe, in Berkshire, July 30, 1718. The proprietary claims of his descendants were bought up by a pension of £4000, which in 1884 was commuted (see PENSIONS).

See Macaulay's *History of England*, and J. Paget's *Inquiry into the Evidence of the Charges brought by Lord Macaulay against William Penn* (1858); the Life prefixed to his collected works (2 vols. 1726), and to later issues of 'select works;' and *Lives by Clarkson* (1849). Hepworth Dixon (new ed. 1856), Robert J. Burdette (New York, 1882), Stoughton (new ed. 1883), and J. W. Graham (1917).

Pennalism. See FAGGING.

Pen-names. See PSEUDONYMS.

Pennant, THOMAS, traveller, was born of a good old Welsh family at Downing, near Holywell, Flintshire, 14th June 1726, and was educated at Wrexham, Fulham, and Hadley. In 1744 he went up to Queen's College, Oxford, but he left without taking a degree, having meanwhile, in 1746, ridden down into Cornwall—the first of his many tours. These included visits to Ireland (1754); the Continent (1765), where he made the acquaintance of Buffon and Voltaire; Scotland (1769 and 1772), which 'was then,' he says, 'almost as unknown as Kamchatka, but ever since has been inondée with southern visitants;' and the Isle of Man (1774), besides rambles through England and his native principality. He married twice, in 1759 and 1777; was made member of the Royal Society of Uppsala, an F.R.S., and a D.C.L. of Oxford; and died at Downing, 16th December 1798.

From boyhood a naturalist, for years a correspondent of Linnaeus, Pennant published *British Zoology* (1765-77), *British Quadrupeds* (1771), *Arctic Zoology* (1785), *History of London* (1790), &c.; but to-day he is chiefly remembered by his *Tours*

in Scotland (3 vols. 1771-75) and Wales (2 vols. 1778-81), the former of which works extorted from Johnson the admission: 'He's a *Whig*, sir, a *sad dog*; but he's the best traveller I ever read; he observes more things than any one else does.'

See the amusing *Literary Life of the late Thomas Pennant, Esq., by Himself* (1793), and the memoir prefixed to Sir John Rhys's edition of the *Tours in Wales* (3 vols. Carnarvon, 1883).

Pennatula, an interesting marine animal whose quill-like or feather-like appearance is suggested by the title and by the popular name Sea-pen. It is one of the Alcyonaria, and a good type of the very distinct order Pennatulacea. Like almost all Alcyonarians, it is a colony of polyps or zooids, but, as in other Pennatulacea, the first-formed polyp becomes long and substantial, and turns into a support for all the rest. The lower part of the support forms a stalk which is fixed in the mud on the floor of the sea; the upper part, or rachis, gives off, by budding, numerous secondary polyps or zooids. These are of two kinds—(a) larger 'autozooids,' nutritive and sexual, which fuse together in bilateral leaves or pinnules; and (b) inconspicuous 'siphonozooids,' which have no tentacles, are non-sexual, and occur in crowds on the rachis, serving to keep up internal currents of water. Up the centre of the stalk and rachis there runs a calcareous axis, and around both kinds of zooids, as well as in the flesh between them, there are numerous smooth red needles of lime, which give the whole colony a fine colour. When a living Sea-pen is touched in the dark it becomes brilliantly luminous or phosphorescent, the seat of the light-production being inside the larger zooids. A

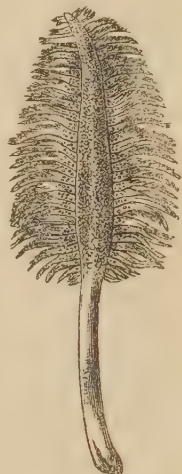


Fig. 1.
Ventral View of *Pennatula phosphorea* (about one-half natural size).



Fig. 2.
Cross section of the axis and one 'leaf' set of fused Polyps (after Marshall). The most ventral polyp is longest and oldest.

common British species, *Pennatula phosphorea*, about 5 inches long, is common off the coasts in water ten to twenty fathoms deep; a magnificent form, *P. grandis*, from the northern waters of both the Old World and the New, may be over 2 feet long. See A. M. and W. P. Marshall, Report on Pennatulids (Birmingham, 1882), Kölliker's 'Challenger' Report (1880), Hickson's 'Siboga' Report (1918).

Pennell, JOSEPH, American etcher and book illustrator, born in 1860 at Philadelphia, has achieved great distinction at exhibitions throughout the United States and Europe, and is represented in most of the notable galleries. He has

also written numerous books including *A Canterbury Pilgrimage* (1885), *Our Sentimental Journey Through France and Italy* (1888), and works on illustration, lithography, and etching. In his *Life of James M'Neill Whistler* (1908), as also in the *Whistler Journal* (1921), he was aided by his wife, Elizabeth Robins Pennell (born at Philadelphia, 1855). Her works, mostly illustrated by her husband, include biographies of *Mary Wollstonecraft* (1884) and *Charles Godfrey Leland* (1906), *French Cathedrals, Monasteries, and Abbeys* (1909), *Our Philadelphia* (1914).

Penni, GIOVANNI FRANCESCA, usually called *Il Fattore*, a painter of the Umbrian school, born at Florence probably in 1496, died at Naples in 1536. He was a pupil and favourite of Raphael, and most of his works are copied from his master.

Pennine or PENNINITE, mineral of the chlorite group, found in the Pennine Alps. A hydrous silicate of aluminium, magnesium, and iron, it occurs in long green rhombohedra, pleochroic from clear green to brown or reddish.

Pennine Alps. See ALPS.—For the Pennine Range, see GREAT BRITAIN.

Pennisetum, a genus of grasses, natives of Africa (tropical and subtropical), Southern Europe, Asia, and America. Some are cultivated as cereals. See MILLET.

Pennon. See FLAG.

Pennsylvania, a north-eastern state, the second in population, of the United States of America; area, 45,215 sq. m.

The Appalachian (q.v.) system of mountains crosses Pennsylvania from north-east to south-west. It here attains its greatest breadth, but none of the ridges reach any great altitude, though a few peaks among the Alleghanies attain a height of more than 2500 feet. Between the Blue or Kittatinny Mountains on the east and the higher Alleghany range on the west lie numerous minor forest-clad chains, interspersed with picturesque valleys, many of them rendered exceedingly fertile by the limestone bed which produces their soil. The surface of the state is naturally divided into three sections, the low district south-east of the mountains, the mountainous region, and the broken hilly plateau in the west. The triangular south-eastern part of the state consists of a narrow level plain near the Delaware River, with an elevation of not more than 100 feet above the sea, merging into a higher rolling region which extends to the base of the mountains. From Canada to the southern limit of the Appalachians extends an almost continuous valley, lying east of the main ranges, and separated from the coast region by the skirting south-eastern ridge. This 'great valley' is throughout its whole extent protected by a southern or eastern wall, except in Pennsylvania, where, through a break of about 50 miles, the Cumberland Valley is without a barrier toward the sea, and the fertile calcareous soil spreads out over Lancaster and parts of York, Berks, and Chester counties, making this one of the best farming regions of the country. The mountain region covers a belt which in places is more than 100 miles in width, and embraces about one-fourth of the area of the state. More than twenty ranges have been named, and the whole region is justly celebrated for its scenery. The rivers have in various places cut gaps through the ridges, thus affording passages for travel and commerce. Many of these water-gaps are exceedingly picturesque, and are much visited by tourists. The western plateau region comprises about one-half the area of the state; it is crossed by a few ridges, contains some isolated peaks, and is deeply furrowed by

watercourses. Much of this section is heavily wooded.

The geology of Pennsylvania is particularly remarkable on account of the great development of the different periods of the Palæozoic era. The formations in the south-eastern part of the state are in dispute, but the vicinity of Philadelphia is generally admitted to be Archæan, and a little farther north is a belt of Quaternary alluvium. The Silurian deposits, which extend along the Hudson River in New York, continue into Pennsylvania and form the Kittatinny Mountains. The Devonian area of New York also covers a large part of the northern and north-eastern portion of Pennsylvania. West of the Kittatinnies the mountains present alternate Silurian and Devonian formations. West of the Alleghanies, throughout the great bituminous coalfields, the rocks are mainly conglomerate. The mountains and the western plateau region were originally highly elevated tracts, and have suffered to a vast extent from erosion. They have contributed nearly all the material for building up the lowland regions of New Jersey, Delaware, Maryland, and Virginia, and for the formation of the Lower Mississippi valley. The geological disturbances have been greatest and most frequent in the eastern part of the state, where the beds of anthracite coal occur at all angles and in some cases in a vertical position, whereas the bituminous coal-beds of the western field are nearly horizontal. The breaking of the strata and the enormous pressure to which the eastern coal-deposits have been subjected has resulted in giving Pennsylvania the most valuable anthracite basins of the country. It is a notable fact that the percentage of gas in the coal regularly increases from the eastern ranges to the western coal-measures. Although Pennsylvania is one of the richest mineral regions of the world, there is no department of her mineral wealth in which she exercises such exclusive control as in her deposits of anthracite coal. The bituminous coal is excellent in quality and variety, and the amount is practically inexhaustible, but the western coalfields are only part of a vast deposit which extends westward and southward into adjoining states. The iron ore which has contributed so materially to her wealth and prosperity is mined from an extensive belt which reaches on the north to Canada and on the south to Alabama. Even the petroleum and natural gas which are such important products of western Pennsylvania are found in other sections; but as yet her anthracite coal-basins are without a rival. The anthracite tract covers an area of 472 sq. m., and is situated in the highland district between the Delaware and Susquehanna rivers. The most important deposits lie in three great fields, known as the southern, middle, and northern fields. It is estimated that with an output of 100,000,000 tons per year the anthracite mines would not be exhausted for two centuries. In 1880 the output was 28,649,811 tons; in 1923, 92,663,854 tons. Pittsburgh is the centre of the bituminous region, and the production in 1923 was 169,044,178 tons. The proximity of coal and iron in such vast quantities has made Pennsylvania a great mining and manufacturing state. Though much surpassed by the Lake Superior region in the mining of iron ore, Pennsylvania still ranks high in the manufacture of pig-iron.

The successful boring for Petroleum (q.v.) in 1859 produced an excitement which was not surpassed even by the discovery of gold in California. Fortunes were made and lost in a day. The mining of petroleum and the manufacture of the various articles produced from it have created new and important industries. The utilisation of natural gas for heating and manufacturing purposes also

for a time modified methods of living in western Pennsylvania. There are large zinc-works at South Bethlehem, and nickel is obtained in Lancaster county. Copper is mined to a limited extent; slate, marble, and limestone are largely quarried; and salt-springs abound in the petroleum region. There are many medicinal springs.

The eastern part of the state is drained by the Delaware and its tributaries the Schuylkill and Lehigh. The Susquehanna, with its affluents the North Branch, the West Branch, and the 'beautiful Juniata,' occupies the central drainage area. The Susquehanna is too rapid and too shallow for navigation, but it is used for floating quantities of timber, and coal, lumber, and other products are carried by the canals along its banks. A portion of the north-western region belongs to the valley of the Genesee, but the greater part of western Pennsylvania is drained by the Alleghany and Monongahela rivers, which, uniting at Pittsburgh to form the Ohio, furnish the state with a great highway of inland navigation. Pennsylvania has 16,000 miles of railroad and 800 miles of canals. For the 'Pennsylvania system,' see PRISONS.

In the mountains and wooded sections the smaller wild animals are still abundant. The panther, wild cat, and black bear are occasionally seen, and in some places the deer and wild turkey are not uncommon. The climate is healthful, but subject to extremes, and much modified by differences of elevation. Heavy snows fall on the mountains in winter, and the rivers of the western half of the state are often flooded in spring and summer (see e.g. JOHNSTOWN). Nearly one-fourth of the state is wooded; lumbering is one of the sources of wealth in the north, and farther south and west are great forests of hemlock, which maintain some of the largest tanneries in the world. In the Pocono swamps and plateaus, between the Wyoming and Kittatinny Mountains, the virgin growth of beech is known as the 'Shades of Death.' The soil, except in the mountains, is rich and fertile. Agriculture is a leading occupation, and in many crops Pennsylvania holds a high rank. The mountain regions and the western plateau are well suited for grazing, and the horses, cattle, sheep, and dairy products are noted for their excellence. The most important industries of Pennsylvania are mining and manufacturing. The amount of capital invested is greater than in any other state, and in the value of her manufactured products Pennsylvania is surpassed only by New York. Her commerce, both foreign and domestic, is very extensive. Shipbuilding is an interest of importance; river-steamers are built at Pittsburgh, and the perfection reached in the construction of iron steamships on the banks of the Delaware has given to that stream the title of the 'Clyde of America.'

History.—The first permanent settlement in the state was made in 1643 by Swedes, at the present site of Chester. Their colony of New Sweden was twelve years later conquered by the Dutch. In 1664 the English obtained possession, and the territory now called Pennsylvania was in 1681 granted by Charles II. to William Penn (q.v.). The friendly relations already existing between the whites and the Indians were re-established by Penn by a treaty, which was faithfully observed by both parties for more than fifty years. During the French and Indian wars, however, and again during the war of the revolution, the frontier settlements were attacked. In the struggle for independence and in the civil war Pennsylvania took a prominent part, and witnessed a number of the most famous battles and events connected with each. Schools were established by the earliest settlers, and a system of education formed part of the original scheme of government prepared by William Penn. The pub-

lic schools now are attended by over one and a half million pupils, and there are more than thirty universities and colleges in the state. A system of Soldiers' Orphan Schools was established in 1865, and there are numerous other charitable and educational institutions. There is a large foreign element in the population; many of the miners and ironworkers, especially, are of Irish, Hungarian, and Italian birth, and serious riots have not seldom occurred (see also MOLLY MAGUIRES). Among the farmers a very large proportion are of German descent, and still speak the *patois* known as 'Pennsylvania Dutch.' This belongs to the South German dialects, and is most closely related to the Pfälzisch; it preserves many old and curious German words, but is also interspersed more or less with Germanised English words, according to the locality. There are perhaps two million people around Philadelphia and New York who speak the *patois*; and in the country south-east of the Alleghenies they have their own dialectal newspapers. Specimens (spelt phonetically) of the dialect may be given: 'Ich trink tschenerli rooter wei' (I generally drink red wine); and 's wetter iss d'r gants daak schee gwest' (the weather has been fine the entire day). See Prof. S. S. Haldeman's *Pennsylvania Dutch* (1872); H. H. Reichard, *Pennsylvania-German Dialect Writings* (Lancaster, Pa. 1918); also A. J. Ellis's *Early English Pronunciation* (part iv. 1875).

The state contains 67 counties, and returns 2 senators and 36 representatives to congress. Philadelphia, the metropolis of the state, is the leading manufacturing city of the Union and ranks third in population (1,823,158 in 1920). Among other important cities are Pittsburgh, with which the large adjoining city of Allegheny is combined (588,193), Scranton (137,783), Reading (107,784), Erie (93,372), Harrisburg, the capital (75,917), Wilkes-Barre (73,833), Allentown (73,502), Johnstown (67,327), Altoona (60,331), Chester (58,030), Lancaster (53,160), Bethlehem (50,358). Pop. of the state (1850) 2,311,786; (1900) 6,302,115; (1910) 7,665,111; (1920) 8,720,159.

Penny (O.E. *pening* or *pending*; apparently from *pand*, 'a pawn,' Ger. *pfand*, Lat. *pannus*), a British coin, first mentioned in the laws of Ina, king of the West Saxons, about the close of the 7th century. It was at this time a silver coin, and weighed about 22½ troy grains, being thus about 1/10th of the Saxon pound-weight. This relation to the pound-weight is evidently derived from the usage of the early Franks, who retained the Roman division of the *libra* into 20 *solidi*, and the *solidus* into 12 *denarii* (the denarius being thus the 240th part of the *libra* or pound). See MARK. Halfpence and farthings were not coined in England till the time of Edward I., but the practice previously prevailed of so deeply indenting the penny with a cross mark that the coin could be easily broken into two or four parts as required. Silver farthings ceased to be coined under Edward VI., and silver halfpennies under the Commonwealth. Up to this time the penny had steadily decreased in weight; and under Elizabeth it was finally fixed at 7½ grains, or 1/16 of an ounce of silver, a value to which the subsequent copper pennies closely approximated. In 1672 an authorised copper coinage of pence, halfpence, and farthings was established. In 1797 twopenny pieces were coined, but were soon withdrawn. The penny of the present bronze coinage, first issued in the end of 1860, is of only about half the value of the old copper penny and as metal is worth only about one-seventh of a penny. The German *pfennig* was also originally a silver coin, bearing the same relation to the German pound of silver as the English penny to its pound. Now the nickel ten-pfennig

piece is $\frac{1}{10}$ th of the mark. The old Scots penny was only $\frac{1}{12}$ th of the English one, as the pound Scots and the Scots shilling were also $\frac{1}{12}$ th of the English coins of the same names. In the 12th century it was made very broad and thin.



Pennyroyal (*Mentha Pulegium*). other species occur locally.

Pennyroyal (*Mentha pulegium*), a species of Mint (q.v.), a native of Europe and western Asia, abundant in England and in some parts of Ireland, not found wild in Scotland, though sometimes grown there in gardens for its reputed medicinal

qualities. It enjoys a high popular reputation as an emmenagogue, but no dependence may be placed in its efficacy. The name pennyroyal is given in North America to a small plant, *Hedeoma pulegioides*, allied to the mints, and having, like them, a pleasant aromatic smell and a warm pungent taste. It is much in use in domestic medicine, in the form of a warm infusion, to promote perspiration and as an emmenagogue.

Penny Weddings was the name given to festive marriage ceremonials in Scotland at which the invited guests made contributions in money (seldom more than 1s. each), to pay the general expenses, and leave over a small sum, which would assist the newly-married pair in furnishing their dwelling. This practice was prevalent in the 17th century; and, as leading to 'profane minstrelsing and promiscuous dancing,' was denounced by an Act of the General Assembly, 1645, as well as by numerous acts of presbyteries and kirk-sessions about the same period.

Pennywort. For Ivy-leaved Toadflax, see TOADFLAX; for Cotyledon, NAVELWORT.—Marsh or Water Pennywort is a small British umbelliferous plant, *Hydrocotyle vulgaris*, a low herb with roundish peltate leaves, growing in marshy places. Totally unlike most members of its family in superficial appearance, it has its flowers few in number and almost sessile, so that the umbel is almost reduced to a head. The stem is creeping, rooting at the joints. Other species of *Hydrocotyle* are distributed over temperate and tropical regions.

END OF VOL. VII.





